PROCEEDINGS

OF THE

Biological Society of Washington

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1959

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PUBLICATION NOTE

By a change in the By-Laws of the Biological Society of Washington, effective March 27, 1926, the fiscal year now begins in May, and the officers will henceforth hold office May to May. This, however, will make no change in the volumes of the Proceedings, which will continue to coincide with the calendar year. In order to furnish desired information, the title page of the current volume and the list of newly elected officers and committees will hereafter be published soon after the annual election in May.

All correspondence should be addressed to the Biological Society of Washington, % U. S. National Museum, Washington, D. C.

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Errata

In the paper by Donald F. Hoffmeister and Luis de la Torre, Two New Subspecies of *Peromyscus difficilis* from Mexico, the last two lines on page 167 and the first line on 168 should be the fourth, fifth and sixth lines of paragraph 2, page 168.

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PROCEEDINGS

The two meetings during 1959 were held in Room 43 of the United States National Museum.

1027th Meeting — May 25, 1959
EIGHTIETH ANNUAL MEETING

President Owens in the chair; 21 members present.

The reports of the Recording Secretary, Corresponding Secretary, Treasurer, Committee on Publications, and Committe on Communications were presented.

The following officers and members of council were elected: President, Howard B. Owens; Vice Presidents, D. H. Johnson, A. C. Smith, C. F. W. Muesebeck, and Allen J. Duvall; Recording Secretary, S. F. Blake; Corresponding Secretary, John L. Paradiso; Treasurer, B. R. Feinstein; Members of Council, J. P. E. Morrison, V. S. Schantz, L. M. Russell, and C. O. Handley, Jr.

The business meeting was followed by two papers, as follows: Dr. R. J. Downs, of the Pioneering Laboratory in Plant Physiology, U. S. Dept. Agriculture, spoke on recent developments in the control of germination, growth, and flowering of plants by low intensity light. Dr. T. E. Hinton, of the Farm Electrification Research Laboratory, U. S. Dept. Agriculture, spoke on current research on various attractants to economically important insects.

1028th Meeting — December 11, 1959

President Owens in the chair; 32 members present.

New members elected: Walter C. Brown, R. E. Crabill, Jr., W. T. Keeton, Jr., L. M. Smith, T. J. Spillman, and H. E. Vible.

Dr. Blake exhibited some lichens from the Near East which he thought might be connected with the "manna" of the Biblical story of the Exodus.

Formal Communication: Dr. C. O. Handley, Jr., U. S. National Museum: Experiences in collecting mammals in the Republic of Panama.

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PROCEEDINGS

OF THE

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THE SCIENTIFIC NAMES OF THE SPECIES OF CAPUCHIN MONKEYS (*Cebus* Erxleben).

By Philip Hershkovitz

Curator of Mammals, Chicago Natural History Museum

The correct scientific name for each of the four recognized species of capuchin monkeys is (1) *Cebus apella* Linnaeus, 1758, for the tufted (or crested) capuchin; (2) *Cebus capucinus* Linnaeus 1758, for the black white-fronted capuchin; (3) *Cebus albifrons* Humboldt, 1812, for the brown pale-fronted capuchin; (4) *Cebus nigrivittatus* Wagner, 1848, for the brown, dark-limbed capuchin with the small wedge-shaped cap. It appears that the first three names are now firmly established. The validity of the fourth, *Cebus nigrivittatus,* however, has been questioned in recent years, most lately by Hill (1958:316).

The first attempt to nullify the name *nigrivittatus* Wagner as employed in my (1949) review of the genus *Cebus,* was made by Tate (1954:415). This authority argued that the name *Cebus apella* should have been used instead for the brown untufted capuchin with wedge-shaped cap. This identification was shown to be erroneous (Hershkovitz, 1955:449), and it is doubtful that anyone now seriously believes that *Cebus apella* is anything but the tufted species of *Cebus.*

The next effort to invalidate the name *Cebus nigrivittatus* was made by Husson (1957). According to my esteemed colleague, the name had been secondarily homonymized with that of a squirrel monkey, *Chrysothrix nigrivittatus* Wagner, by Pusch (1941:145), hence must be permanently suppressed. This concept of the status of secondary homonyms was disputed by me in 1949 (pp. 345, 368, 417-418) and again in 1958 (1958a: 54; 1958b:1242) and is repudiated in the as yet unpublished London (1958) draft of the International Rules of Zoological Nomenclature.

The latest pronouncement on the subject is by Hill (1958:318) who decided "that the scientific name of the Weeper Capuchin [i.e. *Cebus nigrivittatus*] should correctly be *Cebus griseus* F. Cuvier 1824 (1819)" Judged by the framing of his reference Hill based his proposition solely on a misinterpretation of a condensed citation worded "*sajou mâle,* Cuvier, 1824, livr. 12, pl., November 1819 (*Cebus griseus* F. Cuvier)" in my (1949:347-348) synoptic synonymy of Cebus *nigrivittatus.* In the *Histoire Naturelle des Mammifères* by E. Geoffroy St.-Hilaire and F. Cuvier (1818-1842) where the names in question first appear, the *sajou* *mâle* is described and figured in *livraison* 12 under its vernacular name only. The *livraison* was separately published and issued in 1819. It was then bound with 19 other *livraisons* to form the first of seven volumes and dated 1824. It is not until the end of volume 7, on page 2 of the *Table générale et méthodique de toutes les espèces figurées et décrites dans l'Histoire Naturelle des Mammifères,* that the technical name *Cebus griseus* for the *sajou mâle* appears for the first time. The *Table* was separately issued some time after the publication of the final (67th) *livraison* in April 1833. Volume 7 itself is dated 1842, and this is the date taken for all technical names for animals described in the various *livraisons* under vernacular names only. It is also to be noted that the *Table* and all other indices of the *Histoire Naturelle des Mammifères* were compiled and published by the son of Frédéric Cuvier after the death of his father in 1838. Thus, the first technical name based on the *sajou mâle* F. Cuvier, 1819, is *Cebus griseus* F. Cuvier, *fils*, 1842.

As happens so often, the belated appearance of the *Table* permitted other authors to publish names which anticipated or preoccupied practically all those proposed by F. Cuvier, *fils*. Thus *Cebus griseus* F. Cuvier, *fils*, 1842, for the *sajou mâle,* is invalidated by *Cebus griseus* Desmarest, 1820, based primarily on the *sajou gris* of Buffon (1767). This last has been positively identified as a tufted capuchin equal to *Cebus apella* Linnaeus (cf. Hershkovitz, 1949:339, 340 and footnote 1). It is true that Desmarest referred the *sajou mâle* of Cuvier to his *Cebus griseus,* but ''*avec doute*'' (p. 82) and only as a ''variété.'' Under no consideration can Cuvier's *sajou mâle* be treated as a type of *Cebus griseus* Desmarest.

Another capuchin with a comparable history is described by F. Cuvier in *livraison* 51, published September 1825, under the heading *sajou à pieds dorés, ou chrysope.* At the end of the article, Cuvier suggests that ''*le nom chrysopes pourra servir à le désigner dans les catalogues méthodiques.*'' Nowhere in the text is the combination of *chrysopes* with a definite generic name either used or implied. The first valid name, i.e. binomial, for the *chrysope* is *Cebus chrysopus,* proposed by Lesson in 1827. F. Cuvier, *fils* used exactly the same technical name in the *Table* of 1842. Like his translation of *chrysopes* or *pieds dorés,* as ''goldenhanded,'' I cannot follow Hill's (1955:54) use of *chrysopes* [sic] as a technical name in combination with *Cebus* dated from Cuvier, 1825, or his reasons for the identification of a mounted specimen without data in the Royal Scottish Museum, with the *sajou a pieds dorés* of F. Cuvier.

All evidence, viewed in the light of taxonomic principles and rules of nomenclature, requires that the name for the dark brown untufted capuchin with the small triangular or wedge-shaped cap remain *Cebus nigrivittatus* Wagner, 1848.

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TWO NEW GENERA OF SOUTH AMERICAN RODENTS (CRICETINAE)

By Philip Hershkovitz
Curator, Division of Mammals

Descriptions of the following genera are based on specimens preserved in the British Museum (Natural History) and in the Chicago Natural History Museum.

Thanks are expressed to the authorities of the British Museum for permission to study the collection of mammals in their charge and for the many courtesies shown me.

Examination of material in the British Museum was made possible by a grant from the National Science Foundation.

WIEDOMYS (new genus)

Type species—Mus pyrrhorhinos Wied-Neuwied.

Characters.—A small, scansorial, red-nosed, red-eared, red-rumped mouse; tail about two-thirds total length, fifth hind toe nearly as long as fourth, claws short and recurved; skull with unexpanded zygomatic arches, non projecting anterior zygomatic plate, divergent sided and ridged supra-orbital region well developed interparietal, greatly inflated bullae, long incisive foramina, long and wide bony palate; incisors unspecialized, molars bunobrachyodont, with mesoloph obsolescent. mesolophid absent, anterior median fold well defined in upper and lower first molars.

Remarks.—This monotypic genus is named in honor of Prince Maximilian zu Wied-Neuwied, the discoverer of the type species and one of the great naturalist-travelers of the nineteenth century.

The following description of *Wiedomys* and comparisons with other forms are made in terms of its type and only known species. For explanations of cranial and dental terms, see Hershkovitz (1959, Fieldiana, in press).

Wiedomys pyrrhorhinos Wied-Neuwied

Mus pyrrhorhinos Wied-Neuwied, 1821, Reise nach Brasilien, **2**:177 footnote). Schinz, 1821, Cuvier Das Thierreich. **1**:228—BRAZIL: Bahía.

Mus pyrrhorhinus [sic], Wied-Neuwied, 1823, Abbild. Naturg. Brasil., Lief. 3, pl. 2 (animal). Lund, 1841, Afh. Vid. Danske Selsk. Nat. Math., **8**:276—BRAZIL: Lagôa Santa, Minas Gerais. Lesson, 1842, Nouv. Tabl., Reg. Anim., p. 142. Goodwin, 1953, Bull. Amer. Mus. Nat. Hist., **102**:300—type history.

M[*us*] *pyrrhorhinus* [sic], Wied-Neuwied, 1826, Beitr. Naturg. Brasil., **2**:418—BRAZIL: Bahįa; characters.

Hesperomys pyrrhorhinus [sic], Burmeister, 1854, Syst. Uebers. Thiere Brasil., **1**:172—BRAZIL: Sertong von Bahįa. Thomas, 1886, Ann. Mag. Nat. Hist., (5), **18**:421—part, regarded as referrable to *Oryzomys.*

[?] *Oryzomys pyrrhorhinus* [sic], Bertoni, 1914, Descr. Fis. Econ. Paraguay, p. 73—PARAGUAY: Sina, Trinidad.

Oryzomys pyrrhorhinus [sic], Thomas, 1928, Ann. Mag. Nat. Hist., (10), **1**:155—BRAZIL: distribution (Ceará to Minas Gerais); characters; comparisons. Ellerman, 1941, Families and genera of living rodents, **2**:341, 342, 345, 349—characters; comparisons; relationships.

Orizomys [sic] *pyrrhorhinus* [sic], Moojen, 1943, Bol. Mus. Nac., Rio de Janeiro, Zool., no. 5:11—BRAZIL: Poção, Pernambuco; Ceará; Monte Alegre; habits.

[*Rhipidomys*] *pyrrhorhinus* [sic], Tate, 1932, Novit. Amer. Mus., no. 581:4, 5, 6, 19—taxonomic history.

[*Oecomys*] *pyrrhorhinus* [sic], Osgood, 1933, Journ. Mammal., **14**:370 BRAZIL: Ibiapaba, Piauhy; Lamarão. Bahįa; characters; taxonomic history.

Thomasomys pyrrhorhinus, Moojen, 1952, Os roedores do Brasil, p. 61—BRAZIL: Ceará; Pernambuco; Paraiba do Norte; Barreira, Bahįa; Minas Gerais; northern Mato Grosso; Paraná; Rio Grande do Sul; breeding and nesting.

Thomasomys pyrrhorhinus [sic], Vieira, 1955, Arq. Zool., São Paulo, **8**:413—listed.

Type.—Female, skin only (tail missing), mounted, American Museum of Natural History, no. 574; collected by Prince Maximilian zu Wied-Neuwied and acquired with the Maximilian collection.

Type locality.—"Riacho da Ressaque," i.e., Rio Ressaro, a small tributary of the Guaviao (which flows into the Rio Contas), southern Bahįa, eastern Brazil.

Distribution.—Eastern Brazil, from the States of Piauhy and Ceará south into Rio Grande do Sul, west into Minas Gerais and, possibly, Mato Grosso and Paraguay.

External characters.—Size small, about equal to *Oryzomys bicolor* but head and tail proportionately longer; pelage long, loose, coarse; back mixed buffy and brown; sides buffy; nose, eye ring, preauricular tufts, inner and outer sides of ears, outer sides of fore and hind limbs, and rump bright reddish-orange in marked contrast with pale coloration of remainder of body; underparts sharply defined white; tail averaging two-thirds total length of animal, the fine scales not hidden by the hair, gray-brown above, somewhat paler beneath, pencil absent; hind feet buffy above, claws short, recurved and hidden by digital tufts; fifth hind toe, less claw, reaching end of second phalanx of fourth, first hind toe less claw, extending a short distance beyond base of second digit; plantar surface of heel hirsute, sole with six tubercles, the four postdigital tubercles enlarged; mammae, 1-2 = 6 (fide Wied-Neuwied).

Color of young like that of adult but with paler reddish-orange markings.

Cranial characters.—Sides of supraorbital region weakly ridged and divergent posteriorward; mid-transverse width of paired frontals more than greatest width of rostrum; nasals relatively short, not markedly tapered behind, the proximal tips rounded or truncate and approximately in line with fronto-maxillary sutures; anterior zygomatic plate more or less vertical in position and hardly visible when skull is viewed from directly above; antorbital foramen only slightly excised on dorsal surface; fronto-parietal suture crescentic; braincase moderately inflated, not vaulted; interparietal large; hamular process of squamosal long, slender and clearly defined by large temporal vacuities; incisive foramina well open and extending behind to plane between procingulum and protocone of first molar; palate between first molars slightly wider than alveolar length of m^1; posterolateral border of palatine extending well behind third molar and marked by one or two pits; mid-posterior palatal border sub-concave or V-shaped, the notch extending quite or slightly anteriad to posterior plane of third molars; width of mesopterygoid fossa at base of hamular processes less than width of parapterygoid fossa measured at same plane; paired hamular processes of pterygyoids parallel-sided; sphenopalatine vacuities large; bullae greatly inflated, depth of either bulla three times or more distance between both bullae measured along basioccipital suture; length of bulla, less tube, subequal to length of incisive foramina and greater than alveolar length of molar row; coronoid process short; capsule encasing posterior tip of lower incisor forming a ridge but not projecting as a blunt spinous process.

Dental characters.—Upper incisors opisthodont, ungrooved; molar rows parallel-sided; upper molars bunobrachyodont, the inner and outer cusps of equal height, crowns of lower molars bilevel, i.e., inner cusps crested, outer lower, but not plane; anteromedian fold of m $\frac{1}{1}$ well defined, procingulum of upper with two fully developed conules, the inner about one-half size of outer, procingulum of lower first molar with subequal conules; major fold widely trenchant, with enterostyle (id) present in first and second molars, an enteroloph (ectolophid) present in first molars; first minor folds present in all molars; second secondary folds absent in all but newly erupted m $\underline{1\text{-}2}$; mesoloph low and obsolescent, mesostyle present and fused with paralophule; mesolophid absent, mesostylid and/or entolophid present.

Systematic position and comparisons.—Obsolescence or absence of the mesolophostyle (id) separates *Wiedomys* from all oryzomyine and true peromyscine (including *Rhipidomys* and *Thomasomys*) rodents. The narrow mesopterygoid fossa, long wide palate with posterolateral palatine pits, well developed interparietal, simplified molar enamel pattern and special details of external structure place *Wiedomys* near such phyllotine genera as *Calomys* (=*Hesperomys*) and *Eligmodontia.* Wied's red-nosed mouse, however, is separated from all phyllotines by its color pattern, slight dorsal excision of the antorbital foramen and somewhat less specialized molars. It differs from the specialized vole-like and shrew-like mice composing the *Akodon*-group by color pattern, long tail, short, recurved claws, short rostrum, greatly inflated bullae, ridged supraorbital edges, fully developed interparietal and other characters of lesser note.

Externally, *Wiedomys pyrrhorhinos* is remarkably similar to the possibly sympatric *Thomasomys oenax* and has been confused with it (Thomas, 1886, Ann. Mag. Nat. Hist., [5], **18**:421). The latter is much larger with underparts not well defined from sides, the basal portions of the hairs dark gray, plantar surface of heel bare, supraorbital region parallel-sided and square, not ridged. Also, a functional mesolophostyle (id) is present in all species of *Thomasomys*. Wied's red-nosed mouse has also been treated as a *Rhipidomys* and as an *Oecomys*, a subgenus of *Oryzomys*. Resemblances between these small arboreal cricetines are parallelisms common to many climbing, tree nesting rodents, irrespective of ancestry. Ellerman (1941, Families and genera of living rodents, 2: 342, 349) classified *pyrrhorhinos* as a "species group" of *Oryzomys*. He pointed out, however, that the mouse was unlike any *Oryzomys* he had seen and that in a final revision it "will prove to be the type of a very distinct group or probably subgenus."

Habitat and habits.—The red-nosed mouse is an inhabitant of the scrub forests or *caatingas* of northeastern Brazil. Wied-Neuwied saw the animal, a female with five young, in an abandoned nest of a thorn bird, *Anabates rufifrons*. The nest of this bird, which may be from three to six feet long, is made of dry intertwined branches and attached to lianas. Moojen (1943, Bol. Mus. Nac., Zool., 1:11; 1952, Os roedores do Brasil, p. 62) also reports finding the mouse in old bird nests, including termite cartons previously excavated and occupied by parrots. In one such, A. L. Carvalho (in Moojen) counted 8 adults and 13 young of different sizes. Moojen adds that the mouse makes its own nest too, in stone walls, hollow trunks of trees, canopies of thick shrubs and low palms. Dry leaves, grass or cotton fibers are used in the construction. Up to six young, usually five, are produced in a litter. The mouse was observed to be an agile climber. According to Moojen, it is called *rato-de-fava* (bean rat) in Pernambuco, *rato-de-palmatorio* (palmatory rat) in Paraiba. Wied-Neuwied used the name *catinga-mouse* for the one he described from Bahía.

Measurements (in millimeters)—Of two adults, one from Lamarão, Bahía, the other from Ladeira Grande, Ceará: Head and body, 105, 100; tail, 160, 193; hind foot, dry (with claw), 25, 26; ear, from notch, 18, 20; greatest length of skull, 30.0, 29.7; zygomatic breadth, 14.4, 15.1; interorbital constriction, 4.7, 4.6; midfrontal breadth, 6.4, 6.0; greatest width of rostrum, 5.2, 5.2; nasals, 11.0, 10.4; braincase, 13.0, 12.8; interparietal, 4.0 × 10.4, 3.8 × 9.3; incisive foramina, 6.8, 6.6; diastema, 7.0, 7.1; width of zygomatic plate, 2.5, 2.5; length (less tube) and depth of bullae, 6.3 × 5.4, 6.4 × 5.3; alveolar length of molar row, 4.7, 4.7. Comparable measurements of the type, from the original description: Head and body, 117; tail, 202.

Specimens examined.—Three. Lamarão, Bahía, 1 (British Museum [Natural History]); Ladeira Grande, Ceará, 1 (British Museum [Natural History]); Ibiapaba, 1, juvenal (Chicago Natural History Museum).

PSEUDORYZOMYS (new genus)

Type species.—*Oryzomys wavrini* Thomas (1921, Ann. Mag. Nat. Hist. [9], **7**:177).

Characters.—The type and only known species of the genus resembles *Oryzomys palustris* in size, external appearance and, very probably, in habits. Cranial and dental characters of *wavrini*, however, prove it to be more nearly related to *Phyllotis* than to any oryzomyine. A monograph of the phyllotine rodents, including a fully documented account of the characters and systematic position of *Pseudoryzomys* will appear in a forthcoming number of Fieldiana.

Remarks.—In addition to the type of *Pseudoryzomys wavrini* from Jesematathla, Chaco Boreal, Paraguay, there is another specimen in the British Museum from Misión, Chaco Boreal, and a third, in the Chicago Natural History Museum, from Tacaagle, Rió Porteño, Formosa, Argentina.

A Note on *Rhipidomys macconelli* de Winton.

In comparing *Wiedomys pyrrhorhinos* (see above) with species of *Rhipidomys* and *Thomasomys* in the British Museum, it was found that the Mt. Roraima specimen originally described as *Rhipidomys macconelli* by de Winton (1900, Trans. Linn. Soc. London, [2], **8**:52) is correctly allocated to genus. It is a member of the *Rhipidomys latimanus* group and most nearly related to *R. fulviventer.* For no apparent reason, *R. macconelli* was transferred to *Thomasomys* by Thomas (1917, Ann. Mag. Nat. Hist., [8], **20**:195) where it has been kept by all subsequent compilers.

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DESCRIPTION OF THE APTEROUS FORM OF CINARA PINIVORA (W)

F. C. Hottes

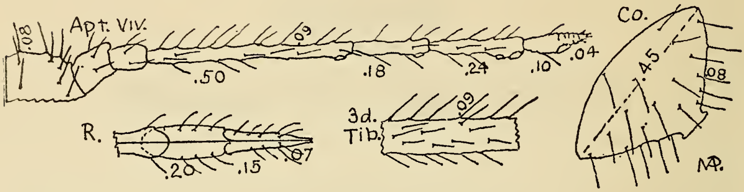
In 1919 Wilson described *Cinara pinivora* from alate viviparous females taken in New York. H. E. Milliron in 1957 took apterous viviparous females of this species which have been made available to me for description by the United States National Museum.

Cinara pinivora (Wilson)

Apterous viviparous female.

Size and general color.—Length from vertex to end of anal plate varying from 2.55 — 3.37 mm. Color of living specimens not recorded, as represented by cleared mounted specimens as follows: head and prothorax brown, dorsum of meso and metathorax with large pigmented areas, the area on the metathorax more or less divided in the middle. First antennal segment concolorous with head, second antennal segment not nearly so dark. Third fourth and fifth antennal segments pale with apical portions pale brownish, the brown being more extensive on the fifth. Sixth antennal segment brown. All femora pale on basal halves, shading to brownish at apex the brown being more extensive on the femora of the metathoracic legs. Tibiae brown near base, this followed by an extensive pale dusky region, which shades into brown about the middle, the pale area is more extensive on the pro and mesothoracic tibiae. All tarsal segments brown. Mid dorsal region of abdomen with two rows of irregular margined pigmented spots, arranged on a pale base, which has in addition a few small irregular pigmented spots, not in rows. Cornicles same color as pigmented areas in dorsum, cauda and anal plate only slightly darker.

Head and thorax.—Length of antennal segments as follows: III .49 — .51 mm., IV .18 mm., V .225 — .24 mm., VI .10 + .04 mm. Hair on antennal segments sparse, more numerous on anterior margin, varying in length on posterior margin from .045 — .06 mm. length on anterior margin .09 mm. Hair on antennal segments set at angle slightly more than forty five degrees, distinctly spinelike on anterior margin, finer on posterior margin. Pigmented regions on the fourth and fifth antennal segments very indistinctly imbricated. Sixth segment distinctly imbricated. Third antennal segment with from zero to one secondary sensoria, primary sensorium on this segment present or absent, when present small. Fourth antennal with only primary sensorium, fifth antennal segment with one secondary and primary sensoria. Marginal sensoria



Cinara pinivora (W)

extending by about one sensorium in either direction beyond primary. Width of head through the eyes .67 mm. Ocular tubercles small. Hairs on first and second antennal segments few, apparently arranged in two incomplete rows, on each segment. Hair on vertex and dorsum of head quite similar to hairs on anterior margin of third antennal segment, or slightly shorter. Hairs on dorsum of head failing to reach posterior margin of head, and not present directly adjacent to eyes. Median transverse suture of head brownish, rather narrow. Rostrum reaching mid region of cornicles. Hairs on dorsum of prothorax grouped into two transverse rows. Lengths of prothoracic femora and tibiae as follows: .755 — .90 mm., 1.03 — 1.20 mm. similar lengths for the metathoracic legs are 1.20 — 1.29, 1.95 — 2.22 mm. Hairs on anterior margin of metathoracic femora distinctly more spinelike than elsewhere, fewer and more upstanding towards base, almost procumbent near apex on anterior margin. Hairs on metathoracic tibiae, on the whole more numerous, shorter and less spinelike on the inner margin than on the outer. Hairs on outer margin of metathoracic tibiae about as long as width of tibiae or only very slightly shorter. Ventral surface of first metatarsal segment with about twelve hairs. Hairs on second metatarsal segment more numerous and longer on the dorsal region than on the ventral surface.

Abdomen.—Dorsum of abdomen except for pigmented areas reticulated. Hairs on dorsum of abdomen not numerous, some hairs arising from pigmented spots other than the large pigmented areas, for the most part these spots are lateral to the dorsal spots. For the most part the hairs on the dorsum are spaced farther apart than their length. Hairs on the ventral surface of the abdomen far more numerous and shorter than those on the dorsum. Cornicles with base measuring about .45mm. Outer margin of cornicles slightly irregular. Hairs on cornicles few, hardly more numerous on constricted region than elsewhere. In shape the cornicles are rather flat. Transverse pigmented areas anterior to cauda toothed on inner and outer margins, provided with a single row of hairs, the setulae on these areas are but poorly developed, they being much better developed on pigmented areas directly anterior, if such are present. Cauda and anal plate with dark setulae. Genital plate rather narrow, rounded anteriorly and deeply excavated on the posterior, provided with numerous hairs which cover most of surface.

Morphotype apterous viviparous female deposited in the United States National Museum. Redden State Forest, Del. Virginia pine (*Pinus virginiana*) May 1, 1957. Collected by H. E. Milliron on main branches.

April 22, 1959

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PROCEEDINGS
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A NEW SPECIES OF SCHIZOLACHNUS (Aphidae)

F. C. Hottes

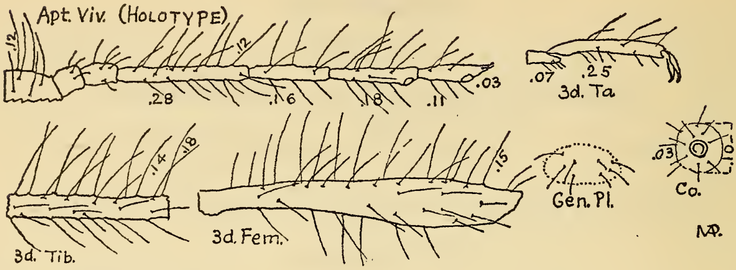
Miss Louise M. Russell of the United States National Museum sent me the material taken by H. E. Milliron from which this new species is described. I express my appreciation to both of them.

Schizolachnus lanosus n. sp.

Apterous viviparous female.

Size and general color.—Length from vertex to end of cauda about 1.62 mm. Color in life not recorded, but specimens, described as being flocculent, as represented by cleared mounted specimens as follows: head with vertex and median portion of dorsum pale brownish, lateral portions and posterior margin of head pale. First and second antennal segments pale brownish. Third and fourth antennal segments pale with apical areas tinged slightly darker. Fifth and sixth antennal segments uniform pale brownish. Pro and mesothoracic femora with extreme base pale, remainder a uniform brown. Metathoracic femora with pale area near base longer than pale area on anterior femora, remainder of segments brownish. Pro and mesothoracic tibiae pale brownish with proximal and distal regions tinged darker. Metathoracic tibiae a uniform pale brownish. Tarsal segments similar to ends of tibiae. Dorsum of abdomen without pigmented areas. Cornicles pale brownish.

Head and thorax.—Lenth of antennal segments as follows: III .28 — .285 mm., IV .16 — .165 mm., V .165 — .18 mm., VI .11 + .03 mm. The only sensoria present are the primary on the fifth and sixth segments, these have wide rims. Marginal sensoria on sixth segment absent. Sixth antennal segment very, very faintly imbricated. Hair on antennal segments few, on third antennal segment longer and more upstanding on anterior margin, on this margin the hairs vary in length from .09 — .12 mm. Hairs on dorsum of head few, about .12 mm. in length, limited to mid dorsal region, not reaching vicinity of eyes or posterior margin. Hairs on first antennal segment shorter than hairs on second antennal segment. Rostrum reaching mid region of mesothoracic coxae. Lengths of prothoracic femora and tibiae .375 and .465 mm. Lengths of metathoracic femora and tibiae .69 and .98 mm. Lengths of metatarsal segments .07 and .25 mm. Hairs on femora not numerous. upstanding, on metathoracic femora reaching a length of .15 mm. on this segment the hairs are slightly more numerous on the anterior margin. Hairs on metathoracic tibiae not numerous, fine, upstanding, slightly more upstanding on outer margin, where they vary in length from .14 —



Schizolachnus lanosus

.18 mm. Ventral surface of first metatarsal segment with about five short hairs near the apex. Hairs on dorsum of second metatarsal segment very few, very long and fine. Hairs on ventral surface of second metatarsal segment much shorter than the hairs on the dorsum.

Abdomen.—Hairs on dorsum of abdomen sparse, fine, about .12 mm. in length, more numerous on ventral surface, but shorter, finer and more variable in length on this surface. Cornicles shallow cones, with the base measuring about .10 mm. Hairs on cornicles fine, short and few in number. Cauda and anal plate with surfaces very finely setulose. Hairs limited to posterior margins, few in number. Cauda almost as long as wide at the base. Genital plate small in size, in shape a broad oval, provided with few hairs at the ends.

This species keys, but not without question to *Schizolachnus pineti* (*F*) in my key to species, Proceedings Biological Society of Washington 1956. The hind tibiae are not thick, the tarsal segments are not of the same length, the hairs on the antennae, femora and tibiae far too few.

Holotype, apterous viviparous female, deposited in the United States National Museum. Taken on the needles of *Pinus virginiana* Petersburg, Del. July 3, 1957 by H. E. Milliron.

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TWO NEW SUBSPECIES OF BIRDS FROM WESTERN NORTH AMERICA

By Thomas D. Burleigh

In the course of studying collections taken in connection with the investigation of birds in the Northwest it became apparent that two resident species, the Chestnut-backed Chickadee and the Winter Wren, represented distinct and undescribed races. These are as follows:

Parus rufescens caliginosus new subspecies

Characters.—Similar to *Parus rufescens rufescens* but darker; pileum and hindneck clove brown rather than sepia brown, back, scapulars and rump dark chestnut; sides and flanks likewise dark chestnut; chin, throat, and upper part of chest so dark brown as to be almost black, and lacking the reddish tinge characteristic of *rufescens.* There is no appreciable size difference.

Measurements.—Adult male – wing 60-64.5(62.3); tail 47.5-52(50); exposed culmen 8-10(9). Adult female – wing 54.5-59(57.3); tail 44-48 (46); exposed culmen 7.5-10(8.8).

Type.—Adult male No. 394631, United States National Museum (Fish and Wildlife Service collection), 20 miles northeast of Moscow, Latah County, Idaho, June 14, 1947; David W. Johnston, original number 134.

Distribution.—Resident in southern British Columbia, east of the coast ranges, northern Washington, east of the Cascades, northern Idaho, northeastern Oregon, and western Montana west of the Continental Divide.

Remarks.—In worn breeding plumage, both *rufescens* and *caliginosus* are noticeably lighter in the color of both the upper parts, and the throat and chest, than in fresh plumage, but regardless of season *caliginosus* can be distinguished by its darker coloration.

Specimens of *Parus rufescens caliginosus* examined.—Total number 23, from the following localities: *Idaho*: Latah County, Moscow, November 11, 1947, female adult; Moscow, 20 miles northeast, June 11, 1947, female adult; June 14, 1947, 2 male adult; June 17, 1947, male immature; Harvard, July 8, 1947, male immature; East Fork Meadow Creek, June 24, 1947, female immature; Deary, May 14, 1948, male adult; December 13, 1951, 2 male adult; February 19, 1953, 2 female adult; Nez Perce County, Lewiston, December 21, 1952, female adult; February 13, 1953, female adult; March 4, 1953, male adult; March 16, 1953, male adult; Clearwater County, Headquarters, February 28, 1952, 2 female adult; March 18, 1956, male adult. *Washington*: Bumping Lake, September 1, 1917, adult female; Blue Mts. (21 miles southeast of Dayton), June 12, 1919, adult male. *Montana*: Columbia Falls, February 18, 1893, adult male; March 6, 1896, adult male.

Troglodytes troglodytes salebrosus new subspecies

Characters.—Similar to *Troglodytes troglodytes pacificus* but decidedly darker, both above and below. Upper parts chocolate brown rather than reddish brown (light russet) as in *pacificus.* Throat, chest, and flanks of under parts dull brown in contrast to light brown of *pacificus.* The barring of the back, characteristic of the other races, especially those in the eastern part of the range of this species, obscure or totally lacking. There is no appreciable size difference.

Measurements.—Adult male – wing 44.5-50(47.3); tail 28-33(30.5); exposed culmen 10-12(11). Adult female – wing 42-48(45); tail 27-30.5 (28.2); exposed culmen 10-12(11).

Type.—Adult male No. 465530, United States National Museum (Fish and Wildlife Service collection): Dismal Lake, Shoshone County, Idaho, June 21, 1951. Thomas D. Burleigh, original number 17217.

Distribution.—Breeds in southern British Columbia, east of the coast ranges, southwestern Alberta, northern Washington east of the Cascades, northern Idaho, northeastern Oregon, and western Montana west of the Continental Divide. Winters at lower altitudes at the southern edge of its breeding range, and casually farther south.

Remarks.—*Troglodytes troglodytes salebrosus* is the least rufescent of the present recognized races. This character is evident not only in adults, but in juvenal specimens taken during the summer months prior to the post juvenal moult. Immature specimens of *pacificus* taken after the post juvenal moult, are noticeably darker than breeding specimens and in their appearance suggest *salebrosus,* but their rufescent upper parts readily distinguish them from this new race. In this connection it is worth noting that what might be interpreted as color phases in *pacificus* are actually age differences. Birds perceptibly darker than typical breeding individuals proved, where fall specimens were concerned, to have the thin almost transparent skull characteristic of young birds, and consequently were young of the year. This color difference would appear to remain unchanged until the first post nuptial moult, when the characteristic rufescent plumage of *pacificus* is acquired. Females taken at Tillamook, Tillamook County, Oregon, on March 18, 1954, and at Quinault, Grays Harbor County, Washington, on March 22, 1954, are indistinguishable in their dark coloration from specimens in this plumage taken in this coastal region in the fall.

Specimens of *Troglodytes troglodytes salebrosus* examined.—Total number 39, from the following localities: *Idaho*: Latah County, Moscow, October 6, 1948, male adult; October 27, 1950, male adult; October 25, 1951, female adult; March 26, 1952, male adult; September 29, 1952, male adult; October 19, 1953, female adult; April 10, 1954, male adult; April 17, 1954, female adult; October 4, 1954, male adult; May 2, 1955, female adult; October 13, 1955, female adult; September 7, 1956, female immature; March 7, 1957, male adult; November 2, 1957, male adult; Deary, May 7, 1948, male and female adult; November 13, 1948, male adult; December 13, 1951, male and female adult; Harvard, June 30, 1953, male juvenile; Clearwater County, Headquarters, June 14, 1951, male adult; October 27, 1951, male adult; November 11, 1951, male adult; November 7, 1952, female adult; April 21, 1953, female adult; Shoshone County, Avery, June 20, 1951, male adult; Dismal Lake, June 21, 1951, male adult; Bonner County, Hope, June 13, 1903, female juvenile; Priest Lake, October 2, 1897, male adult; Sandpoint, November 26, 1948, female adult; Boundary County, Bonner's Ferry, November 23, 1948, female adult. *Washington*: Grays Harbor County, Aberdeen, January 26, 1957, female adult. *Oregon*: Strawberry Mts., Grant County, July 14, 1915, male adult. *Montana*: Java, June 19, 1895, male adult; Gird Creek Canyon, Ravalli County, October 24, 1945, female adult. *Nevada*: Cottonwood Range, September 19, 1896, female adult; Truckee Reservation, December 25, 1867. *Wyoming*: Teton Pass, September 15, 1910, female immature; Moose Creek, Teton Mts., August 27, 1910, male immature. *British Columbia*, Moose Pass, July 29, 1911, male adult.

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DESCRIPTION OF A RACE OF THE SHEARWATER *PUFFINUS LHERMINIERI* FROM PANAMA

By Alexander Wetmore

Shearwaters of this species have been noted as seen occasionally in the southern part of the Caribbean Sea, but there has been little reported concerning them. The only specimen on record for the area is one obtained by Enrico Festa in May 1895, when on board ship 300 miles from Colón. The typical race, *Puffinus lherminieri lherminieri* breeds on Bermuda, in the Bahama Islands, on Mona Island west of Puerto Rico, on Little Saba Island (near St. Thomas), Ginger Island (near Tortola), on numerous islets in the Lesser Antilles between St. Martin and Barbados, and on islets off Tobago. The race described herewith is from a hitherto unrecorded population that nests on an island off the coast of northwestern Panamá on the southern shore of the Caribbean, 1200 miles or more distant from any of its relatives.

Puffinus lherminieri loyemilleri subsp. nov.

Characters.—Similar to Puffinus lherminieri lherminieri Lesson[1] but smaller.

Description.—Type, U. S. Nat. Mus. No. 468691, Male, Tiger Rock, Tiger Cays, off Cabo Valiente, Valiente Peninsula, Bocas del Toro, Panamá, collected February 25, 1958, by A. Wetmore (original number 22182). Upper surface from crown to tail, except as indicated, between dark Quaker drab and sooty black; hind neck and wings dark Quaker drab; entire under surface white, except as indicated; posterior half of loral area mixed white and dark Quaker drab; anterior half of lores, anterior two-thirds of upper eyelid, and lower eyelid white; posterior margin of eyelids deep Quaker drab; sides of neck deep mouse gray; flanks between deep and dark mouse gray; under tail coverts deep mouse gray, tipped lightly with white and white basally; edge of wing between dark Quaker drab and sooty black; under wing coverts white; axillars white, tipped lightly with dark mouse gray. Culmen black; sides of bill mouse gray; lower surface of mandible grayish olive; tarsus, middle and inner toes drab; line down ridge of back of tarsus, and outer toe sooty black. (From dried skin.)

Measurements.—Males (6 specimens), wing 185-193 (188), tail 80.7-

[1]*Puffinus* (sic) *Lherminieri* Lesson, Rev. Zool., vol. 2, no. 3, Apr. (May) 1839. p. 102. (Straits of Florida).

87.7 (85.2), culmen from base 27.1-30.1 (29.3), tarsus 38.4-39.8 (39.3) mm.

Females (5 specimens), wing 185-195 (190), tail 82.8-88.5 (86.3), culmen from base 27.7-31.2 (29.2), tarsus 38.2-40.0 (39.0) mm.

Type, male, wing 186, tail 85.4, culmen from base 29.5, tarsus 39.8 mm.

Range.—Known only from the Tiger Cays, off the Valiente Peninsula, Bocas del Toro, Panamá.

Remarks.—The colony of shearwaters in the Tiger Cays was found by Dr. Loye Holmes Miller in 1936 during a brief visit to the Chiriquí Lagoon area, where he was located on a survey ship of the Hydrographic Office of the Navy. A seaman returning from placing a beacon on a rocky island told of seeing birds with single large eggs in holes in the ground. Dr. Miller visited the site on March 12, and found four occupied nesting holes of the Audubon's shearwater, with eggs that ranged from fresh to nearly ready to hatch. He prepared two skins, and a skeleton, and secured other bones from carcasses eaten by vultures. The specimens, placed in the collections at the University of California in Los Angeles, attracted no special attention since the normal breeding range of Audubon's Shearwater was not well known at that time, and it was not realized that this was an unusual extension in range. The skins came to attention recently through a list of birds from Panamá in the University collections sent to me through the interest of Dr. Thomas R. Howell. In recent correspondence Dr. Miller kindly furnished me with a description and a rough map of the locality, from which Mr. Thomas R. Dunn of the Chiriqui Land Company at Almirante, through his knowledge of the area gained in fishing excursions, identified the islet as what is known locally as ''Tiger Rock'' in the Tiger Cays off the end of the Valiente Peninsula. With this information, on February 25, 1958, during a day of favorable weather, I crossed from Almirante in a dugout canoe with an outboard motor, located the island, and found the shearwater colony. The Tiger Cays lie in line from 3000 meters north to 5000 meters northwest of Cabo Valiente at the end of the peninsula. The outermost, at the northwest, is a submerged rock that is awash. Next is a higher rock bearing a navigation beacon, which is designated as ''Tiger Rock'' in the chart and sailing directions for this region. Then comes a slightly larger islet, followed by a larger, longer one, of several separated sections which is known locally as Tiger Rock. At the western end this island is nearly divided by a cleft through which storm waves wash. The higher ground at either side of this depression has a stand of coconuts and guarumos (Cecropia), with undergrowth of coarse grass, caña blanca, and other plants. I stepped ashore at the cleft on a partly submerged rock, and, after a brief examination, climbed the bare rock to the top of the eastern sector. Immediately I noted feathers, fresh droppings, and the pungent odor of shearwaters, and on the steep landward slope, where there was protection from the northern and eastern winds found the openings of numerous burrows. In the hour and a half that I was able to remain I examined only a limited area in which I secured 9 birds and 5 eggs. It had not been possible to beach the cayuco because of the heavy swells, so that when the wind began to freshen I had to leave in order to gain the distant shelter of Crawl Cay channel before the sea became too rough for our small craft. Another island in this group of cays, that is larger, lies to the eastward of the one I visited.

It should be noted that there is also a small island along the eastern shore of Isla Popa on the northern side of the Laguna de Chiriquí that locally is called Tiger Cay, that has no connection with the Tiger Cays described above.

The smaller size that appeared evident in examining the two specimens collected in 1936 is verified in the nine specimens that I obtained. The following measurements taken from specimens of *P. l. lherminieri* in the U. S. National Museum, American Museum of Natural History, Museum of Comparative Zoology, and the British Museum (Natural History), will indicate the difference.

Males (31 specimens), wing 195-209 (201), tail 83.5-95.0 (88.2), culmen from base 28.1-31.8 (30.0), tarsus 37.8-42.5 (40.2) mm.

Females (29 specimens), wing 193-210 (200), tail 83.7-95.0 (88.9), culmen from base 25.7-31.0 (29.2), tarsus 38.0-41.8 (40.4) mm.

The birds from Bocas del Toro have the side of the head including the eyelid white, with only a very slight amount of gray in some individuals. While these markings vary in typical *P. l. lherminieri*, the gray in most is of greater amount. The difference is slight and may not hold in larger series.

The eggs, pure white in color, with the shell slightly pitted, vary in form from subelliptical to long subelliptical and long oval. The measurements, in millimeters, are as follows: 48.3 $\times$ 35.3, 51.3 $\times$ 36.3, 52.2 $\times$ 34.7, 53.1 $\times$ 34.5, 53.9 $\times$ 35.3.

While these sizes come within the lower limits of measurement for eggs of *Puffinus l. lherminieri*, the maximum found in this small series of *loyemilleri* is appreciably less, this being 57.3 mm. for length, and 40.8 mm. in breadth in the nominate form. The average for *loyemilleri* thus appears to be smaller.

The new form appears intermediate between the nominate race and the much smaller *P. l. boydi* Mathews of the Cape Verde Islands. It is named for Dr. Loye Miller in recognition of his many contributions to the science of ornithology.

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AN ELUCIDATION OF THE NEOTROPICAL GENUS CHINAIA WITH A KEY TO MALES AND A NEW ALLIED GENUS

[Homoptera: Cicadellidae: Neocoelidiinae]

By James P. Kramer
Entomology Research Division Agr. Res. Serv. U.S.D.A.

In an earlier paper (1958 Proc. Biol. Soc. Wash. 71:69-74), I described six new species of the genus *Chinaia* from Central America and included a check-list of the species assigned to or described in this genus. All of the species enumerated in the check-list have now been studied. Many of the species are known from uniques which necessitated the study of types. This study was made possible through the very kind cooperation of the following entomologists: W. E. China of the British Museum, G. E. Wallace of the Carnegie Museum in Pittsburgh, and R. Linnavuori of Turku, Tyttölyseo, Finland.

Of the thirteen species included in my original check-list, eleven are now considered to be members of *Chinaia*. One of the eleven is known only from a partly mutilated female and its inclusion is, perhaps, questionable. One of the two species now excluded from *Chinaia* has been referred to *Coelidiana*, while the other appears to be a deltocephaline with uncertain generic affinities. In the course of this study, two new species representing a new genus closely allied to *Chinaia* were discovered. This paper, then, treats *Chinaia*, the species removed from *Chinaia*, and the new closely related genus with its two new species. A revised check-list of *Chinaia* is also included.

Chinaia Bruner and Metcalf

1934. Bull. Brooklyn Ent. Soc. 29(3):120.

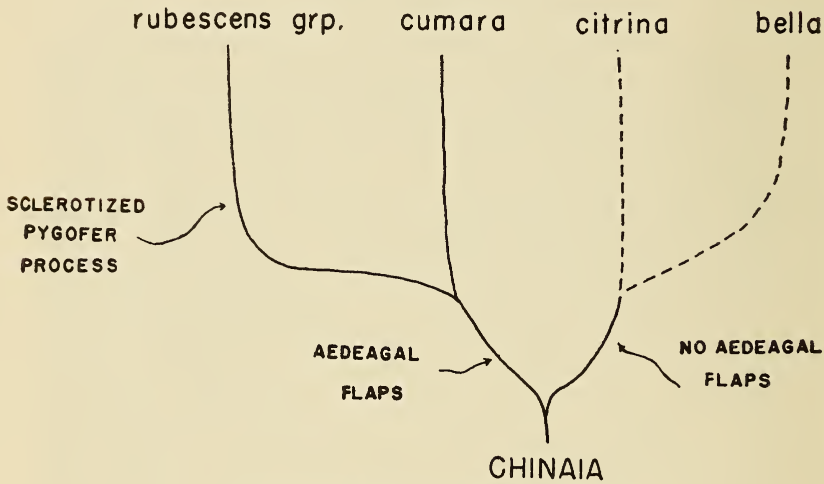
Type of genus *Chinaia bella* Bruner and Metcalf.

Head narrower than pronotum and broadly rounded anteriorly, length of crown much less than basal width between the eyes. Anterior margin of head without a carina. Ocelli on face at a considerable distance below anterior margin of head. Clypellus much wider distally than basally. Antennae as long or longer than the body. Pronotum much wider than long. Scutellum very large and triangular, as long as pronotum. Venation obscure except at apex of the long tegmina.

Coloration yellowish to pale orange with extensive orange to bright red orange markings. Dark brown markings often found on clavus and apical portion of tegmina.

Male genitalia. Valve quite obscure in uncleared specimens. Plates deep and scoop-shaped. Pygofer either with dorsal processes or an elongation of terminus. Connective cruciform, not fused with aedeagus Aedeagus moderately straight or recurved with gonopore opening apically or dorso-apically, except in *bella* where the opening is at the distal portion of the shaft. Aedeagus with or without lateral flaps.

The genus *Chinaia* as presently interpreted includes species which exhibit rather diverse genitalic patterns. Even though some splitting of the genus could be justified on the basis of these divergences, it is believed that little would be accomplished by so doing at this time. Females which are presently unrecognizable to species would then be unrecognizable to genus.



Proposed phylogeny of the genus *Chinaia*

The known species of *Chinaia* fall into two groups based upon the presence or absence of the aedeagal flaps. Those species with the aedeagal flaps form two lines. One of these lines is represented by a single species *cumara* in which paired processes have developed between the aedeagus and flap; while the other line, containing most of the species in the genus, has evolved a distinct sclerotized dorsal pygofer process.

The group which lacks the aedeagal flaps is represented by two species: *bella* and *citrina*. Here the pygofer has elongated and exceeds the male plates. On the basis of the aedeagus, these two species are not very close and probably represent distinct branches. In *bella* the gonopore is located at the distal portion of the broadly recurved tip. In *citrina* the gonopore is at the apex of the slender U-shaped shaft.

The key which follows will allow separation of the males. The females on hand are not associated with males, except in one case, and are not treated at this time.

Chinaia: Key to Males

1. Pygofer in lateral view with a distinctly sclerotized dorsal process 2
   Pygofer in lateral view with terminus prolonged or modified without sclerotized process 8
2. Pygofer process approximately "S" shaped (fig. E2)* 3
   Pygofer process variously formed but not "S" shaped 4
3. Proximal portion of clavus concolorous........ *caprella* Kramer
   Proximal portion of clavus with an orange stripe *permista* Kramer
4. Pygofer process elongate caudad and decurved 5
   Pygofer process neither elongate caudad nor decurved 7
5. Pygofer process bifurcate at apex (fig. D2)* .... *bifurcata* Kramer
   Pygofer process entire at apex 6
6. Pygofer processes in dorsal view straight, terminating wth incurved hooks (Plate I, fig. 13) .... *agarista* Kramer
   Pygofer processes in dorsal view curved outward and without hooks (Plate I, fig. 12) .... *rubescens* (Fowler)
7. Aedeagus in lateral view narrowed on distal one-half (fig. C3)* .... *lepida* Kramer
   Aedeagus in lateral view narrowed on distal three-fourths (Plate I, fig. 7) .... *ornata* (Osborn)
8. Aedeagus with paired basal accessory processes (fig. A3)* .... *cumara* Kramer
   Aedeagus without processes 9
9. Pygofer terminus undulate and hooked (Plate I, fig. 1) .... *bella* Bruner & Metcalf
   Pygofer terminus expanded and then narrowed at apex (Plate I, fig. 8) .... *citrina* Evans

*These fig. numbers refer to illustrations which appeared with the original description in 1958 Proc. Biol. Soc. Wash. 71: 69-74. All of the authors species are treated in this earlier paper.

Chinaia rubescens (Fowler)

1900 *Tettigonia rubescens* Fowler, Biologia Centrali-Americana 2: 282-283, with illustration in color Tab. 19, fig. 7.

Fowler's original description is quoted here: "Pale testaceous, with the base and sides of the pronotum, a broad band on the tegmina, and sometimes the apical portion of the scutellum, red, the red band on the tegmina occasionally covering the whole of the corium except the apex; head short, but longer than the pronotum, which is very short, scarcely produced before the eyes and broadly subtruncate, eyes prominent; tegmina much narrowed toward the apex; legs light testaceous-yellow. Long. 7-8 millim.; lat. 2-2½ millim. Hab. Panama, Volcan de Chiriqui 2500 to 4000 feet (Champion."

Male genital structures. (Pl. I, figs. 11-12) Pygofer process long and spearlike, almost identical to *agarista* in lateral view. In dorsal view the pygofer process is curved laterally without terminal hooks. The ædeagus is like that of *agarista*.

Specimens studied. Two males and one female with data; San Isidre del General, Costa Rica, D. L. Bounds. No dates when collected.

The identity of this species is based upon a male paratype located in the British Museum bearing same collection data as the type specimen

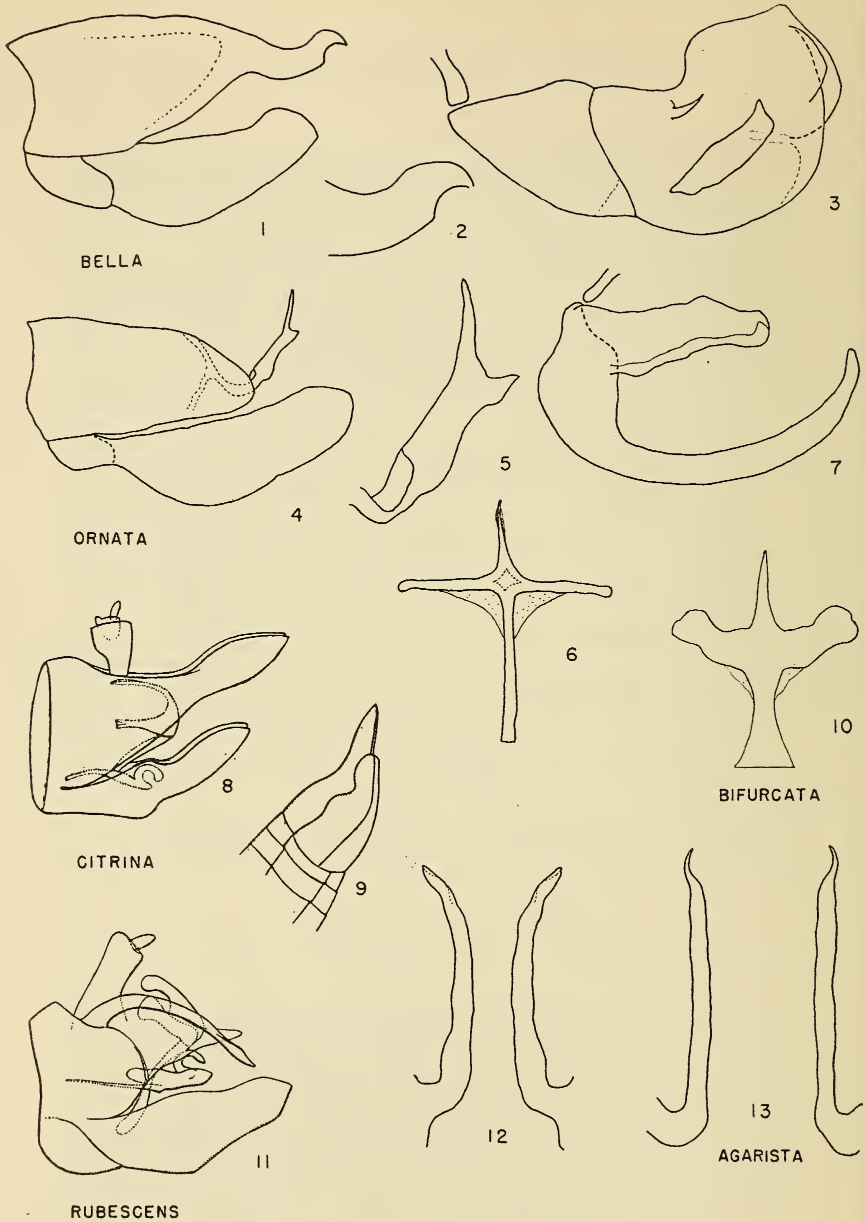


Plate I *Chinaia*

C. bella [1-3] 1. lateral view of pygofer, valve, and male plate. 2. enlarged pygofer extension. 3. lateral view of aedeagus. *C. ornata* [4-7] 4. lateral view of pygofer, valve, and male plate. 5. enlarged pygofer process. 6. ventral view of connective. 7. lateral view of aedeagus. *C. citrina* [8-9] 8. lateral view of whole genital capsule. 9. three-quarters view of genital capsule. *C. bifurcata* [10] 10. ventral view of connective. *C. rubescens* [11-12] 11. lateral view of whole genital capsule. 12. dorsal view of pygofer processes. *C. agarista* [13] 13. dorsal view of pygofer processes.

which is a female. Dr. W. E. China sketched the genitalia and his drawing is used here. *C. rubescens* and *C. agarista* are very close species and can be distinguished with certainty only by the shape of the pygofer process in dorsal view as indicated in the key. Unfortunately the male paratype of *C. rubescens* has been mounted on a slide in lateral view which does not allow a dorsal observation to be made. However, the specimens which I have studied agree in certain other details with the *C. rubescens* paratype. These details are the curvature of the pygofer process in lateral view and the absence of dark brown markings on the clavus and apical cells. The drawings of the pygofer processes were made from Costa Rican specimens.

Chinaia ornata (Osborn)

1924 *Neocoelidia ornata* Osborn, Ann. Carnegie Museum 15 (4):449.

The original description is quoted as follows: "Head short, scarcely produced, narrower than pronotum; vertex wider than long, as long at middle as next the eye; ocelli considerably below the middle of the eye, three times their diameter from the eye; antennae extremely long, longer than entire insect, the outer part of the setae very delicate and irregularly bent and twisted; front somewhat inflated, narrowed abruptly at tip; clypeus short, scarcely longer than wide, widening toward tip, apex truncate; lorae broad, approaching border of cheek; cheeks broad. Pronotum short, one-half longer than vertex, lateral borders curved, hind border faintly sinuate; elytra long, narrowing to apex, appendix narrow. Genitalia: male, plates short, tumid; tips compressed, and bluntly rounded.

Light yellow, with the hinder border of pronotum and cheek, lateral and apical portion of scutellum, a broad discal and apical spot on clavus, an elongate basal spot on corium, a transverse discal spot from sub-costa to claval suture touching apical spot on clavus, two somewhat oblique spots on anteapical cells, orange-red; a darker orange band bordered with fuscous on anteapicals; four blackish dots on apical veins; apical areoles smoky; wings milky subhyaline. Beneath, pale creamy; tarsal claws dusky.

Length: 6.75 mm.

This very ornate species is represented by a single specimen from Valparaiso (2500 ft.) Dept. of Magdalena, Colombia, July, 1898, C. M. Acc. No. 1999 (H. H. Smith coll.)"

Male genital structures. (Pl. I, figs. 4-7) Pygofer process erect, rather slender with a large tooth on posterior margin and narrowed apically. Aedeagus in lateral view recurved with shaft narrowed. The drawings were made from the type specimen which was generously loaned through the courtesy of Dr. G. E. Wallace and the Carnegie Museum of Pittsburg.

Chinaia bella Bruner and Metcalf

1934 *Chinaia bella* Bruner and Metcalf, Bull. Brooklyn Ent. Soc. 29(3): 121-122.

This species was thoroughly treated in the original description both verbally and pictorially. Sufficient to say that *bella* has the same general habitus as the other members of this genus and can only be identified satisfactorily on the basis of the male genitalia.

Male genital structures. (Pl. I, figs. 1-3) As indicated in the key, the

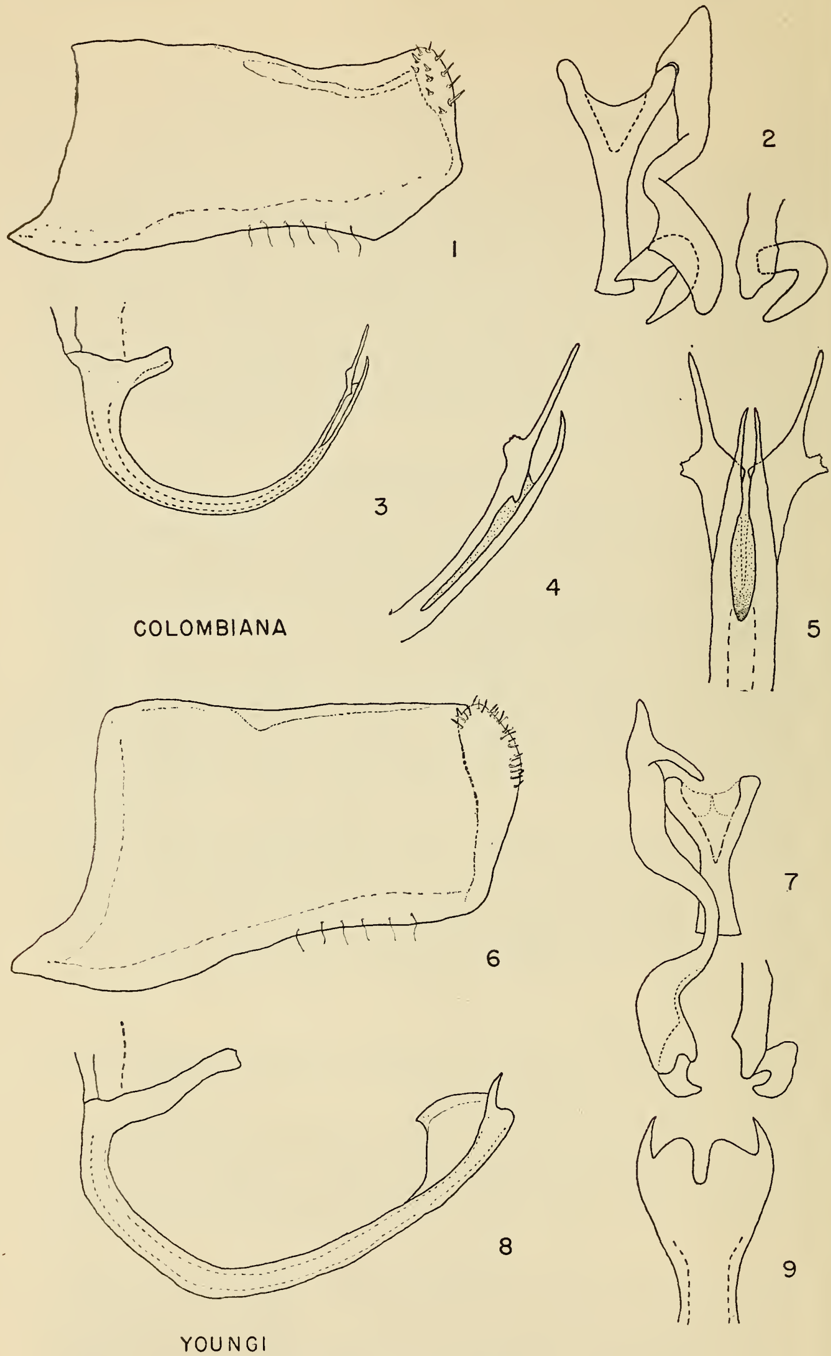


Plate II *Xenocoelidia*

X. colombiana [1-5] 1. lateral view of pygofer. 2. ventral aspect of connective and style (only one drawn) also apex of style in lateral view. 3. lateral view of aedeagus. 4. enlarged lateral view of aedeagus apically. 5. direct caudal aspect of aedeagus apically. *X. youngi* [6-9] 6. lateral view of pygofer. 7. ventral aspect of connective and style (only one drawn) also apex of style in lateral view. 8. lateral view of aedeagus. 9. direct caudal aspect of aedeagus apically.

pygofer is prolonged distally, undulate with an apical hook. The aedeagus is massive and broadly recurved apically. Unlike the other members of the genus the gonopore opens at the distal portion of the shaft. The drawings used here were prepared from a specimen taken from the type series.

Chinaia citrina Evans

1947 *Chinaia citrina* Evans, Trans. Royal Ent. Soc. London 98(6):254.

Evan's description is quoted here: ''Length 8 mm. Head yellow, antennae orange, eyes dark brown. Thorax: pronotum medially yellow, the remainder orange. Scutellum orange. Tegmen yellow with transverse and longitudinal orange markings and with two large oval, and a few small brown markings adjacent to apex. Thorax, ventral surface yellow. Abdomen, ventral surface orange.

Type male from Essequibo River, British Guiana (Oxford University Expedition ix. 29).''

Male genital structures. (Pl. I, figs. 8-9) The terminus of the pygofer is elongate. This elongation is widest near the middle, narrowed at the base and apex which is pointed. The shaft of the aedeagus is greatly narrowed and recurved.

Dr. W. E. China very kindly dissected the type specimen and prepared the drawings which are used in this paper.

Chinaia smithii (Baker)

1898 *Neocoelidia smithii* Baker, Canadian Ent. 30:291-292.

C. smithii is known from a single female. The type has the tegmina missing. Even though this species has the general habitus of a *Chinaia*, the exact generic placement remains in doubt until males are available for study. The original description is included here:

''Female. Length 8 mm. Pale yellowish with faint touches of reddish on sides of front, pronotum, scutel, and along commissural margin of clavus. Elytra shining yellowish, subhyaline, with four dark spots on inner margin, three on clavus and one beyond; with a complete transverse decoloured band before transverse nervures, which is edged before near costa with a dash of red; with another partial decoloured band beyond transverse nervures which is edged near costa with fuliginous. Costal margin of elytra and first sector of wings greenish. Wing subhyaline, with a median row of three fuliginous spots; veins pale brown, excepting first sector. Last ventral segment but little longer than preceding, hind margin truncate, with the lateral angles somewhat produced.

Described from a single specimen from Brazil.''

Revised check-list of species of *Chinaia*

1. *agarista* Kramer, 1958. Proc. Biol. Soc. Wash. 71:74—Panama.
2. *bella* Bruner and Metcalf, 1934. Bull. Brooklyn Ent. Soc. 29(3): 121—Costa Rica.
3. *bifurcata* Kramer, 1958. Proc. Biol. Soc. Wash. 71:71—Panama.
4. *caprella* Kramer, 1958. Biol. Soc. Wash. 71:71—Panama and Canal Zone.
5. *citrina* Evans, 1947. Trans. Royal Ent. Soc. London 98(6):254—British Guiana.
6. *cumara* Kramer, 1958. Proc. Biol. Soc. Wash. 71:73—Guatemala.

7. *lepida* Kramer, 1958. Proc. Biol. Soc. Wash. 71:73-74—Canal Zone.
8. *ornata* (Osborn), 1924. Ann. Carnegie Museum 15(4):449—Colombia.
9. *permista* Kramer, 1958. Proc. Biol. Soc. Wash. 71:71-72—Canal Zone.
10. *rubescens* (Fowler), 1900. Biologia Centrali-Americana 2:282-283—Panama and Costa Rica.
11. *smithii* (Baker), 1898. Canadian Ent. 30:291-292—Brazil.

Species removed from *Chinaia*

Coelidiana undata (Linnavuori) new combination

1956 *Chinaia undata* Linnavuori, Ann. Ent. Fenn. 22(1):35.

The original description is as follows: ''Length 7 mm. Face and under surface pale yellow, vertex, pronotum and scutellum orange-yellow, base of the latter bordered with black and apex with two large black spots. Elytrae yellow, clavus with a black undate stripe (as in *Platymetopius undatus* DeG.), other parts of the clavus reddish, basal margin black. The 1st and 2nd apical cells smoky brown, bases of 3rd and 4th apical cells with a broad black-brown transverse band, and furthermore two large round black spots at the upper cross-veins. Abdomen orange-yellow, legs yellow. Brazil: Nova Teutonia 16 VIII 1938.''

Through the courtesy of Dr. R. Linnavuori, a paratype male was made available for study. It is clearly not a *Chinaia* but belongs to *Coelidiana.* DeLong's paper (1953 Lloydia 16(2):93-131), in which many of the Neocoelidiinae are treated, keys out this genus. On the basis of genitalia, *C. undata* greatly resembles *C. bidentata* (illustrated in DeLong's paper pl. 8 fig. 4). However, in *C. undata* the pygofer is shorter and has but one ventral tooth, while *C. bidentata* has two teeth. Further, in *C. undata* the carina separating the crown and face is very distinct; and while distinctly produced, the anterior margin of the head is broadly rounded in dorsal view. The head of *C. bidentata* has a less distinct carina and is rather bluntly pointed. The color patterns of the two species are very different as indicated in the descriptions.

Neocoelidia punctata Osborn

1923 *Neocoelidia punctata* Osborn, Ann. Carnegie Museum 15(1):77-78.

Study of the type of this species reveals that this is not a *Chinaia* but actually belong to the leafhopper subfamily Deltocephalinae with generic placement uncertain. Osborn's *punctata* lacks the ledge above the antennal pit which is characteristic of all Neocoelidiinae and has styles typical of many deltocephalines.

Xenocoelidia new genus

Type of genus *Xenocoelidia youngi* new species.

Resembles *Chinaia* but differs in shape of clypellus, position of ocelli, modification of male pygofer, and shape of both the connective and styles.

Head either nearly as wide as pronotum or distinctly narrower and broadly rounded anteriorly, length of crown much less than basal width between eyes. Anterior margin of head without a carina. Ocelli on margin of vertex and visible in dorsal aspect. Clypellus very slightly expended before apex. Both clypellus and clypeus rather tumid. Antennae as long as body. Pronotum much wider than long. Scutellum very large and triangular, as long as pronotum. Tegmina long with venation obscure except at apex.

Coloration whitish to yellowish with or without brown, yellow, or red markings.

Male genitalia. Valve obscure in uncleared specimens. Plates deep and scoop-shaped. Pygofer lacking processes or lobes. Terminus of pygofer slightly thickened, bearing setae. Connective Y-shaped and closely associated with the aedeagus but not solidly fused. Style long and slender with a mesal curvature. Aedeagus slender and broadly U-shaped. Gonopore apical or subapical.

Xenocoelidia youngi new species

Length male 8 mm.

Head narrower than pronotum. Lorum as large as clypellus. Ground color a uniform ivory white. Apex of tegmina bright yellow hyaline. Tiny fuscous spot at tip of each clavus and a very slight darkening at center of commissural margin.

Male genitalia. (Plate II, figs. 6-9) Aedeagus slender and curved dorsally, apex in lateral view with a sharp tooth and an acute blade-like dorsal expansion. Gonopore opens apically.

HOLOTYPE male, Buenaventura, Colombia, 1941, C. L. Fagan. U.S.N.M. type no. 64572. Female unknown. This species is named for one of the world's foremost students of the Cicadellidae, Dr. David A. Young, Jr.

Xenocoelidia colombiana new species

Length male 7 mm.

Head slightly narrower than pronotum. Lorum smaller than clypellus. Ground color whitish. Scape and basal half of pedicel bright pink. Anterior margin of head with a pale yellow band below and a bright orange band above. Pronotum with lateral margins and an irregular broadly U-shaped marking centrally located near anterior margin, bright orange. Claval suture with a pale yellow band becoming obscure distally. Clavus with a moderately broad somewhat dusky orange stripe running along scutellum and commissural margin. A brown spot flanks stripe laterally before apex of each clavus. Apex of tegmina brown hyaline.

Male genitalia. (Plate II, figs. 1-5) Aedeagus slender and curved dorsally, split apically in lateral view. Gonopore subapical on venter of shaft.

HOLOTYPE male, Puente Licio, Guasca-Gachetá, Cundinamarca, Colombia, Feb. 20, 1942, Edward A. Chapin, sweeping herbage. U.S.N.M. type no. 64573. Female unknown. Dr. Chapin supplied this additional information: Puente Licio is a bridge across a small stream that crosses the main highway running between Guasca and Gachetá, on the east slope of the Cordillera Oriental.

Vol. 72, pp. 33-36 May 1, 1959

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SUBSPECIES OF VEERY FROM THE NORTHWESTERN UNITED STATES

By Thomas B. Burleigh and Allen J. Duvall
U. S. Fish and Wildlife Service, Washington, D. C.

In a collection of birds taken by Ira N. Gabrielson in Rio Blanco County, Colorado, in 1948 there was a Veery (a female collected on September 20) that could not be allocated to any of the three recognized races. It most closely recembled *Hylocichla fuscescens salicicola* but its grayish upper parts separated it readily from this western form. It was of decided interest, therefore, when subsequently a critical examination of a series of breeding Veerys taken in northern Idaho revealed the fact that they possessed all the characters by which this migrant Colorado specimen was distinguished from the other races of *Hylocichla fuscescens.* These individuals of the extreme western breeding population of the Veery represent a distinct and undescribed race that may be known as:

Hylocichla fuscescens subpallida new subspecies

Characters: Differs from all other races of *Hylocichla fuscescens* in having the upper parts duller, with a gray wash entirely lacking in any other races of Veery examined; crown darker than in *salicicola,* approaching *fuliginosa* in this respect; buff of throat averaging paler, and less heavily marked with dusky. Birds taken in August, after the completion of the post nuptial moult, equally distinct. No appreciable size difference.

Measurements: Nine breeding males from northern Idaho and eastern Washington: Wing, av. 101 mm. (extremes 98-103.5); tail 77.5 (76-80); exposed culmen 13 (12.5-14). Five breeding females from northern Idaho and eastern Washington: Wing, av. 98.5 mm. (97-101.5); tail 73.5 (72.5-75); exposed culmen 12.3 (12-13.5).

Type: Adult male No. 419601, United States National Museum (Fish and Wildlife Service collection): Moscow, Latah County, Idaho, June 10, 1951, Thomas D. Burleigh, original number 13895.

Distribution: Breeds in northern Washington, east of the

Cascades, northern and central Idaho, and western Montana west of the Continental Divide. Winter range not known.

Remarks: Robert Ridgway, in his original description of *H. f. salicicola,* did not designate a type specimen. At a later date he indicated Nos. 66667 and 79460 (U. S. National Museum) as types, evidently making a male and a female type for the race. With one exception (79461—Fort Garland, Colorado) all of the specimens upon which Ridgway based his description of *salicicola* are in the U. S. National Museum. The type series is composed of May, June, and September specimens from Colorado, eastern Montana, Wyoming, and North Dakota. All resemble the additional breeding birds examined from these areas. Since no type was designated in the original description we hereby select No. 66667 from Fort Garland, Colorado, May 26, 1872, as the type, and restrict the type locality of *salicicola* to Fort Garland, Colorado. This specimen is one of the small series which Ridgway had selected subsequent to his description.

Specimens of Hylocichla fuscescens subpallida examined: Total number, 57, from the following localities: *Idaho:* Bonner's Ferry, Boundary County, June 22, 1957, ♂ adult; St. Maries, Benewah County, June 22, 1948, ♂ adult; Potlatch, Latah County, May 21, 1948, ♂ adult; August 13, 1948, ♂ immature; August 16, 1948, ♀ immature; May 26, 1949, ♀ adult; July 13, 1949, ♀ adult; May 24, 1950, ♂ adult; July 12, 1951, ♂ and ♀ adult; August 2, 1951, ♂ juvenile; August 26, 1951, ♀ immature; May 13, 1952, ♂ adult; July 20, 1952, ♂ adult; August 3, 1952, ♂ juvenile; August 12, 1956, ♀ adult; June 30, 1957, ♀ adult; Princeton, Latah County, May 30, 1949, ♂ adult; Moscow, Latah County, May 25, 1948, 2 ♂ adult; July 19, 1949, ♀ adult; August 18, 1949, ♂ immature; August 23, 1949, ♀ immature; September 2, 1950, ♂ adult; May 16, 1951, ♂ adult; June 10, 1951, ♂ adult; May 21, 1952, ♂ adult; May 22, 1953, ♂ adult; September 7, 1957, ♀ immature; June 16, 1958, 2 ♀ adult; Orofino, Clearwater County, June 12, 1951, ♂ adult; July 1, 1952, ♂ adult; Lapwai, Nez Perce County, July 12, 1950, ♂ adult; Cambridge, Washington County, June 4, 1951, ♂ adult; June 7, 1952, ♂ adult; Challis, Custer County, June 29, 1950, ♀ adult; Sun Valley, Blaine County, June 28, 1950, ♂ adult; Henry's Lake, Fremont County, June 11, 1957, ♂ adult. *Washington:* Entiat, Chelan County, July 5, 1910, ♀ adult; July 12, 1918, ♀ adult; July 13, 1918, ♂ adult; Winthrop, Okanogan County, June 23, 1943, ♂ and ♀ adult; Spokane, Spokane County, June 18, 1948, ♂ adult; June 24, 1948, ♂ adult; July 15, 1957, ♀ adult; August 19, 1957, ♀ immature; Pullman, Whitman

County, May 29, 1948, ♀ adult; August 15, 1948, ♂ immature; August 20, 1949, ♂ immature; September 6, 1949, ♂ immature; June 11, 1953, ♂ adult; Palouse, Whitman County, July 16, 1950, ♂ adult; Uniontown, Whitman County, July 8, 1951, ♂ adult; Yakima, Yakima County, July 6, 1952, ♂ adult. *Montana:* Drummond, Granite County, June 29, 1956, ♂ adult.

Vol. 72, pp. 37-38 May 1, 1959

PROCEEDINGS
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A NEW SPOTTED GROUND SQUIRREL FROM MEXICO

By Donald F. Hoffmeister
Museum of Natural History, University of Illinois, Urbana

Collecting of mammals by students at the University of Illinois in the sand dunes of northern Chihuahua has revealed the presence there of an undescribed race of the spotted ground squirrel, *Citellus spilosoma.* The particular sand dunes are those surrounding the small town of Samalayuca, twenty-four miles south of El Paso, Texas.

Spotted ground squirrels are not abundant in this dune area in summer, when collecting has been done. For example, on the fourth of August, 1958, the first squirrel was not seen moving about on the dunes until late afternoon (after 4:30 p.m.). On the same day, the sun-temperature on these dues was 116°F. at 12:30 p.m.; 120°F. at 2:00 p.m. On another occasion, temperature taken in the early morning ranged from 90°F. to 98°F. between 8.00 a.m. and 9:30 a.m.

The dunes consist of light-colored but not white sands. There are only a few shrubby plants, such as mesquite and yucca, growing in the dunes.

Two other rodents are endemic to the sand dunes area near Samalayuca: *Dipodomys ordii extractus* Setzer and *Onychomys leucogaster albescens* Merriam.

Capitalized color terms are from Ridgway, Color Standards and Color Nomenclature (1912). Measurements are in millimeters.

Citellus spilosoma ammophilus, new subspecies

Type.—Adult, female, skin and skull, No. 12472, Univ. Illinois Mus. Nat. Hist., from 5½ mi. N Samalayuca, Chihuahua, Mexico; collected August 2, 1956, by Wayne H. Davis, original No. 2469.

Range.—Known only from the sand dunes area in the vicinity of Samalayuca, Chihuahua.

Diagnosis.—A race of *Citellus spilosoma* characterized by especially pale coloration. On the dorsum, in an area of minimum spotting, general color effect near Cream-Buff *c.* Color on dorsum of tail near Cinnamon-Buff *c* with terminal tip whitish. Underside of tail near Pinkish Buff. Dorsal surface of front and hind feet white. Eye ring present but so similar in color to adjacent light-colored areas that it gives the impression of being reduced or nearly absent. Lateral line area white. Underparts white.

In external measurements, *ammophilus* is of an average size for the species; skull slightly smaller than average. See *Measurements.*

Comparisons.—*Citellus spilosoma ammophilus* differs from *Citellus* *spilosoma canescens* and *Citellus spilosoma arens* as follows: Upper parts much lighter; eye ring less conspicuous; dorsal surface of front feet whitish rather than Cinnamon-Buff or Pinkish Buff; dorsal surface of hind feet lighter; upper and under side of tail paler; sides along lateral line whitish rather than washed with Pinkish Buff or Pinkish Cinnamon; nearly all measurements, external and cranial, larger than for specimens of *canescens* from southeastern Arizona; hind foot especially larger; tail shorter.

Citellus spilosoma ammophilus differs from *Citellus spilosoma pallescens* in coloration much as it differs from *C. s. canescens.* It is paler or lighter in all respects. In external measurements, smaller than most *pallescens;* tail noticeably shorter but hind feet of large size in both subspecies. Skull of about same size as most specimens of *pallescens,* but more constricted in postorbital region.

Citellus spilosoma ammophilus differs from *Citellus spilosoma major* in much paler coloration; shorter tail; slightly smaller skull.

Measurements.—The type, an adult female, and a subadult female from 4.8 mi. S Samalayuca are, respectively: total length, 232, 232; length of tail, 68, 74; length of hind foot, 36, 35; length of ear, 8, 10; greatest length of skull, 39.8, 38.0; palatilar length, 17.6, 16.8; zygomatic breadth, 24.0, 23.1; cranial breadth, 19.2, 18.3; interorbital breadth, 9.1, 8.1; postorbital constriction, 14.2, 13.1; length of nasals, 13.7, 11.9; alveolar length of maxillary toothrow, 8.4, 7.9.

Remarks.—*Citellus spilosoma ammophilus* is the palest-colored race of the species. *C. s. ammophilus* occurs in a geographic area between the ranges of the races *canescens, pallescens,* and *major.* It differs from all three in lighter color; in addition, from *canescens* in larger size; from *pallescens* in smaller size and shorter tail; from *major* in slightly smaller size of skull and shorter tail.

Vernon Bailey (Proc. Biol. Soc. Wash., **15**: 118, 1902) described the subspecies *C. s. arens* from El Paso, Texas, which is not far-distant from the type locality of *C. s. ammophilus.* It seems clear after examining Bailey's material that the name *arens* does not apply to specimens from the dunes near Samalayuca. His race is very similar to *C. s. canescens.*

The race *ammophilus* may be restricted to the sand dunes around Samalayuca, Chihuahua. However, there are other sand dunes, quite extensive, to the west of Samalayuca, near Medanos and Barreal, Chihuahua. Possibly spotted ground squirrels of the subspecies *C. s. ammophilus* occur there. In parts of southern Chihuahua, Colima, and Durango, there are large, long-established dunes. Whether spotted ground squirrels, *Citellus spilosoma,* occur in these is not known, and if they should, the degree of paleness is unknown. Some specimens in our collections taken short distances from some of these dunes indicate that they are slightly paler than most *pallescens.* These specimens, however, are not as pale as *ammophilus.*

Specimens examined.—**Chihuahua**: 5½ mi. N. Samalayuca, 1; 4.8 mi. S Samalayuca, 1.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW CRAYFISH OF THE GENUS PROCAMBARUS FROM ALABAMA[1] (DECAPODA, ASTACIDAE)

HORTON H. HOBBS, JR.
University of Virginia
and MARGARET WALTON
Danville, Virginia

The new crayfish described below was collected from eight localities in the vicinity of Montgomery, Alabama, some 200 miles east of the single locality in which its closest relative, *Procambarus jaculus,* was found. The two species occur at approximately the same degree of latitude, and there is evidence that both are secondary burrowing species (Hobbs, 1942: 20), associated with temporary bodies of water.

We have named this crayfish in honor of our good friend, Dr. Ivey F. Lewis, former Director of the Mountain Lake Biological Station, who has aided and encouraged us in our studies for many years.

Procambarus lewisi, sp. nov.

Diagnosis.—Rostrum without marginal spines; postorbital ridges weak and without spines or tubercles; suborbital angle weak or rounded; lateral surface of carapace tuberculate with a single one larger than others immediately caudal to cervical groove; areola 13 to 24 times longer than broad and constituting 32.1 to 37.3 per cent of entire length of carapace. Simple hooks present on ischiopodites of third pereiopods in male, those on fourth bituberculate or knobbed. Palm of chela not bearded but with a row of seven to 11 tubercles. First pleopod of first form male with a slight shoulder on cephalic margin at base of distal seventh; mesial process non-corneous, slender, and extending caudodistad beyond the tips of the other terminal elements; cephalic process slender, lying cephalolateral to the central projection, tip corneous, and projecting distally; caudal process, a corneous, plate-like, sinuous projection, extends almost beak-like, and directed caudodistad but tilted slightly laterad. laterodistally across the caudolateral portion of the terminal end of pleopod; central projection, the largest of the terminal elements, corneous, Annulus ventralis movable with a prominent pair of caudolaterally directed arms; central area elevated (ventrally) with a longitudinal furrow in cephalic half; sinus, originating in cephalic furrow, S-shaped caudally.

Holotype Male, Form I.—Body subovate with the greatest length in

[1]Contribution from the Mountain Lake Biological Station and the Department of Biology, University of Virginia.

the dorso-ventral plane; abdomen and carapace subequal in length (31.5 and 31.4 mm.). Height in region of caudodorsal margin of cervical groove slightly less than width; greatest width of carapace slightly caudal to caudodarsal margin of cervical groove.

Areola about 23.4 times longer than broad with one or two punctations in narrowest part. Cephalic section of carapace about 1.7 times as long as areola (length of areola about 37.9 per cent of entire length of carapace).

Rostrum without marginal spines; margins only slightly elevated, a little thickened basally, and converging to a small indistinctly delimited acumen. Upper surface subplane basally and slightly concave cephalically with scattered punctations and with a row of them mesial to margins. No carina present. Postorbital angle obtuse and rounded. Subrostral ridges evident along basal third of rostrum. Branchiostegal spine very small but acute. Lateral surface of carapace granulate and with one tubercle slightly larger than other granulations on each side just caudal to cervical groove. Dorsal surface of carapace punctate. Cephalic section of telson with two spines in each caudolateral angle.

Epistome (Fig. 10) broader than long, its margins with a few small tubercles; cephalic border without a median projection. Antennules of the usual form with a small spine on lower surface of basal segment. Antennae broken. Antennal scale (Fig. 11) broad; broadest slightly distal to mid-length; lateral portion inflated, slightly convex laterally, and terminating distally in an acute spine; total length almost half that of areola (5.6 and 11.7 mm.).

Left chela (Fig. 7) with palm inflated and with setiferous squamous tubercles present on all surfaces. Inner margin of palm with a row of nine tubercles; below this row another consisting of seven tubercles; tubercles above this row somewhat more irregularly arranged; prominent tubercle on lower surface of palm at base of dactylopodite. Both fingers with moderately well defined, longitudinal, polished ridges above and below. Opposable margin of immovable finger with a row of 11 tubercles, the fourth from the base largest; below the distalmost tubercle in this row lies a very prominent one and a smaller one distal to the latter. Opposable margin of dactylopodite with two rows of tubercles, an upper one of 17 very small ones and a lower of nine; lower row originates at distal end of proximal fourth of finger and the proximal tubercle is largest. Crowded minute denticles present along distal half of opposable margins of both fingers and interspersed among the proximal tubercles. Setiferous punctations covering both fingers except for polished ridges and at base of dactylopodite where small tubercles are present.

Carpopodite of first left pereiopod tuberclate mesially and punctate on other surfaces. In addition to the usual arc of large tubercles along distal border, several smaller ones on mesial surface proximal to the large mesial one. Upper surface with a broad shallow oblique furrow. Meropodite tuberculate above, below, and mesiodistally; one tubercle on upper distal surface larger than others on upper surface; lower surface with the usual two rows, although lateral row somewhat irregular and both rows flanked by others on each side; the more regular mesial row consists of 15 tubercles. Lower surface of ischiopodite with a row of five tubercles.

Ischiopodites of third and fourth pereiopods with hooks (Figs. 8, 9); that on third simple and that on fourth bituberculate; neither opposed by a knob-like prominence on corresponding basipodite. Coxopodite of fourth pereiopod with a caudomesially projecting knob on caudomesial angle, and that of fifth with a ventrally directed projection near caudomesial angle.

First pleopods (Figs. 1, 5) symmetrically arranged and extending to coxopodite of third pereiopod when abdomen is flexed. Tip terminating in four distinct parts, three of which are corneous. No setae on distal half of appendage. For description see *Diagnosis.*

Morphotypic Male, Form II.—Differs from the holotype in the following respects: suborbital angles obsolete; epistome with a small cephalomedian projection; antenna extends caudad to base of third abdominal segment; inner margin of palm of chela with a row of seven or eight tubercles; opposable margins of fingers of chela with a single row of minute denticles, as opposed to crowded ones; hooks and prominences on proximal podomeres of pereiopods all reduced, and hook on ischiopodite of fourth pereiopod with no indication of the bituberculate condition. First pleopod (Figs. 2, 4) with all terminal elements represented; however, none corneous, and all shortened. An oblique transverse suture is present in the basal half of the appendage. See measurements.

Allotypic Female.—Differs from the holotype in the following respects: epistome broadly triangular with a small cephalomedian projection; inner margin of palm of chela with a row of eight tubercles; opposable margins of fingers of chela with a single row of minute denticles as in morphotype, but forming a knife-like edge; cephalic section of telson with three spines in the caudosinistral angle. Annulus ventralis (Fig. 6) movable and not covered in part by sternum immediately cephalic to it. See Diagnosis for description; also see measurements.

Measurements.—(In. mm.).		Holotype	Allotype	Morphotype
Carapace:	height	15.1	10.9	10.6
	width	15.5	10.9	10.6
	length	31.4	22.5	22.2
Areola:	width	0.5	0.4	0.4
	length	11.7	7.9	7.5
Rostrum:	width	5.1	4.0	3.9
	length	7.0	6.5	5.4
Chela:	length of inner margin of palm	11.1	4.2	4.2
	width of palm	8.9	3.9	3.9
	length of outer margin of hand	31.3	12.8	12.6
	length of dactyl	18.2	7.6	7.1

Type Locality.—Roadside ditch 18.8 miles east of Montgomery, Macon County, Alabama, on Route 80. Here the ditch is some six feet wide and the muddy water ranged from a few inches to more than four feet in depth in some places. Grasses grew along the margins of the ditch and filamentous algae were abundant. At 12:45 P.M. on April 16, 1958, the temperature of the water was 12°C. The only other crayfish collected in this locality was *Procambarus acutissimus* Girard.

Disposition of Types.—The holotype, allotype, and morphotype are deposited in the U. S. National Museum (nos. 102467, 102468, and 102469, respectively). The paratypic series consists of 3♂♂, form II, 9♀♀, 13 juvenile♂♂, and 7 juvenile♀♀ in the collection of the senior author at the University of Virginia, and 1♂, form I, 4♂♂, form II, 8 juvenile♂♂, and 4 juvenile♀♀ are in the Tulane Collection.

Range.—In addition to the type locality, specimens are available from the following localities in Alabama. *Lowndes County*: Roadside ditch, 3.9 mi. S.W. of intersection of Rts. 11 and 80 on Rt. 11; Stream 32.4 mi. S. of Montgomery on U. S. Hwy. 31. *Montgomery County*: Roadside ditch 12.8 mi. S. of Montgomery on U. S. Hwy. 31; Roadside ditch 18.2 mi. E. of Montgomery on U. S. Hwy. 80; 2.5 mi. S.E. of junction of U.S. Hwy. 231 and Rt. 6; 3 mi. E. of Montgomery. *Macon County*: Stream and roadside ditch 0.8 mi. S. of Ft. Davis on U. S. Hwy. 29.

Relationships.—*Procambarus lewisi* has its closest affinities with *P. jaculus* Hobbs and Walton (1957: 48) but may be distinguished from it by the structure of the first pleopod and the bituberculate or knobbed hooks on the ischiopodites of the fourth pereiopods of the first form male and by differences in the annulus ventralis of the female. The antennal scale is also broader in *P. lewisi* than in *P. jaculus.*

Remarks.—There is little variation among the 52 specimens available; most of the crayfish are comparatively small and a discussion of variations within the species must await the procurement of a series of larger, unquestionably mature, specimens.

It seems probable that *P. lewisi* is a secondary burrower although most of the specimens were taken from open water. The fact that the majority of the individuals collected were young and were in company with other adult crayfish suggests that the more mature specimens were in burrows. Other species related to *P. lewisi* are known to be secondary burrowers—*P. planirostris* Penn (1953: 71), *P. hybus* Hobbs and Walton (1957: 39), and *P. mancus* Hobbs and Walton (1957: 44); also, the only specimens available of *P. jaculus* were taken from temporary water in a roadside ditch.

ACKNOWLEDGMENTS

We wish to express our appreciation to Dr. George H. Penn who has permitted us to examine the specimens of *P. lewisi* in the Tulane Zoological Collection and to Mr. Thomas L. Johnson of the University of Virginia who assisted in collecting most of the specimens on which this description is based.

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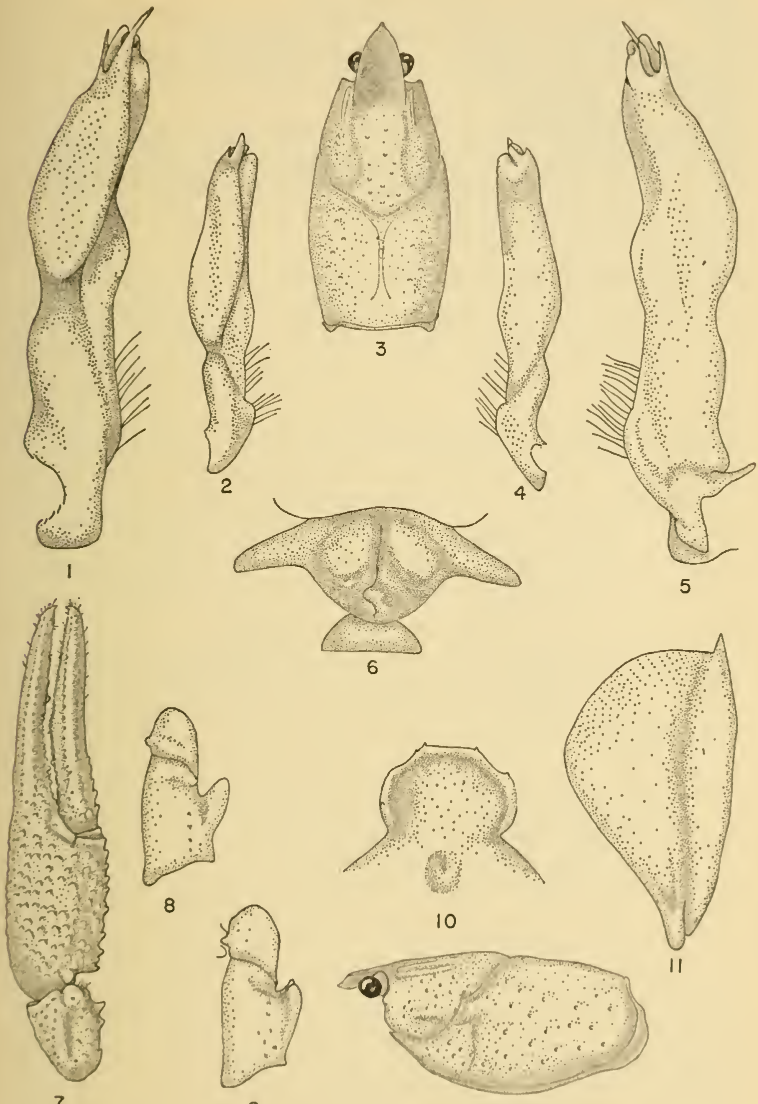

Explanation of Plates

Procambarus lewisi

Fig. 1. Mesial view of first pleopod of holotype.

Fig. 2. Mesial view of first pleopod of morphotype.

Fig. 3. Dorsal view of carapace of holotype.
Fig. 4. Lateral view of first pleopod of morphotype.
Fig. 5. Lateral view of first pleopod of holotype.
Fig. 6. Annulus ventralis of allotype.
Fig. 7. Distal podomeres of cheliped of holotype.
Fig. 8. Basipodite and Ischiopodite of third pereiopod of holotype.
Fig. 9. Basipodite and Ischiopodite of fourth pereiopod of holotype.
Fig. 10. Epistome of holotype.
Fig. 11. Antennal scale.
Fig. 12. Lateral view of carapace of holotype.

Vol. 72, pp. 45-54 May 1, 1959

PROCEEDINGS
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A NEW SPECIES OF SOUTH AMERICAN BROCKET, GENUS *MAZAMA* (CERVIDAE)

By Philip Hershkovitz
Curator of Mammals, Chicago Natural History Museum

The dwarf deer of the Amazonian flanks of the Andes of northern Bolivia and southern Peru variously recorded in scientific literature as pudus (*Pudu mephistophiles*) or as indeterminate brockets, prove to be representatives of a hitherto unnamed species of *Mazama.*

Thanks are here expressed to the authorities of the American Museum of Natural History for permission to describe the specimen here selected as type, and to the authorities of the United States National Museum for the loan of additional material.

The following abbreviations are used in the list of specimens examined:

AMNH = American Museum of Natural History
CNHM = Chicago Natural History Museum
USNM = United States National Museum

Mazama chunyi, new species

[?] *Pudua mephistophelis* [sic], Matschie (not de Winton), 1899, Sitzb. Gesellsch. Naturf. Fr. Berlin, p. 130—part, BOLIVIA.

Pudu mephistophiles, Sanborn (not de Winton), 1952, Mus. Hist. Nat. "Javier Prado," (A), Zool., no. 12:8—PERU: Chuntahuampa, Sandia, Puno; San Juan, Sandia, Puno.

[?] *Pudua* sp., Eaton, 1916, Mem. Connecticut Acad. Arts Sci., 5:15—PERU: Machu Picchu, Cusco (scapula in Indian burial cave).

Pudua [sp.], Tate, 1931, Journ. Mammal., 12:252—BOLIVIA: "temperate forest of the eastern slopes of the Cordillera Real."

Mazama species, Thomas, 1920, Proc. U.S. Nat. Mus. 58:242—PERU: Santa Ana, Cusco, 3480 feet.

Mazama sp., Sanborn, 1951, Publ. Mus. Hist. Nat. "Javier Prado," (A), 6:25—PERU: Tío, Marcapata, Cusco, 2000 meters.

Type.—Male, juvenal, skin and skull, American Museum of Natural History no. 73098; collected 28 May, 1926, by G. H. H. Tate.

Type locality.—Cocopunco, a site on the eastern slope of the Cordillera Real on the road to Mapiri, La Paz, Bolivia; altitude, about 3200 meters.

Distribution.—The Andes of northwestern Bolivia and southeastern Peru in the headwaters of the Río Beni (La Paz, Bolivia), Río Madre de Dios (Puno and Cusco, Peru), and the Río Urubamba (Cusco).

Diagnosis.—Smallest species of *Mazama*, size as in *Pudu pudu.*

Description.—General color of head and body cinnamon brown to rufous brown, shoulders and outer side of limbs more uniformly brown than back; individual cover hairs of back drab basally, buff or rufous terminally except for the fine dark brown tips; inner side of ears, lateral narial patch and mental patch white; throat, chest, inner sides of fore and hind legs buff to ochraceous-tawny; belly white; tail short, like rump above, sharply defined white beneath; external opening of preorbital gland small; tarsal and metatarsal tufts present and concealing corresponding glands; fore and hind hoofs long and slender, their greatest width slightly more or less than one-half greatest length; dew claws longer than wide.

Nasals at midline shorter than frontals at midline; diastema shorter than alveolar length of upper cheek teeth; antorbital fossa shallow or dish-shaped, without fenestrations; superior portion of ascending ramus of premaxillary reaching lateral tips of nasals; long axis of antorbital vacuity oblique; area of vacuity less than one-half plane area of facial plate of lacrymal; greatest supraorbital breadth less than width of braincase (Plates 1, 2).

Antlers as usual in the genus, spike-like and, judged by a fragmentary skull from Santa Ana, Peru, short, delicately formed, directed straight back in line with dorsal plane of forehead, burr comparatively simple and little differentiated from pedicle.

Coloration of type.—Back and sides of head and body wood brown ticked with buff; juvenal spot pattern faintly defined on lower back; lateral band, chest and inner sides of thighs ochraceous buff, belly white; upper surface of muzzle, forehead, crown, outer side of ears, chin and lips brown, inner side of ears white; lateral narial patch trimmed in type, white in female from Tío, Peru; mental patch white, throat ochraceous buff; limbs brown.

Variation.—Peruvian specimens from San Juan (1500 meters) and Tío (2000 meters) are darker, more reddish brown on dorsal surface, more reddish on underparts, and with pelage harsher, than the type. The hairs at anterior base of each ear are whorled in the Tío specimen, and the lower anterior border of each ear presents a white patch. A trimmed pelt from Chuntahuampa, Peru (2500-3000 meters), is intermediate in color and texture of pelage between the specimens from lower altitudes and the type from 3200 meters above sea level.

Available material suggests that the difference in color between the pale holotype of the temperate zone of the Andes in Bolivia and the darker individuals of the subtropical zone of the same slope of the Andes in Peru, is clinal.

Measurements (in millimeters).—Those of the type, a juvenal with milk premolars and unerupted third molars, followed by the external measurements of an adult ♀ from Tío, Peru, and the cranial measurements of an adult ♀ from San Juan, Peru. Head and body, 706, 720; tail, 24,—; hind foot, 124, 164; ear,—, 63 (notch); greatest length of skull, 117, 146; zygomatic breadth, 60, 66.9; greatest supraorbital breadth, 35, 40; width of braincase, 43.2, 47.7; nasals 27.1, 37.9; diastema, 30.2, 40.5; cheek teeth, 37.8 (dpm^2—m^2), 44.7 (pm^2—m^3); antlers, from base of burr, in a male from Santa Ana, Peru, 51 (right), 52 (left).

Comparisons.—Though pudu-like in size and general appearance *Mazama chunyi* differs from true pudus (*Pudu pudu* Molina and *P.*

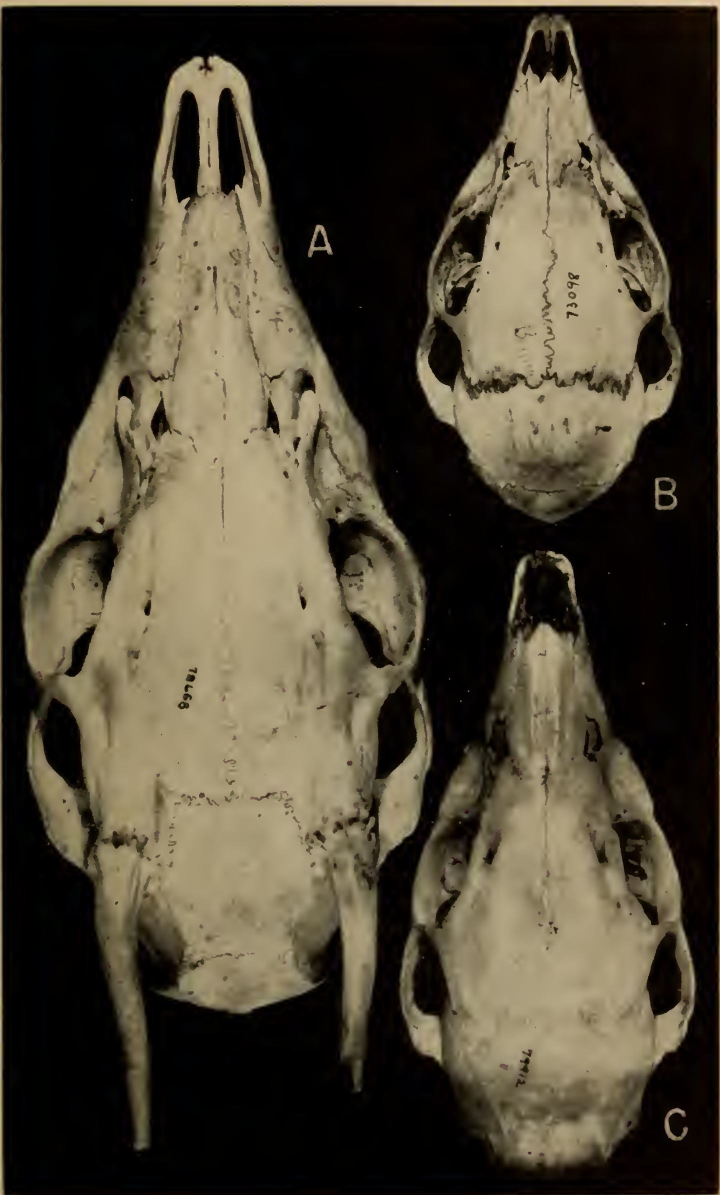

Plate 1

mephistophiles de Winton) chiefly by the following characters: External cuneiform present as a discrete tarsal bone; first incisor (Plate 5B) broadly spatulate, its greatest width more than combined width of second and third incisors; presence of white mental and narial patches; tail distinguishable from rump, its undersurface sharply defined white. The preorbital gland in *M. chunyi* is small, the preorbital fossa shallow, as in *Pudu mephistophiles,* while in *Pudu pudu* the gland is large, the fossa deep or bowl-shaped (Plate 3A-D).

The chunyi, or dwarf, brocket is distinguished from the much larger hed brocket, *Mazama americana,* the only sympatric congener, by absence of whorl or reversed direction of hair growth on nape, absence of supraorbital streak or circumorbital band, and by the much shorter tail. The brown brocket, *Mazama gouazoubira,* averages smaller than the red, but is still appreciably larger than *M. chunyi,* paler throughout, with tail very much longer, supraorbital streak or spot usually present and hoofs broader. *Mazama rufina* described from the Andes of Ecuador, but not known to occur in Peru or Bolivia, differs from *M. chunyi* by its deeper red or reddish-black body color, contrastingly darker metapodials, and the extremely large preorbital gland with the correspondingly deep, bowl-shaped preorbital fossa as in *Pudu pudu* (Plate 3D).

Habitat and habits.—The discovery of the type specimen of *Mazama chunyi* is told by Tate (1931, Journ. Mammal., 12:252) as follows: ''These diminutive deer have been recorded only occasionally. The temperate forest of the Cordillera Real (Bolivia) contains numbers of this animal. In the tangled moss-hung woods signs of them were frequent in the form of foot-prints and droppings. In one valley-head where they seemed most plentiful we set out a regular mine-field of steel traps and managed in this way to catch one.''

Presence of the chunyi brocket in southeastern Peru was suspected by Mrs. Hilda Heller a year before she actually sent two specimens to the Chicago Natural History Museum. According to her field notes dated 1950, ''there is a tiny red deer with spike horns in the hot and cold zones in forest land and in brush land in the Sandia and Tambopata valleys. It is called *chunitaruca, chuni* meaning small and taruca [*or taruga*] meaning deer.'' In her notes for 1951, Mrs. Heller corrected the spelling of the local name of the deer to *chuñitaruca.* She gives this account of the first specimen secured. ''Chuñitaruca. M194♀ [CNHM 79912] . . . found in the Tambopata River at San Juan. The river had been high. The finders believed the hair [of most of the hide] had been torn off by the current or the friction of the rocks; the meat was considered fresh enough to eat. When I received the skin it was really dry, but I suspect, from a slight bloom on the moist part of the neck, that it would not stand tanning. Altitude or origin unknown. The species occurs at San Juan, 5000 feet, and at Sandia, 7,500 feet, perhaps higher.'' in addition to the damaged hide, Mrs. Heller salvaged the skull intact and the foot bones.

The second specimen, a hide with the head, limbs and tail trimmed off, was purchased in Sandia from a woman ''who had it from her people in Chuntahuampa near Pucarimayo on the old road to Valle Grande at a fairly high altitude. They called it *chuñitaruca.*''

Mrs. Heller adds that ''December is the month in which [chunyi

Plate 2

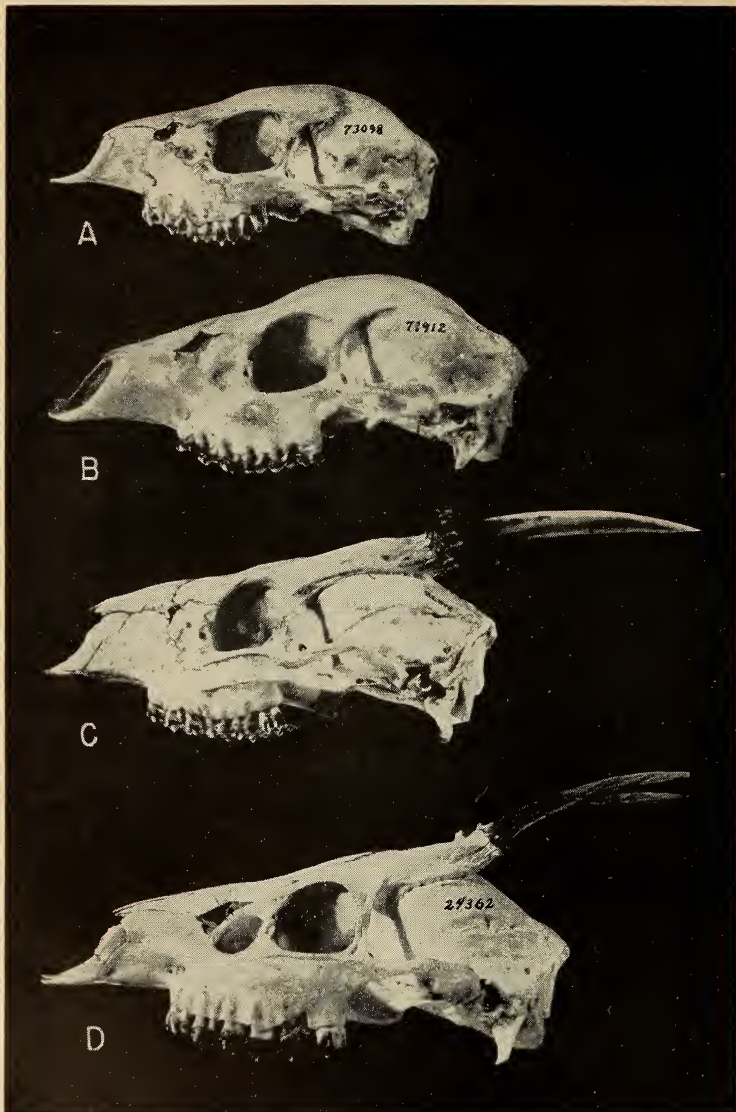

Plate 3

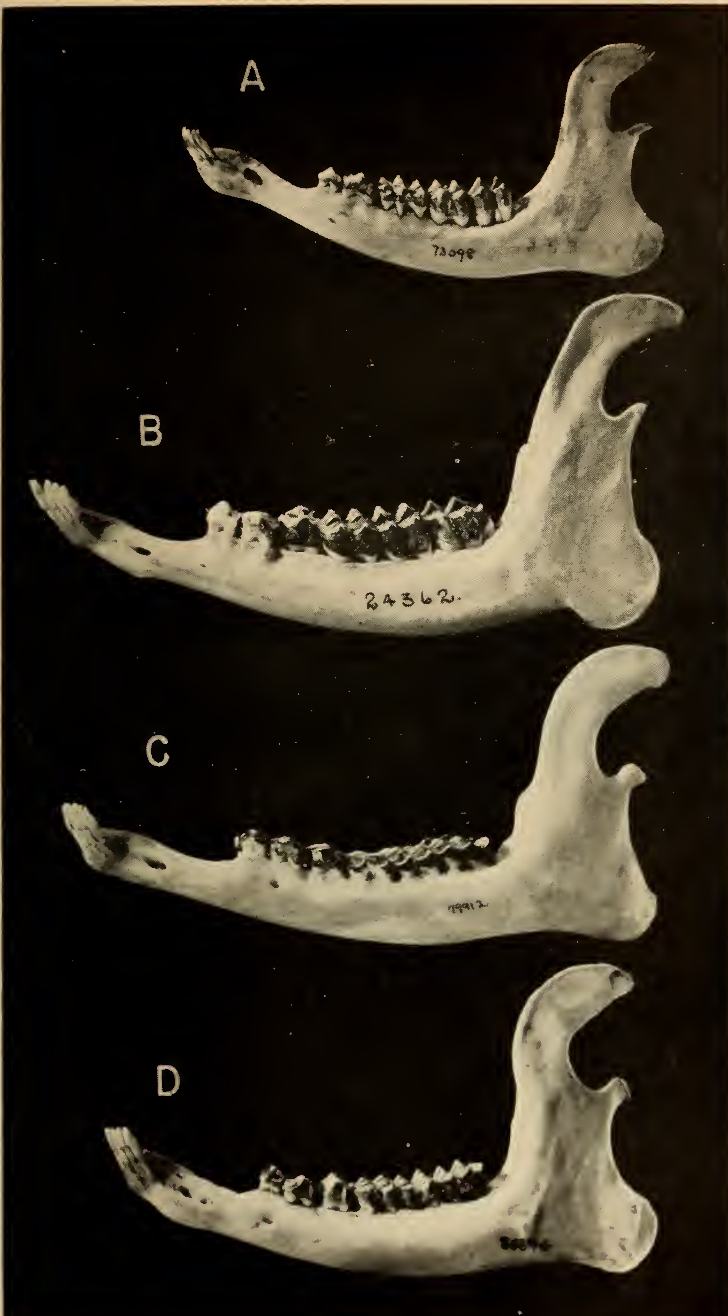

Plate 4

brockets] are usually obtained, for it is then that they come to eat potatoes. Because of their small size (weight about 25 pounds), they are not hunted by sportsmen for meat, but by the farmers in order to protect the potatoes.''

Remarks.—The external, osteological and dental characters of *Mazama chunyi* used in the above comparisons with the two known species of *Pudu,* serve to distinguish all brockets from pudus.

Present material representing *Mazama chunyi* is fragmentary but each part whether skin, skull or foot bones, is identifiable as representing an extremely small species of *Mazama.* The holotype, a juvenal male with the second upper molars not quite fully in place and without trace of antler pedicles, is the only specimen with both skin and skull in good condition. The state of each of the remaining specimens is described in the following section.

Specimens examined.—5. BOLIVIA: Cocopunco, La Paz, the type (AMNH); PERU: Tío, near Marcapata, Quispicanchi, Cusco, skin (CNHM); San Juan, Río Tambopata, Sandia, Puno, trimmed and partially bare skin, skull, foot bones (CNHM); Chuntahuampa, near Pucarimayo, Río Huari Huari (upper Río Inambari), Sandia, Puno, 1 trimmed hunter's pelt (CNHM); Santa Ana, Río Urubamba, Cusco, posterior half of skull with antlers intact (USNM).

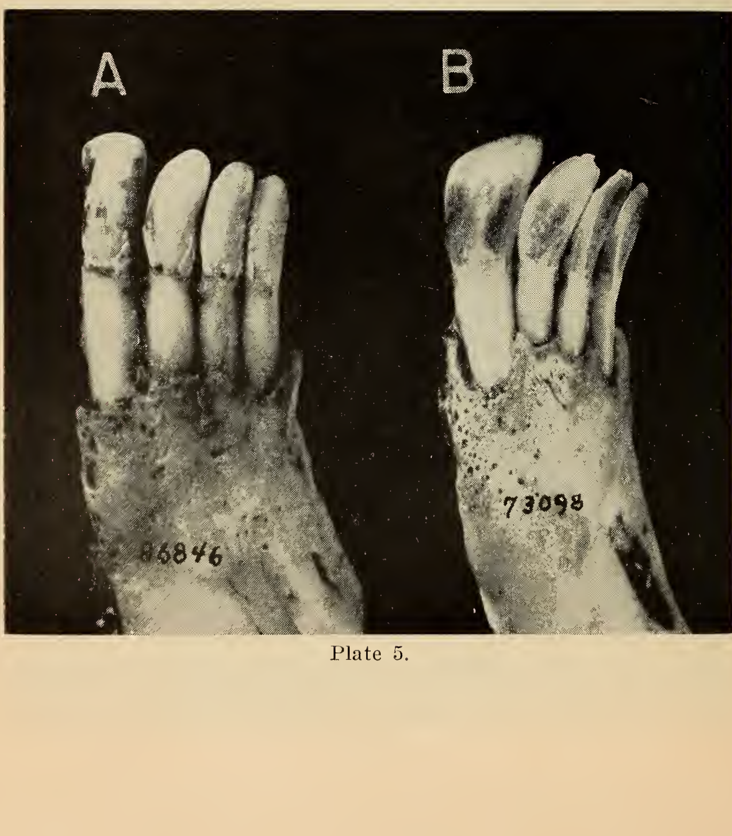

Plate 5.

Explanation of Plates.

Plate 1. Dorsal aspect of skulls of

A, *Mazama americana whitelyi* (Quincemil, Marcapata, Cusco, Peru).
B, *Mazama chunyi* (type, Cocopunco, Bolivia);
C, *Mazama chunyi* (San Juan, Peru).

All figures slightly over ½ × natural size.

Plate 2. Ventral aspect of same skulls shown in Plate 1.

Plate 3. Side view of skulls of

A, *Mazama chunyi* (type);
B, *Mazama chunyi* (San Juan, Peru);
C, *Pudu mephistophiles* (Malvasá, Cauca, Colombia);
D, *Pudu pudu* (Chiloé Island, Chile).

All figures slightly under ½ × natural size.

Plate 4. Left mandibles of

A. *Mazama chunyi* (type);
B. *Pudu pudu;*
C. *Mazama chunyi;*
D. *Pudu mepjhistophiles.*

All figures slightly over ½ × natural size.

Plate 5. Lower front teeth (approximately ×4) of

A, *Pudu mephistophiles;*
B, *Mazama chunyi* (type).

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PROCEEDINGS
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A NEW GENUS AND TWO NEW SPECIES OF LEAF-HOPPERS FROM SOUTH AMERICA (HOMOPTERA: CICADELLIDAE: NEOCOELIDIINAE)

By James P. Kramer
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and Rauno Linnavuori
Turku, Tyttölyseo, Finland

The new leafhoppers characterized in this paper are rather notable insects. The collection localities indicate that these species are jungle dwellers in the hinterlands of South America. They represent the largest members of the subfamily Neocoelidiinae as yet described. Superficially, their habitus is reminiscent of some of the larger Neotropical Gyponinae. However, this similarity fades with a closer examination.

Megacoelidia new genus

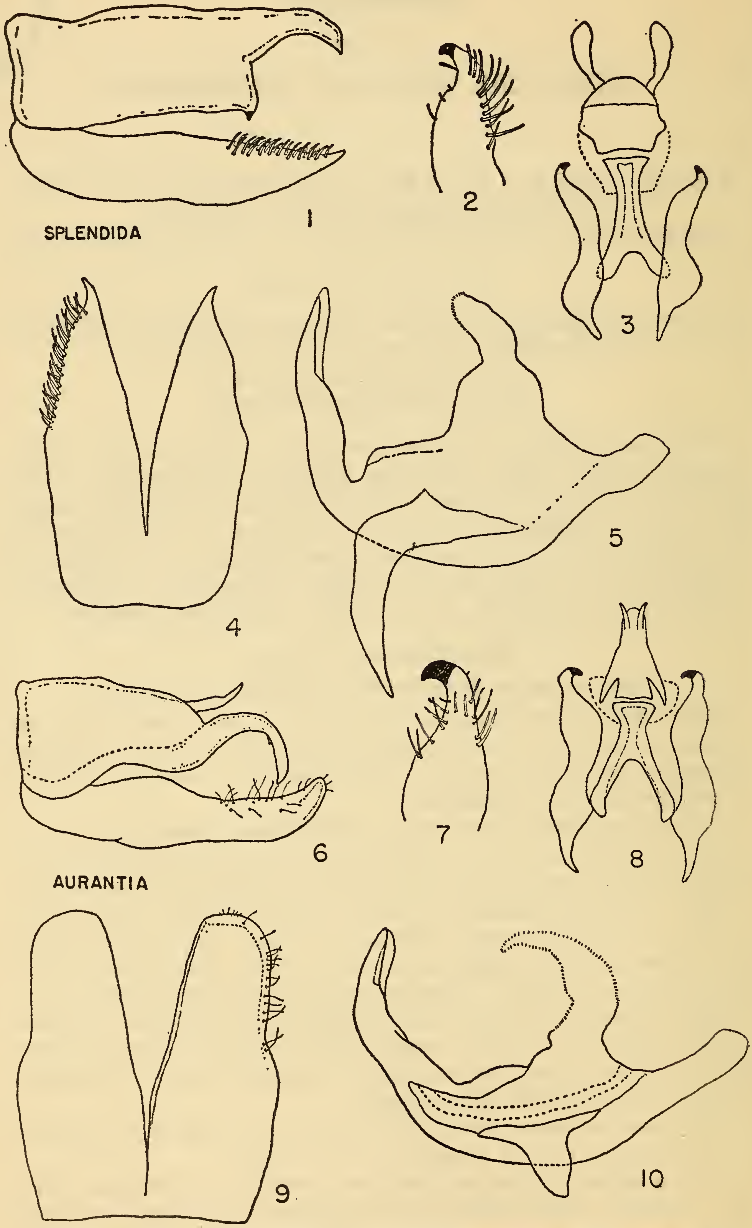
Type of genus **Megacoelidia splendida** new species

While *Megacoelidia* does not appear to be very close to any described genus, it has the exceedingly long antennae plus the carina separating the face and crown which represents a condition found in several genera of Neocoelidiinae.

Large robust leafhoppers. Head comparatively small, slightly less than two-thirds as wide as pronotum. Eyes rather small. Crown subquadrate, much wider than long, produced beyond eyes and distinctly concave. Posterior margin of crown carinate, lateral margins subcarinate. A distinct carina running transversely between ocelli which are on the anterior margin of the crown. Face long, with clypellus exceeding genae distally. Clypellus parallel sided and medianly subcarinate. Oblique ledge above each antennal pit well developed. Antennae longer than body. Pronotum large, slightly indented on posterior margin. Scutellum large and triangular. Tegmina long, with venation similar to that of other Neocoelidiinae.

Coloration in known species deep orange to orange with a narrow black border on apex of tegmina.

Male genitalia. Plates large and fused basally. Valve lacking. Pygofer variously modified distally with elongations or processes. Connective



Megacoelidia splendida (figs. 1-5) and *Megacoelidia aurantia* (figs. 6-10). 1 and 6, lateral view of pygofer and male plate; 2 and 7, apex of style; 3 and 8, ventral aspect of styles, connective, and aedeagus; 4 and 9, male plates; 5 and 10, lateral view of aedeagus.

Y-shaped and clearly articulated with the aedeagus. Style slender with one apical lobe. Aedeagus stout with apical portion recurved. Gonopore opens dorsally and below the apex.

Megacoelidia splendida new species

Length.—Male 13 mm.

Coloration.—Venter and legs pale orange. First tibia with a black stripe its length on anterior face. Second tibia with a black stripe on basal half. Third tibia with an elongate basal spot. Face pale orange. Scape and pedicel light brown, flagellum dark brown. Crown orange. Pronotum mainly orange, tending to yellow cephalad and with a narrow black border on posterior margin. Scutellum yellow. Tegmina orange, basally of a slightly darker shade, with a narrow black border on apex.

Male genital structures.—(figs. 1-5) Male plates pointed apically, points turning laterad. Apex of pygofer with a dorsal extension and ventral tooth. Aedeagus stout with a pair of long lateral processes and recurved apically. Gonopore opens dorsally at base of recurved portion.

HOLOTYPE Male, Esperanza, Brazil, State of Amazonas, August 9, 1920. U.S.N.M. type number 64652. Female unknown.

The black posterior margin of the pronotum and the many differences in the genitalia will separate this species from the only other known member of the genus.

Dr. Henry Dietrich of Cornell University very kindly supplied the following original collection data: ''Brazil, Amazonas. Down the Rio Solimões from Brazilian frontier, Tabatinga and Esperanza and mouth of Rio Javari, (early Aug. 9) to Capacetes, São Paulo de Olivença and beyond.'' Rio Solimões is that portion of the Amazon River bordering the southernmost tip of Colombia and runing into Peru. Both Tabatinga and São Paulo de Olivença are towns on the Rio Solimões in Brazil. Tabatinga is very near the Colombian border and is situated directly southeast of Leticia, Colombia. Rio Javari is the river which separates Brazil and Peru on the northern portion of their common border. The only ''Esperanza'' in this section of Brazil is Boa Esperança on the Jandiatuba River which is situated slightly east and south of São Paulo de Olivença.

Megacoelidia aurantia new species

Length.—Male 13 mm.

Coloration.—Venter and legs pale orange. First tibia like *splendida*. Second and third without black markings. Face and antennae like *splendida*. Crown, pronotum, scutellum, and tegmina a uniform deep orange. Tegmina with a narrow black apical border as in *splendida*.

Male genital structures.—(figs. 6-10) Male plates with apex broadly rounded and blunt. Apex of pygofer with a short dorsal process and a long decurved ventral process. Aedeagus stout, apex recurved, with a pair of short lateral processes. Gonopore opens dorsally near base of recurved portion.

HOLOTYPE Male, Chaparé (Yungas), Bolivia, 1-49, Bridarolli. U.S.N.M. type number 64653. Female unknown.

The lack of a black posterior margin on the pronotum and the distinctive genital structures will separate *aurantia* from *splendida.*

Chaparé is the name of a river, and Yungas is a general region. Both of these are now included in the Bolivian state of Cochabamba.

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PROCEEDINGS

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A SYNOPSIS OF THE OSTRACOD (CRUSTACEA) GENUS *CYPRIDOPSIS* WITH THE DESCRIPTIIN OF A NEW SPECIES[1]

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Brady (1867) established the genus *Cypridopsis* and designated *Cypridopsis vidua* (=*Cypris vidua* O. F. Müller 1776) the type species. The genus includes ostracods of the family Cypridae that have the following description: Shell high, tumid; valves approximately the same size; natatory setae of both antennae well developed; terminal podomere of the maxillary palp longer than wide; furca reduced to a base, tapering distally to a seta.

Brady and Norman (1896) proposed the genus *Pionocypris* for ostracods with the left valve larger than the right, but otherwise essentially similar in general morphology to members of the genus *Cypridopsis*. They designated *C. vidua* the genotype of the new genus *Pionocypris* and restricted the genus *Cypridopsis* to individuals having the right valve longer than the left. The literature contains instances in which *Pionocypris* has been confused through misspelling with *Prionocypris* Brady and Norman 1896.

The genus *Pionocypris* is of questionable validity. An examination of the sketches and a review of the descriptions of the species of *Pionocypris* suggest that they may properly be assigned to the genus *Cypridopsis*. In view of the foregoing it is proposed that *Pionocypris* Brady and Norman 1896 be absorbed into the older genus *Cypridopsis* Brady 1867.

Representatives of the genus *Cypridopsis* are widely distributed. Of the forty two species listed in this paper, twenty one have type localities in Africa, eleven are from North America, and five have been described from Europe. Several of the species reported by Sars (1924a) from Africa, and the South American species described by Sars (1901) were transported in dried mud to Sweden where they were cultured in aquaria.

[1]Acknowledgment is made of the assistance of Miss Alice Boatright, Staff Artist, Department of Zoology, Universiy of Illinois, who prepared the drawings, and of Mrs. Corinne A. Ferguson who prepared specimens for study.

Members of the genus range in length from 0.35 mm. for *C. yucatanensis* Furtos 1938, probably the smallest freshwater ostracod known, to 0.90 mm. for *C. aldabrae* Müller 1898. Apparently all members of the genus are free-living. However, Deschiens, Lamy and Lamy (1953) report that *C. hartwigi* Müller 1900 has been observed preying upon snails of the species *Bullinus contortus* Michaud 1829 and *Planorbis glabratus* Say 1828.

Wherever possible the length, height, and color of the valves and the geographical distribution have been recorded for a species. There are numerous instances in which investigators neglected to give full descriptions of their species. Indeed, the scanty morphological characteristics upon which several species of *Cypridopsis* have been established may reasonably lead to some doubt as to their validity.

SPECIES OF CYPRIDOPSIS

C. aculeata (Costa 1852)
Size: Length of female 0.72 mm. Males unknown.
Color: Dark bluish-green.
Distribution: Europe, Iceland, Central Asia, Africa.

C. aldabrae Müller 1898
Size: Length of female 0.90 mm. Males smaller than females.
Color: Not recorded.
Distribution: Aldabra, East Africa; Southwest Africa.

C. brevis Sars 1924a
Size: Length of female 0.50 mm. Males unknown.
Color: Bright emerald green.
Distribution: Bergvliet Flats, South Africa. Cultured in an aquarium from dried mud.

C. brevisetosa Klie 1943
Size: Length of female 0.70 mm; height 0.35 mm. Length of male 0.63 mm; height 0.34 mm.
Color: Bright green in region of adductor muscles; ends and ventral margin are yellowish-brown.
Distribution: Morocco.

C. clavata Sars 1924a
Size: Length of female 0.78 mm. Males unknown.
Color: Not recorded.
Distribution: South Africa.

C. dadayi Mehes 1913
Size: Length of female 0.58 mm; height 0.32 mm. Males unknown.
Color: Brownish-green.
Distribution: Bogota, Colombia.

C. echinata Müller 1909
Size: Length of female 0.72 mm. Males unknown.
Color: Dark green.
Distribution: South Africa.

C. elizabethan Sars 1924a
Size: Length of female 0.70 mm. Males present, but less numerous than females.
Color: Light yellowish-green with patches of darker hue in dorsal region.
Distribution: South Africa. Cultured in an aquarium from dried mud.

C. flavescens Sars 1901
Size: Length of female 0.63 mm. Males unknown.
Color: Not recorded.
Distribution: Argentina. Cultured in aquarium from dried mud.

C. fuhrmani Mehes 1913
Size: Length of female 0.68 mm; height 0.41 mm. Males unknown.
Color: Greenish-yellow.
Distribution: Bogota, Colombia; Argentina.

C. glabrata Sars 1924a
Size: Length of female 0.87 mm. Males smaller than females.
Color: Dark olivaceous.
Distribution: South Africa. Cultured in an aquarium from dried mud.

C. gregarina Sars 1924a (= *C. triquetra* G. W. Müller)
Size: Length of female 0.80 mm. "Male of somewhat smaller size."
Color: Dark brownish-green.
Distribution: Union of South Africa.

C. hartwigi Müller 1900
Size: Length of female 0.80 mm. Males unknown.
Color: Slate gray.
Distribution: Germany; Morocco.

C. helvetica Kaufman 1892
Size: Length of female 0.62 mm; height 0.40 mm. Males unknown.
Color: Green with three darker bands, the middle one imperfectly developed.
Distribution: Switzerland.

C. hirsuta Sars 1924a
Size: Length of female 0.80 mm. Males unknown.
Color: Not recorded.
Distribution: South Africa.

C. inaudita Furtos 1936a
Size: Length of female 0.72 mm; height 0.40 mm. Males unknown.
Color: The color had been destroyed by a preservative.
Distribution: Yucatan.

C. lusatica Schäfer 1943
Size: Length of female 0.64 mm; height 0.33 mm. Male unknown.
Color: Yellowish-brown.
Distribution: Morocco.

C. *mexicana* Furtos 1938
Size: Length of female 0.35-0.38 mm; height 0.25-0.26 mm. Males unknown.
Color: "Undetermined due to action of preservatives on pigments."
Distribution: Yucatan.

C. *musquizensis* Tressler 1954
Size: Length of female 0.70 mm; height 0.44 mm. Length of male 0.62 mm; height 0.41 mm.
Color: Not recorded.
Distribution: Texas.

C. *niagraensis* Furtos 1936a
Size: Length of female 0.58 mm; height 0.35 mm. Males unknown.
Color: "Three dorso-lateral bands of dark hue."
Distribution: Yucatan.

C. *obscura* Sars 1901
Size: Length of female 0.70 mm. Males unknown.
Color: Dark green with darker shadows, but without well formed bands.
Distribution: Argentina. Cultured in an aquarium from dried mud.

C. *ochracea* Sars 1924a
Size: Length of female 0.78 mm. Males unknown.
Color: Pale yellow.
Distribution: South Africa.

C. *okeechobei* Furtos 1936b
Size: Length of female 0.64 mm; height 0.40 mm. Length of male 0.58 mm; height 0.37 mm.
Color: Light yellow with three dark-green dorso-lateral bands.
Distribution: Florida.

C. *phantomensis* Tressler 1954
Size: Length of male 0.64 mm; height 0.44 mm. Females not observed.
Color: Not recorded.
Distribution: Texas.

C. *pincta* (Strauss 1821)
Size: Length of female 0.60 mm. Males unknown.
Color: Green with three lateral gray bands.
Distribution: France.

C. *pinguis* Sars 1901
Size: Length of female 0.80 mm. Males unknown.
Color: Not recorded.
Distribution: Argentina. Cultured in an aquarium from dried mud.

C. *potamis* Tressler 1954
Size: Length of female 0.60 mm; height 0.40 mm. Males unknown.
Color: Not recorded.
Distribution: Texas.

C. punctata Sars 1924b
Size: Length of female 0.70 mm. Males unknown.
Color: Not recorded.
Distribution: Southwest Africa.

C. pygmaea Sars 1924a
Size: Length of female 0.45 mm. Males unknown.
Color: Not recorded.
Distribution: South Africa. Cultured in an aquarium from dried mud.

C. pyramidata Sars 1924a
Size: Length of female 0.59 mm. Males unknown.
Color: Not recorded.
Distribution: South Africa.

C. reniformis Sars 1924a
Size: Length of female 0.80 mm. Males unknown.
Color: Not recorded.
Distribution: South Africa.

C. rhomboidea Furtos 1936a
Size: Length of female 0.68 mm; height 0.40 mm. Males unknown.
Color: Not recorded.
Distribution: Yucatan.

C. spinifera Sars 1924a
Size: Length of female 0.80 mm. Males present, but in smaller numbers than females.
Color: Dark green.
Distribution: Union of South Africa.

C. striolata Sars 1924a
Size: Length of female 0.54 mm. Males unknown.
Color: Dark Green.
Distribution: Cultured in an aquarium from dried mud. South Africa.

C. tonsa Sars 1924a
Size: Length of female 0.78 mm. Males unknown.
Color: Not recorded.
Distribution: South Africa.

C. toyensis Tressler 1954
Size: Length of female 0.61 mm; height 0.34 mm. Males unknown.
Color: Reddish-brown.
Distribution: Texas.

C. trigonella Sars 1924a
Size: Length of female 0.63 mm. Males unknown.
Color: Light green with a distinct orange tinge on posterior portion of shell; the orange color is due to ripe ova.
Distribution: South Africa. Cultured in an aquarium from dried mud.

C. tumidula Sars 1924a
Size: Length of female 0.58 mm; length of male 0.50 mm.

Color: Not recorded.

Distribution: South Africa. Cultured in an aquarium from dried mud.

C. vidua (O. F. Müller 1776) Brady 1867

Size: Length of female 0.64-0.72 mm; height 0.40-0.45 mm. Males unknown.

Color: Ground color green or white with dark green or black transverse bands.

Distribution: Common throughout the Holarctic region, and also reported from the Neotropical.

C. viduella Sars 1896

Size: Length of female 0.60 mm; height 0.30 mm. Males unknown.

Color: Not recorded.

Distribution: Africa; Yucatan.

C. yucatanensis Furtos 1936a

Size: Length of female 0.35 mm; height 0.25 mm. "Males slightly smaller than females."

Color: Destroyed by preservative.

Distribution: Yucatan.

Cypridopsis canadensis, n. sp.

Figs. 1-4.

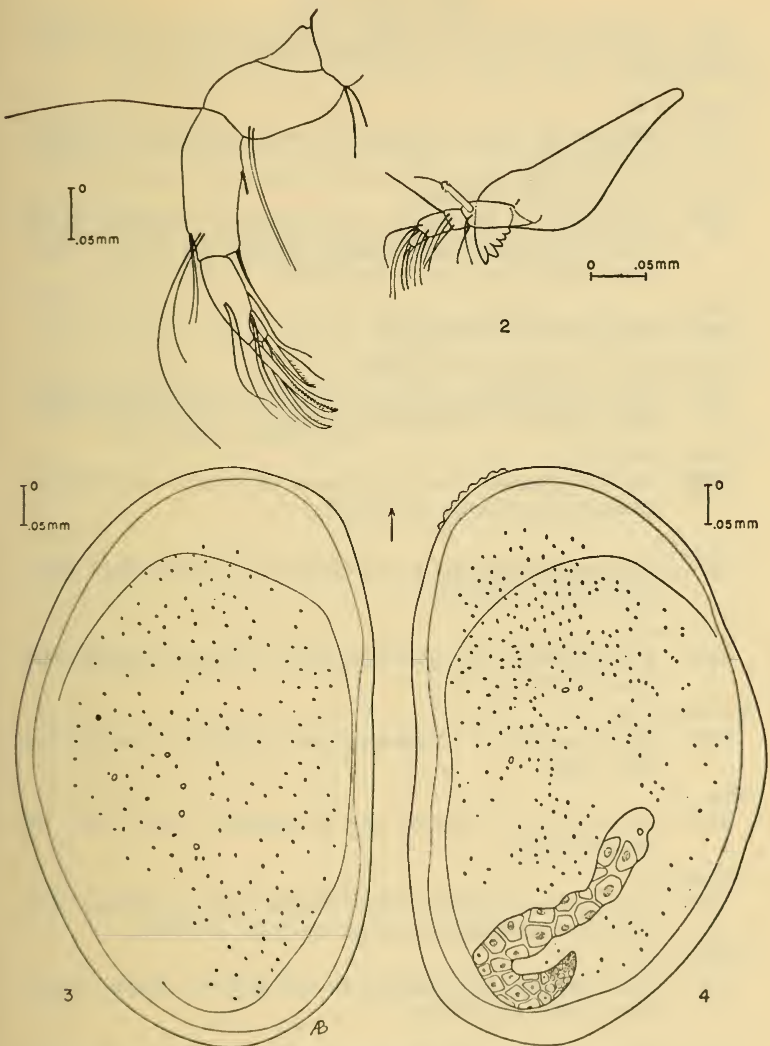
Specific characters.—*Female*. Shell ovoid, tumid; height approximately three-fifths of the length; greatest height at or near the middle. Dorsal margin of the left valve evenly arched, ventral margin almost straight; anterior and posterior extremities broadly rounded. Dorsal margin of the right valve with sinuations anterior and posterior to the middle; extremities rounded; antero-ventral margin serrated; ventral margin slightly sinuated. Surfaces of valves with short hairs and puncta; submarginal line considerably removed from anterior extremity. Color gray, without transverse bands. Length 0.76 mm., height 0.46-0.47 mm. Natatory setae of second antennae barely reaching the tips of the end-claws. The proximal podomere of the mandibular palp with a distinctive seta-bearing club.

Male.—Unknown.

Remarks.—The size, color, and shape of the valves, and the peculiar seta-bearing club of the mandibular palp constitute a group of characters that serve to distinguish *Cypridopsis canadensis* n. sp. from all other members of the genus.

Type locality.—*C. canadensis* n. sp. was collected by Dr. Richard W. Coleman on August 14, 1957 from a pool near Coop Petroleum Products, Southey, Saskatchewan, Canada.

Type specimens. A stained microscopic mount of the holotype female and one paratype female preserved in ethyl alcohol are deposited in the United States National Museum. Catalogue numbers are for the holotype USNM 102576 and for the paratype USNM 102577.



PLATE

Cypridopsis canadensis n. sp.—Drawings were made from a specimen stained with a 1% alcoholic solution of eosin Y and mounted in Canada balsam.

Fig. 1. Antepenultimate, penultimate, and ultimate podomeres of second antenna.

Fig. 2. Mandible with mandibular palp.

Fig. 3. Mesial view of left valve.

Fig. 4. Mesial view of right valve with ovary.

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PROCEEDINGS
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TWO NEW TROGLODYTIC MILLIPEDS FROM TEXAS

By Nell B. Causey
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Six, or possibly five, species of millipeds have been collected in Texas caves. Additional forms will certainly be discovered, for relatively little collecting has been done. These troglodytic millipeds are either cambalids or polydesmids and are not known to have close relatives in the nearby epigean habitats, where the dominant orders are Julida and Spriostreptida.

The following summary includes the millipeds and the caves from which they have been collected: *Eclomus specobius* Chamberlin 1952 and *Cambala caeca* Loomis 1953, which possibly are synonyms (Loomis, 1953), from both Wyatt Cave and Felton Cave, Sutton County; *Cambala* sp. from Mayfield Cave, Sutton County; *Cambala captiosa*, n. sp., from Beck's Ranch Cave, Williamson County; a small, eyeless cambaloid form, possibly epigean, of uncertain genus, from Big Mouth Cave, Wheeler County; *Speodesmus echinourus* Loomis 1939, from Prassel Ranch Cave, Kerr County, Ezell's Cave, Hays County, a tentative determination (Chamberlin, 1952) from Wonder Cave, Hays County, Schneider Cave and Cascade Cave, Kendall County; and *Speodesmus bicornourus*, n. sp., from Beck's Ranch Cave, Williamson County.

Cambala captiosa, new species

Figures 1-3

Diagnosis: An eyeless species closely resembling *C. caeca*, from which it can be distinguished by the absence of a caudally produced margin on the posterior angle of the collum and by the presence of hooked setae on the apex of the coxa of the posterior gonopod.

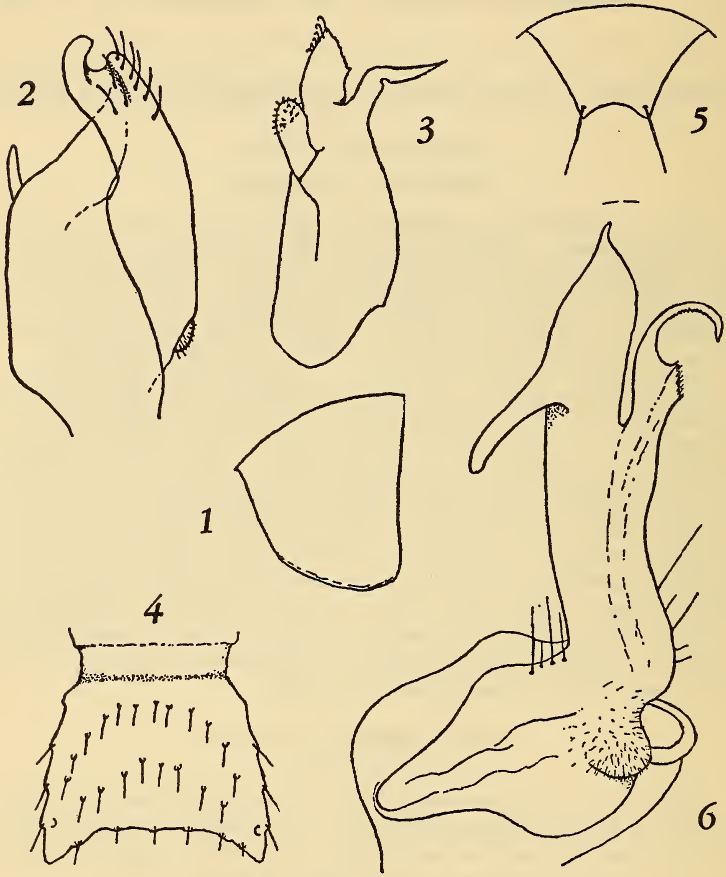
Type material: Male holotype, American Museum of Natural History; female and larval male paratypes in the author's collection.

Type locality: Beck's Ranch Cave, Beck's Ranch, 6 miles west of Round Rock, Williamson County, Texas, 1 ♂, 1 ♀, 1 larval ♂, Dec. 10, 1955, W. McAlister and D. Kyser.

Range: Known only from the type locality.

Description of male holotype: Length about 19 mm., width 1.5 mm., 41 segments, the last three legless. Dark brown in alcohol.

Head smooth, without ocelli, the clypeus with 4 widely spaced setae



EXPLANATION OF FIGURES

Cambala captiosa, n. sp., male holotype. Fig. 1. Collum, left lateral view. Fig. 2. Right anterior gonopod, ventral view. Fig. 3. Left posterior gonopod, lateral view.

Speodesmus bicornourus, n. sp., male holotype. Fig. 4. Sixteenth body segment, dorsal view. Fig. 5. Anal scale. Fig. 6. Right gonopod, posterior view.

and the labrum with about 14. Antennae thickened, the second segment almost twice as long as broad and segments 5 and 7 broader than long; segments in order of decreasing length 2, 3, 4, 5, 6, 1, 7. Collum as long as the next three segments combined; from a lateral view (fig. 1) the posterior margin appears almost straight; the lateral margin is slightly raised from the level of the dorsal ridge of the antennal furrow to the posterior angle; a few very indistinct horizontal triae can be seen on the posterior margin above the posterior angle. Segment 7 is approximately one-half broader than the second through the sixth segments. Tergites of the first three and the last segment are entirely smooth above; each of the remaining segments has six conspicuous dorsal crests and about 12 much less distinct crests and striae on the lateral and ventral surfaces; dorsal crests of segment 4 not as well developed as those of the following segments; segment 2 with a small lateral crest at about the level of the posterior angle of the collum; segments 2 and 3 with a few faintly indicated striae on the lateral and ventral surfaces. Pore crests begin on segment 5 and continue through penultimate segment and are typically the same height and length as the four plain dorsal crests; anterior half of pore crests about four times as broad as posterior half and slightly higher. Anal tergite as long as the two preceding segments, its apex not extending beyond the anal valves; anal valves smooth, inflated; preanal scale broad.

First legs composed of 5 segments, the basal one with an acute lateral lobe, the distal one with a terminal claw. Segments 3 and 4 of legpairs 6 and 7 inflated and rounded on the ventral surface.

Apex of anterior gonopod (fig. 2) longer and more sharply curved than in *C. caeca.* Apex of coxa of posterior gonopod (fig. 3) with several hooked setae and the short telopodite with numerous short prickles on the apical half, distinguishing this species from *C. caeca.*

Female paratype: Length about 23 mm., width 1.9 mm., 50 segments, the last one legless. Arrangement of crests and other somatic characters as in the male.

Cambala sp.

Record: Mayfield Cave, Sonora, Sutton County, Texas, 1 mutilated specimen of undetermined sex, Feb. 9, 1957, Ross Gurner. Width 1.5 mm., 2 legless segments, collum as in *C. caeca*, which has been collected in nearby caves.

Speodesmus bicornourus, new species

Figures 4-6

Diagnosis: Distinguished from *S. echinourus* by its larger body, longer legs, shorter setae on the dorsum, and the presence of only two setae on the preanal scale.

Type material: Male holotype and female paratype, American Museum of Natural History; remaining male and female paratypes in the author's collection.

Type locality: Beck's Ranch Cave, Beck's Ranch, 6 miles west of

Round Rock, Williamson County, Texas, 3 ♂, 4 ♀, Dec. 10, 1955, W. McAlister and D. Kyser.

Range: Known only from the type locality.

Description of male holotype: Length about 19 mm., width 1.2 mm., length of antennae about 3 mm. Color in alcohol pale yellow-gray. Body loose-jointed.

Collum almost as broad as head, its anterio-lateral margin semicircular and its posterior margin very slightly concave; lateral margin slightly irregular and without well defined teeth; anterio-lateral margin with 14 setiferous tubercles; one-third of the way back from the anterior margin there is an irregular row of 8 setiferous tubercles, and two-thirds of the way back is another irregular row of 8. Surface between tubercles smooth on all segments. Metatergite of second segment rectangular, as broad as any of the other tergites, its lateral margin with about 7 irregular teeth. Metatergites of segments 3 and 4 slightly longer and broader than collum, their anterior angles, as on all of the following metatergites, are rounded and the lateral margins have 3 setose teeth and one or two indistinct teeth without setae. On succeeding segments the anterior angles of the metatergites are more broadly rounded, the posterior angles are more acutely produced behind the posterior margin, and the lateral teeth are minute. Ratio of length to width of metatergite of segment 8 about 3/4; on more posterion segments it is about 8/9 ,fig. 4). Metatergites 2 through 19 each with 3 transverse rows of setose tubercles, with from 8 to 12 in the first and second rows and 6 in the row on the caudal margin; on segments 2 through 5 all three rows are almost straight; from segment 6 on back the first row is strongly bowed and the second row is moderately bowed. Pore formula normal. Pores open on the dorsal surface of the metatergites near the third setigerous tooth.

Typical legs are about 3 mm. long, slender, with the ratio of the length of the segments, beginning with the first, as follows: 3, 10, 24, 8, 9, 27. The first and second legspairs are one-half and two-thirds the length of typical legs, respectively. Other legs anterior to the gonopods are slightly shortened. No tubercles were observed on the legs.

In situ, the solenomerite of the gonopod is contiguous with its mate in the middle line. The retrorse lateral spine seems to be nearer the apex of the telopodite than in *E. echinourus*, which I have not seen; the solenomerite is a relatively short branch and the opening of the seminal canal is minutely fringed (fig. 6).

Specodesmus echinourus

Record: Ezell's Cave, San Marcos, Hays County, Texas, 1 ♀, 1 larval ♂, Mar. 25, 1937, Ottys Sanders. In this species the body is much smaller, the legs are shorter, the dorsal setae longer and more numerous, and the lateral teeth distinctly sharper than in *S. bicornourus*.

I am indebted to Dr. T. C. Barr, Jr., and to Mr. Ottys Sanders for the specimens used in the preparation of this paper.

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A SECOND SPECIES OF THE MILLIPED GENUS *TRIGENOTYLA* (CHORDEUMIDEA: CONOTYLIDAE: TRICHOPETALINAE: SCOTERPINI)

By Nell B. Causey

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The segmentation of the basal region of the posterior gonopod offers a convenient basis for dividing the family Conotylidae into natural groups. The trend in the evolution of this gonopod from a 7-segmented walking leg is toward a structure composed of only two thickened, elongated segments. This has been brought about by the fusion of the three basal segments and by the degeneration of the three distal segments or by fusion of part of them with the fourth segment, the femur.

The North American subfamilies of the Conotylidae are the Conotylinae, in which the basal segment of the posterior gonopod is a short coxa with a gland opening and conspicuous processes; and the Trichopetaline, in which the basal segment is an elongated coxoprefemur. In the tribe Trichopetalini a small, rounded coxal lobe and the opening of the coxal gland are on the mesial surface of the coxoprefemur. In the tribe Scoterpini two membranous pieces extend from the base of the coxoprefemur across the sternum to the opposite coxoprefemur; the anterior extension is a continuous band and the posterior one is a coxal lobe that is contiguous with its mate in the midline; the opening of the coxal gland is at the apex of the coxal lobe. The two genera included in the Scoterpini, *Scoterpes* and *Trigenotyla,* resemble the Trichopetalini in the long segmental setae, the small body, the absence or almost complete absence of body pigment, and in the structure of the anterior gonopods.

The resttelopodite (This name was used by Verhoeff for the region of the gonopod beyond the coxoprefemur.) consits of one elongated segment in the epigean genus *Trigenotyla,* while in the troglodytic genus *Scoterpes* it consists of one elongated segment, which is the femur, and two or three degenerate terminal segments. The presence of segments beyond the femur is a primitive character that is found in the family Conotylidae only in the genus *Scoterpes.* Natural selection within caves has favored the retention of the terminal segments, while they were lost in epigean forms. In the tribe Trichopetalini, the resttelopodite consists of only one segment in all known members, including the troglodytic genus *Zygonopus.* This suggests that *Zygonopus* became a troglodyte after the reduction of the posterior gonopod to two segments had occurred.

Genus *Trigenotyla*

Trigenotyla Causey, 1951, Proc. Biol. Soc. Washington, vol 64, p. 118.

Generotype: *T. parca* Causey 1951. Other species: *T. vaga,* n. sp. *Craspedosoma flavidum* Bollman 1888 may be congeneric with these species.

Range: *Trigenotyla parca* has been collected in Carroll, Washington, and Madison Counties, Arkansas, and *T. vaga* in Latimer County, Oklahoma.

Body 6 to 7 mm. long, weakly pigmented; no promentum; ocelli in about three irregular rows that form a triangular patch; antennae clavate, about as long as the width of the body; paranota small, the anterior angle rounded; length of segmental satae about four-tenths the body width, set in a very slightly curved oblique row on most segments, the distance between the two internal setae of a segment usually more than three times the distance between the external and internal setae; segmental setae shorter, finer, and more widely separated across the dorsum than in *Scoterpes*; sixth leg-pair with segments 3 and 4 slightly thickened and bowed. Anterior gonopod with a medial group of three setae and a lateral group of several setae; the elongated coxite is deeply bifid; the pseudoflagellum is either plumose or membranous. The posterior gonopod is composed of two segments; the basal segment is prolonged ventrad beyond its articulation with the smaller second segment; the coxal lobe extends mesiad from the base of the coxoprefemur to the middle of the sternum, and a continuous membranous band connects the two prefemurs.

Key to the Species of *Trigenotyla,* Based on the Male

Both branches of the coxite of the anterior gonopod are narrow; one margin of the anterior branch is irregularly toothed. Pseudoflagellum plumose .... *parca*

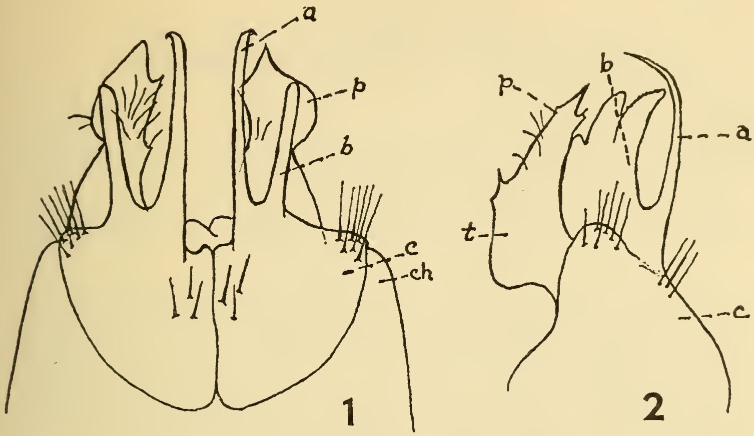
Anterior branch of the coxite of the anterior gonopod is narrowly elongated and both margins are even; the posterior branch is broadly lamellar and divided into three short lobes at the apex. Pseudoflagellum broad and membranous .... *vaga,* n. sp.

Trigenotyla vaga, new species

Figures 1 and 2

Diagnosis: Distinguished from *T. parca* by the anterior gonopod, which has the anterior branch of the coxite narrowly attenuated and the posterior branch broadly lamellar.

Type locality: A river ravine, Latimer County, Oklahama, 1 ♂, Dec. 9, 1933, collected by J. R. Carpenter.



1 2

Explanation of Figures

Trigenotyla vaga, new species, male holotype. Figure 1. Anterior gonopods, anterior view. Figure 2. Left anterior gonopod, lateral view. a-anterior branch of coxite; b-posterior branch of coxite; c-coxa; ch-cheirite; p-pseudoflagellum; t-telopodite.

Type material: Male holotype in American Museum of Natural History.

Range: Known only from the type locality.

Description of male holotype: Length about 6.5 mm., greatest width 1 mm. Color amber, possibly modified by having been dry. Ocelli in a triangular area on a brown background, in irregular rows of 7, 5 (4), 2. Paranota and arrangement of setae as in *T. parca.* Tarsi of legpairs 3, 4, and 5 with a row of setae with minute bladders at the apex. Sixth legpair with segments 3 and 4 slightly thickened and bowed. No lobes observed on seventh legpair. Coxae of legpairs 10 and 11 with the usual coxal gland openings.

Anterior gonopod (Figures 1 and 2) with the coxite deeply bifid, the anterior branch elongated, evenly attenuated, and bent caudad; and the posterior branch large, lamellar, with three stout teeth at the apex. Coxal setae straight, a group of three near the median line and another group of six near the ventral margin. Telopodite much narrower and shorter than the coxa; its pseudoflagellum is as large as the posterior branch of the coxite and in the form of an irregular membrane on which a few fibrillae can be seen. Cheirite narrowed, its apex not reaching to the ventral margin of the coxa.

Posterior gonopod as in *T. parca.*

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SNAKES OF THE CHILPANCINGO REGION, MEXICO

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In the course of biological investigations carried on by the senior author and his students in the Mexican state of Guerrero from 1952 to 1958, 283 snakes were assembled from the Chilpancingo region. These represent 42 species, five of which have not been reported previously from that area. Although we concentrated heavily on the herpetofauna, we failed to take 19 species that had been reported by other workers in the area.

Our efforts were concentrated in the vicinity of Acahuizotla, a small village about 30 km. south of Chilpancingo, but we made numerous trips to localities within a radius of 50 miles.

Physiography and Vegetation. The main topographic features of central Guerrero have been produced by erosion and volcanism. The most conspicuous feature of the area is the Sierra Madre del Sur which trends in a general east-west direction in conformity with the shape of the continental mass. The Balsas Basin, which borders the study area on the north, was formed by the Río Balsas, the major river of Guerrero. Within the basin proper the seasons are rather distinct. The rainy season is extremely short, lasting mainly from June through September, but sporadic rains occur in October and November. The rains fall primarily in late afternoon and at night. They are usually of short duration but often torrential. Daytime temperatures are hot throughout most of the year. The vegetation is xeric and sparse in most areas but becomes more luxuriant at higher elevations.

The mountains of the Sierra Madre del Sur form an effective barrier to prevailing winds from the Pacific and their north side is comparatively drier than the south. Consequently, the Tropical Deciduous Forest is composed of two types; the xeric, which lies on the northern slopes of the sierra, and the mesic, which occupies the southern slopes. The elevations at which the various vegetation types occur are about 2000 feet lower on the southern slopes and the ecotone between the tropical deciduous and pine-oak forests is not as distinct as that on the northern slopes.

Of the 61 forms of snakes occurring in the region, more than half (34) are confined to one of four vegetation types (Fig. 1); 27 occur in two or more types (Fig. 2).

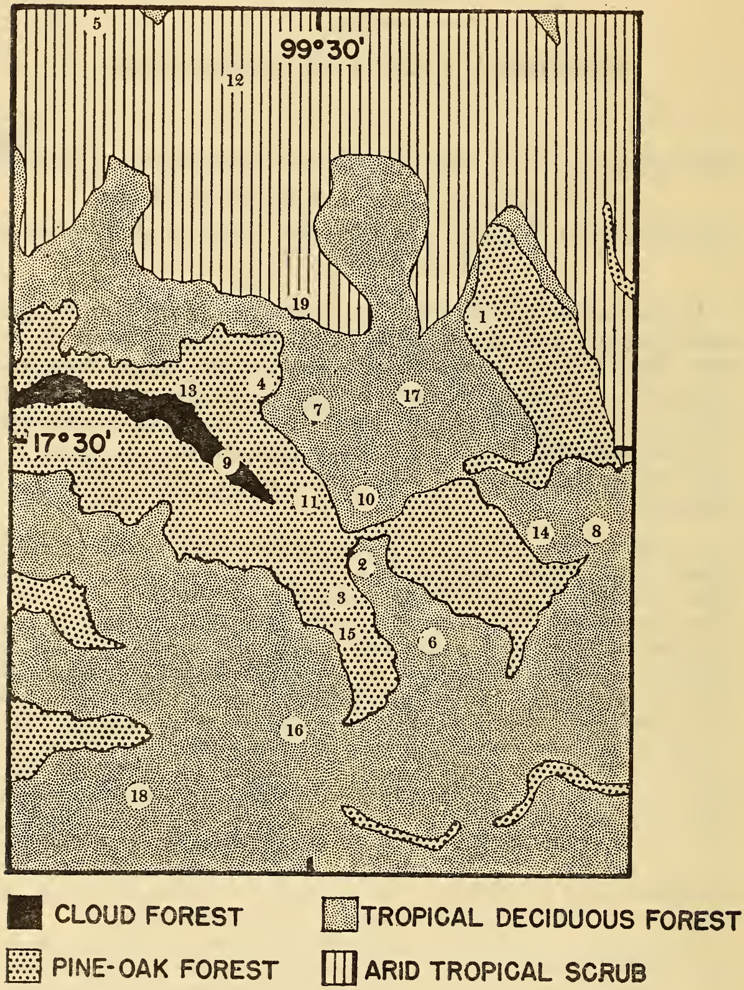

FIGURE I.

Figure 1. Vegetational map of the Chilpancingo Region. The numbers are sites at or near wich specimens have been taken. (1) Almolonga (= Amula), (2) Acahuizotla, (3) Agua del Obispo, (4) Amojileca, (5) Balsas Norte, (6) Chapolapa, (7) Chilpancingo, (8) Colotlipa, (9) Cuapongo, (10) Mazatlán, (11) Mazatlán Logging Camp, (12) Mexcala, (13) Omilteme, (14) Quechultenango, (14) Rincón, (16) Tierra Colorada, (17) Tixtla, (18) Xaltianguis, (19) Zumpango.

The following accounts of species are based on specimens collected by field parties of the Department of Wildlife Management and deposited in the Texas Cooperative Wildlife Collection (TCWC).

Family TYPHLOPIDAE Jan

Typhlops braminus (Daudin)

TCWC (5), Tropical Deciduous Forest. Acahuizotla, 2800 ft., (4); 1 mi. SW Colotlipa, 2800 ft., (1). Scales from rostral to tip of tail, 303-322, mean 313; scale rows at mid-body, 20; supralabials, 4—4 (4), 3—3 (1); each scale with minute brown stippling. Other records: Chilpancingo (Shreve, 1938; Taylor, 1940a); Agua del Obispo (Smith, 1943; Taylor, 1940a); *ca.* Xaltianguis (Taylor, 1940a).

Leptotyphlops phenops bakewelli (Oliver)

TCWC (5), Tropical Deciduous Forest. Acahuizotla, 2800 ft., (2); 2 mi. W. Colotlipa, 2700 ft., (1); 1 mi. SW Colotlipa, 2800 ft., (2). Scale rows at mid-body, 14; ventrals, 221-246, mean 236; caudals, 11-20, mean 14.8; supralabials, 4—4; infralabials, 4—5 (1), 5—5 (2), 6—6 (2). Other record: Acahuizotla (Smith, 1943).

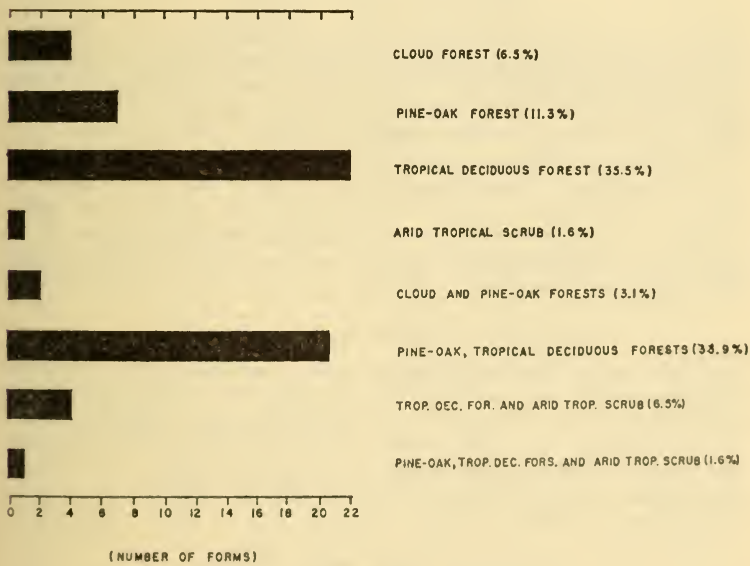

FIGURE 2

Figure 2. Bar graph showing the distribution of snakes in the Chilpancingo region according to vegetation types. Note that the bottom four bars include two or more vegetation types; the top four, a single vegetation type.

Family BOIDAE Gray

Constrictor constrictor imperator (Daudin)

TCWC (13), Lower Pine-oak and Tropical Deciduous forests. Acahuizotla, 2800 ft., (5); *ca.* Colotlipa, 2800 ft., (2); 5 mi. SE Tierra Colorada, 1000 ft., (1); Xaltianguis, 1600 ft., (1); *ca.* Agua del Obispo, 3300 ft., (5). Scale rows at mid-body, 61—76, base of tail, 37—42; ventrals of males, 237—239, mean 238, of females, 229—249, mean 238.4; caudals of males, 64—67, mean 65.7, of females, 52—62, mean 56.3; supralabials, 18—21; infralabials, 21—25; total length of largest specimen, 2030 mm., smallest, 482 mm. This species exhibited the greatest amount of variation of all of the forms examined.

Family PYTHONIDAE Cope

Loxocemus sumichrasti (Bocourt)

TCWC (1 female), Tropical Deciduous Forest. Acahuizolta, 2800 ft. Scale formula, 30—31—25; ventrals, 263; caudals, 43; supralabials, 10—11; infralabials, 12—12; preoculars, 1—1; postoculars, 3—3; temporals, 3+4 on each side. Our specimen is similar to those taken near Acapulco by Taylor (1940b).

Family COLUBRIDAE Dunn

Clelia clelia clelia (Daudin)

TCWC (2), Tropical Deciduous Forest. Acahuizotla, 2800 ft. The two specimens, both females, definitely establish the presence of this race in the Pacific subregion of southwestern Mexico. According to Smith and Taylor (1945), this race previously was known from only five localities in Chiapas, Oaxaca, Tabasco, Veracruz, and Yucatán.

Our specimens show no approach to the color ascribed to the northern race *immaculata* in Colima and Jalisco. Each of the dorsal scales is distinctly dark-tipped. Scale formula, 17—17—17; ventrals, 221, 228; caudals, 75, 84; supralabials, 7—7; infralabials, 8—8, preoculars, 1—1; postoculars, 2—2; temporals, 2+3 on each side; loreal distinct, longer than high; total length, 686, 495 mm.

Coniophanes fissidens dispersus (Smith)

TCWC (1 male), Tropical Deciduous Forest. Acahuizotla, 2800 ft. Scale formula, 19—19—15; ventrals, 123; caudals, 75; supralabials, 8—8; infralabials, 9—9; preoculars, 1—1; postoculars, 2—2; temporals, 1+2 +3 on each side. Our specimen differs from the description of the type and paratype mainly in the paucity of white in the region of the nape, dark stripes strongly evident only on the tail; two white spots on each side of the neck, rather than one.

Conophis vittatus viduus (Cope)

TCWC (9), Lower Pine-oak and Tropical Deciduous forests. Acahuizotla, 2800 ft. (3); Agua del Obispo, 3300 ft. (1); *ca.* Colotlipa, 2700 ft. (5). Differences between specimens from the Chilpancingo region and a series of *C. vittatus vittatus* from the vicinity of Acapulco are as follows:

Chilpancingo Area		Acapulco
	Ventrals	
(7) Male	161—164 (M—162.0)	(7) 149—156 (M—152.4)
(2) Female	163, 168	(2) 157, 159
	Caudals	
(7) Male	64—71 (M—66.3)	(7) 65—67 (M—66.0)
(2) Female	63, 65	(2) 60, 62

Previous to this study, *C. vittatus viduus* was known only from the vicinity of Tehuantepec, Oaxaca. The aforementioned series extends the range of *vittatus viduus* some 300 airline miles west northwest.

Dryadophis melanolomus stuarti (Smith)

TCWC (3), Lower Pine-oak and Tropical Deciduous forests. Acahuizotla, 2800 ft. (2); Agua del Obispo, 3300 ft. (1). Scale formula, 17—17—15; ventrals of male, 182, of females, 187, 188; caudals of male, 120, of females, 113, 114; supralabials, 9—9; infralabials, 10—11 (2), 11—11 (1); preoculars, 1—1 (2), 2—2 (1); postoculars, 2—2; temporals, 2+2 on each side.

Drymarchon corais rubidus (Smith)

TCWC (4 males), Tropical Deciduous Forest. 2 mi. SW Colotlipa, 2700 ft. (1); Acahuizotla, 2800 ft. (2); Tixtla, 4300 ft. (1). Scale formula, 19—17—15; ventrals, 199—201 (M—199.8); caudals, 72—77 (M—75.0); supralabials, 8—8; infralabials, 8—8 (1), 8—9 (2), 9—9 (2); preoculars, 1—1; postoculars, 2—2; temporals, 2+2. Other record: *ca.* Chilpancingo (Hall, 1951).

Drymobius margaritiferus fistulosus (Smith)

TCWC (17), Tropical Deciduous Forest. Acahuizotla, 2800 ft. (13); *ca.* Colotlipa, 2700 ft. (2); *ca.* Tierra Colorada, 1000 ft. (2). Scale formula, 17—17—15; ventrals of males, 143—150 (M—147.0), of females, 147—153 (M—149.6); caudals of males, 130—138 (M—134.6), of females, 126—131 (M—128.0); supralabials, 9—9 (15), 9—10 (2); infralabials, 9—10 (1); 10—10 (12), 10—11 (2), 11—11 (2); preoculars, 1—1; postoculars, 2—2; temporals, 2+2 on each side. Other records: Tierra Colorada, Ocotito (Smith, 1942b).

Elaphe triaspis intermedia (Boettger)

TCWC (13), Lower Pine-oak and Tropical Deciduous forests. Acahuizotla, 2800 ft. (10); Agua del Obispo, 3300 ft. (1); 1 mi. SW Tixtla, 4500 ft. (1); 4 mi. N. El Ocotito, 2400 ft. (1). Scale formula, 27—31—21 to 33—35—25, more commonly 29—35—21; ventrals of males, 242—260 (M—252.3), of females, 267—282 (M—275.7); caudals of males, 108—124 (M—118.8), of females, 85—107 (M—94.5); supralabials, 8—8 (6), 8—9 (6), 9—9 (1); infralabials, 10—11 (5), 11—11 (5); 11—12 (2), 12—12 (1); preoculars, 0—0 (1), 1—1 (11), 1—2 (1); postoculars, 2—2; temporals, 2+5 to 3+5, more commonly 3+4. Other records: *ca.* Chilpancingo (Hall, 1951); Amula (Günther, 1894).

Enulius unicolor (Fischer)

TCWC (2 males), Lower Pine-oak and Tropical Deciduous forests. 4 mi. W. Chilpancingo, 5800 ft. (1); Acahuizotla, 2800 ft. (1). Scale formula, 17—17—17; ventrals, 166, 175, caudals, 87, 104; supralabials, 7—7; infralabials, 7—7, 7—8; no preoculars; postoculars, 2—2; temporals, 1+2 on each side. The male from 4 mi. W. Chilpancingo differs from the series discussed by Taylor (1940b), in having a lower combination of ventrals and caudals, 270, rather than 280 or more. Other record: Agua del Obispo (Taylor, 1940b).

Geophis omiltemana (Günther)

TCWC (2), Humid Pine-oak Forest. 1 mi. W. Omilteme, 7800 ft. Scale formula, 17—17—17; ventrals of male, 158, of females, 160; caudals of male, 48, of female, 42; supralabials, 6—6; infralabials, 7—7; no preoculars; postoculars, 2—2; temporals, 1+2 on each side. The vertebral and two paravertebral scale rows of the male are faintly keeled. Other records: Omilteme (Günther, 1893; Smith, 1943).

Lampropeltis doliata blanchardi (Stuart)

TCWC (5), Lower Pine-oak and Tropical Deciduous forests. *ca.* Colotlipa, 2700 ft. (2); 10 km. SW Chilpancingo, 4500 ft. (1); 2.5 mi. S. Almolonga, 5600 ft. (2). Scale formula, 23—21—19; ventrals of males, 211, 212 (2), of females, 208, 211; caudals of males, 54 (2), 55, of females, 51, 48; supralabials, 7—7; infralabials, 9—9; preoculars, 1—1; postoculars, 2—2; temporals, 2+3 on each side. This series differs from a series examined by Hall (1951) in having all infralabials 9—9, rather than 8+8. Other records: *ca.* Chilpancingo (Gadow, 1905; Hall, 1951); Tierra Colorada, Amula (Smith and Taylor, 1945).

Leptodeira septentrionalis polysticta (Günther)

TCWC (4), Lower Pine-oak and Tropical Deciduous forests. Acahuizotla, 2800 ft. (3); Agua del Obispo, 3300 ft. (1). These specimens are discussed in detail by Duellman (1958). Other record: Agua del Obispo (Smith, 1943).

Leptodeira latifasciata (Günther)

TCWC (2), Tropical Deciduous Forest. Acahuizotla, 2800 ft. In our two immature specimens, the male has eight white rings on the body and four on the tail; in the female, seven and three, respectively. The nape and posterior part of the head back of the eyes are orange in color; the black bands are about three times as wide as the white ones. Other records: Rio Balsas (Boulenger, 1905; Gadow, 1905); El Naranjo (Taylor, 1938).

Leptodeira annulata cussiliris (Duellman)

TCWC (14), Lower Pine-oak and Tropical Deciduous forests. Acahuizotla, 2800 ft. (9); 4 mi. W. Chilpancingo, 5800 ft. (1); 5 mi. SW Tierra Colorada, 1000 ft. (1); Rincón, 2500 ft. (2); 4 mi. N. Ocotito, 2600 ft. (1). This series is discussed in detail by Duellman (1958). Other records: *ca.* Chilpancingo, Tierra Colorada, Agua del Obispo (Smith, 1943; Duellman, 1958); Mazatlán (Taylor, 1938); Omilteme, Xaltianguis (Duellman, 1958).

Manolepis putnami (Jan)

TCWC (8), Tropical Deciduous Forest. Acahuizotla, 2800 ft. Scale formula, 19—19—15; ventrals of males, 170, 173, of females, 179—182 (M—180.7); caudals of males, 74, 80, of females, 65—68 (M—66.6); supralabials, 8—8; infralabials, 10—10; preoculars, 1—1; postoculars, 2—2; temporals, 1+2+3 on each side. This series differs from those reported on from Tehuantepec, Oaxaca, by Werler and Smith (1952) in having 10 infralabials, rather than 9; ventral coloration of males identical to that of females rather than immaculate; dorsal color of females brownish rather than gray; brown line on first scale row distinct rather than broken and ill defined; chin, throat, and venter to 17th ventral black, rather than chin only black. There is much less sexual dichromatism in our series than that of the Tehuantepec population.

Masticophis flagellum lineatus (Bocourt)

TCWC (17), Lower Pine-oak and Tropical Deciduous forests. *ca.* Chilpancingo, 4500 ft. (2); Acahuizotla, 2800 ft. (5); 3 mi. S. Petaquillas, 4800 ft. (1); 1 mi. SW Colotlipa, 2700 ft. (3); *ca.* Mazatlán, 4400 ft. (1); Palo Blanco, 3000 ft. (1); 2.5 mi. S. Almolonga, 5600 ft. (4). Scale formula, 19—17—13; ventrals of males, 182-193 (M—187.0), of females, 189-197 (M—193.6); caudals of males, 116-133 (M—124.0), of females, 115-125 (M—119.7); supralabials, 8—8 (15), 8—9 (2); infralabials, 9—10 (1), 10—10 (14), 10—11 (1), 11—11 (1); preoculars, 2—2; postoculars, 2—2 (16), 2—3 (1); temporals, 2+3+3 (16), 1+2+3 (1) on each side. Other records: *ca.* Chilpancingo (Hall, 1951); Amula (Boulanger, 1893).

Oxybelis aeneus auratus (Bell)

TCWC (9), Tropical Deciduous Forest. Acahuizotla, 2800 ft. Scale formula, 17—17—13; ventrals of males, 190, 192, of females, 189—195 (M—192.3); caudals of males, 177, 188, of females, 171—190 (M—179.0); supralabials, 8—8 (8), 8—9 (1); infralabials, 8—9 (2), 9—9 (4), 9—10 (2), 10—10 (1); preoculars, 1—1; postoculars, 1—1 (1), 2—2 (8); temporals, 1+2 on each side. Our largest specimen measured 1368 mm., smallest, 1148 mm. Other records: *ca.* Chilpancingo (Hall, 1951); 6 km. N. Chilpancingo (Taylor, 1941).

Pituophis deppei lineaticollis (Cope)

TCWC (2 males), Tropical Deciduous Forest. Acahuizotla, 2800 ft. Scale formula, 27—27—21; ventrals, 238, 239; caudals, 69, 66+; supralabials, 8—8; infralabials, 11—12; preoculars, 1—1; postoculars, 2—2; temporals, 1+2+3 on each side. Other records: Omilteme (Stull, 1940); Chilpancingo (Smith and Taylor, 1945).

Rhadinaea aemula (Bailey)

TCWC (2), Dry Pine-oak Forest. 2.5 mi. S. Almolonga, 5600 ft. Scale formula, 17—17—17; ventrals of male, 158, of female, 169; caudals of male, 50+, of female, 106; supralabials 8—8, 8—9; infralabials, 10—10; preoculars, 1—1, 2—2; postoculars, 2—2, 2—3; temporals, 1+2+3 on each side. The female differs from the male in having a black dot on the outer edge of each ventral forming an inconspicuous line; the area below the black lateral line is stippled with black rather than clear white. Other records: Omilteme, Mountains near Chilpancingo, Amula (Bailey, 1940).

Rhadinaea hesperia hesperia (Bailey)

TCWC (3), Pine-oak Forest. Mountains west of Acahuizotla, 3500 ft. (1); Agua del Obispo, 3300 ft. (2). Scale formula, 17—17—17; ventrals of males, 149, 147, of female, 163; caudals of males, 120, 59+, of female, 97; supralabials, 8—8; infralabials, 9—9 (2), 9—10 (1); preoculars, 1—2 (1), 2—2 (2); postoculars, 2—2 (2), 3—3 (1); temporals, 1+2 on each side. The loreal scale is present in all three specimens. Other records: 5 mi. N. Chilpancingo (Smith, 1942c); Omilteme, Mountains near Chilpancingo, Chilpancingo, Amula (Bailey, 1940).

Salvadora intermedia intermedia (Hartweg)

TCWC (3), Pine-oak Forest. 4 mi. W. Chilpancingo, 6000 ft. (2); 2.5 mi. S. Almolonga, 5000 ft. (1). Scale formula, 17—15—13; ventrals of males, 177, 181, of female, 194; caudals of males, 102, 105, of female, 100; supralabials, 8—8; infralabials, 10+10; preoculars, 2—2; postoculars, 2—2 (2), 2—3 (1); temporals, 2+3 on each side. The female from Almolonga differs from all other known specimens of *intermedia* in having 194 ventrals rather than 182 or less. Other records: Chilpancingo (Hartweg, 1940); Amula (Boulenger, 1896).

Salvadora mexicana (Dumeril, Bibron, and Dumeril)

TCWC (14), Tropical Deciduous Forest and Arid Tropical Scrub. 1 mi. SW Colotlipa, 2700 ft. (2); *ca.* Tierra Colorada, 1000 ft. (7); Acahuizotla, 2800 ft. (3); Mexcala, 1700 ft. (2). Scale formula, 17—17—13; ventrals of males, 185—189 (M—187.0), of females, 188—193 (M—190.5); caudals of males, 124—142 (M—132.1), of females, 124—129 (M—126.0); supralabials, 8—9 (1), 9—9 (13); infralabials, 10—11 (1), 11—11 (12), 11—12 (1); preoculars, 1—1; postoculars, 2—2 (13), 2—3 (1); temporals, 2+1+2 (9), 2+2+2 (5) on each side. This species is common in the Chilpancingo region. This series was taken from rock walls, under rocks, in tall grass, and in trees. Two specimens were found on the highway, near Mexcala, stuck to freshly poured asphalt.

Sibon nebulatus (Linnaeus)

TCWC (1 male), Tropical Deciduous Forest. Acahuizotla, 2800 ft. Scale formula, 15—15—15; ventrals, 181; caudals, 91; supralabials, 7—7; infralabials, 10—10; preoculars, 0—0; postoculars, 2—3; temporals, 1+2 on each side. This specimen differs from the male discussed by Taylor (1940b), in having 10 infralabials rather than eight. Other record: Palo Gordo (Taylor, 1940b).

Stenorrhina freminvilli freminvilli (Dumeril, Bibron, and Dumeril)

TCWC (18); Tropical Deciduous Forest. 1 mi. SW Colotlipa, 2700 ft. (2); Acahuizotla, 2800 ft. (16). This series of specimens is composed of two distinct forms. One, which agrees with the description of *S. f. lactea* Cope, is reddish above and pinkish below, with a distinct dark stripe through the eye and usually a faint, brownish mid-dorsal stripe.

The other series, which agrees with the description of *S. f. freminvilli*, is grayish brown with five distinct blackish brown stripes. It is difficult for us to conceive of *lactea* as a subspecies of *S. freminvilli* because both forms occur together in relative abundance in central Guerrero without intergrading. A synopsis of the number of ventrals and caudals of the two forms is as follows:

freminvilli	Ventrals	*''lactea''*
165—169 (M—167.4)	males	164—171 (M—167.3)
170—176 (M—172.0)	females	170—175 (M—173.2)
	Caudals	
36—40 (M—38.2)	males	39—40 (M—39.7)
30—34 (M—32.8)	females	31—34 (M—32.7)

The two forms appear to be nothing more than color phases. We feel that *lactea* does not merit subspecific status and that it should be submerged as a synonym of the subspecies *S. f. freminvilli.*

Tantilla bocourti (Günther)

TCWC (3), Lower Pine-oak and Tropical Deciduous forests. Acahuizotla, 2800 ft. (2); Agua del Obispo, 3300 ft. (1). Scale formula, 15—15—15; ventrals of males, 176, 177, of female, 184; caudals of males, 43, 51, of female, 41; supralabials, 7—7; infralabials, 6—6 (1), 6—7 (1), 7—7 (1); preoculars, 1—1; postoculars, 2—2 (2), 2—3 (1); temporals, 1+1 (2), 1+2 (1) on each side. The three specimens fall within the range of variation given by Taylor (1940b). Other record: Omilteme (Smith, 1942a).

Tantilla coronadoi (Hartweg)

TCWC (1), Tropical Deciduous Forest. 3 mi. W. Chilpancingo, 5000 ft. This young male is seemingly the second known specimen of this species. In scalation, it corresponds in most respects with Hartweg's (1944) description of the type, which also came from near Chilpancingo, including the relation of the seventh supralabial to the parietal and the consequent absence of the posterior temporal. The color pattern, however, seems to differ from the type specimen. Superficially, there are three dark longitudinal stripes, most pronounced in the neck region, but under a lens, nine distinct dark stripes are evident. The lateral stripe involves mainly the third and adjacent half of the fourth scale rows as in the type. A distinct whitish spot is evident on each side between the dorsal and lateral stripes, involving the first five scales posterior to the parietals and suggesting the ''beginning'' of a white nuchal collar. A faint light line proceeds forward from each spot along the outer edges of the parietals and prefrontals to converge with the adjoining line on the internasals. Scale formula, 15—15—15; ventrals, 160; caudals, 35; supralabials, 7—7; infralabials, 6—6; preoculars, 1—1; postoculars, 2—2 (lower one minute); temporals, 1—1; seventh supralabial in contact with parietal; total length, 174 mm.; length of tail, 28 mm.

The specimen was found under a rock on the dry, rocky, slopes of the mountains between Chilpancingo and Amojileca. The vegetation there is primarily chaparral and grasses.

Thalerophis diplotropis (Günther)

TCWC (8), Lower Pine-oak and Tropical Deciduous forests. Acahuizotla, 2800 ft. (6); 5 mi W. Acahuizotla, 3500 ft. (1); 2.5 mi. S. Almolonga, 5600 ft. (1). Scale formula, 15—15—11; ventrals of males, 163—172 (M—168.4), of females, 171—177 (M—173.3); caudals of males, 126—154 (M—142.0), of females, 133—147 (M—140.0); supralabials, 8—8; infralabials, 9—10 (1), 10—10 (3), 10—11 (3), 11—11 (1); preoculars, 1—1; postoculars, 2—2; temporals, 1+2 on each side. The male from Almolonga has fewer ventrals and caudals (163 and 126 respectively) and more infralabials (11) than normally found in this form. Other records: Ocotito, Chilpancingo (Oliver, 1948); Amula (Günther, 1894).

Toluca conica (Taylor and Smith)

TCWC (19), Humid Pine-oak Forest. 2 mi. W. Omilteme, 8000 ft. Scale formula, 17—17—17; ventrals of males, 120—125 (M—122.3), of females, 124—133 (M—129.5); caudals of males, 30—35 (M—32.7), of females, 21—28 (M—25.1); supralabials, 6—6 (4), 6—7 (2), 7—7 (11); infralabials, 6—6 (10), 6—7 (3), 7—7 (6); preoculars, 1—1; postoculars, 1—1 (3), 2—2 (16); temporals, 1+2 on each side; loreal, 0—0 (16), 1—1 (3). This series does not differ significantly from the description of the type and paratypes given by Taylor (1940b). Other records: Between Rincón and Cajones, Agua del Obispo (Smith, 1943); Chilpancingo (Taylor, 1940b); Tierra Colorada, Gadow, 1905).

Trimorphodon biscutatus semirutus (Smith)

TCWC (7 females), Tropical Deciduous Forest. Acahuizotla, 2800 ft. (6); 1 mi. SW Colotlipa, 2700 ft. (1). Scale formula, 25—24—16 to 25—28—19; ventrals, 259—281 (M—272.1); caudals, 85—103 (M—93.9); supralabials, 8—8 (2), 9—9 (5); infralabials, 11—11 (1), 12—12 (4), 13—13 (1), 14—14 (1); preoculars, 3—3; postoculars, 3—3; temporals, 3+3 (1), 3+4 (6) on each side; loreal, 2—2. Fugler and Dixon (in press) have discussed the relationships of this species with forms to the north and a population of the same species to the south. Other records: Agua del Obispo, between Rincón and Cajones (Smith, 1943); Tierra Colorada (Gadow, 1905).

Trimorphodon latifascia (Peters)

TCWC (5), Lower Pine-oak and Tropical Deciduous forests. *ca.* Almolonga, 5800 ft. (3); 4 mi. W. Chilpancingo, 5800 ft. (1); Palo Blanco, 4800 ft. (1). Scale formula, 21—23—15 to 26—23—15; ventrals of males, 198, 220, 221, of females, 222, 226; caudals of males, 66, 77, 78, of females, 64 (2); supralabials, 8—8 (3), 8—9 (2); infralabials, 11—12 (1), 12—12 (2), 12—13 (1), 13—13 (1); preoculars, 2—2 (1), 3—3 (4); postoculars, 3—3; temporals, 3+4 and each side; loreals, 2—2 (4), 3—3 (1); dorsal blotches, 14—17 (M—16). This series differs from those discussed by Taylor (1940b) in having a higher average number of dorsal blotches. Other record: *ca.* Chilpancingo (Hall, 1951).

Tropidodipsas guerreroensis (Taylor)

TCWC (8), Tropical Deciduous Forest. Acahuizotla, 2800 ft. These specimens have been discussed in detail by Davis (1953).

Thamnophis chrysocephalus (Cope)

TCWC (1 male), Humid Pine-oak Forest. 4 mi. W. Mazatlán, 8000 ft. Scale formula, 17—17—15; ventrals, 141; caudals, 76; supralabials, 7-8; infralabials, 9—10; preoculars, 1—1; postoculars, 3—3; temporals, 3+3 on each side. This specimen constitutes the fourth locality record for this species in Gunerrero. It apparently is restricted to the high elevations in central and northwestern Guerrero.

Thamnophis cyrtopsis cyclides (Cope)

TCWC (5), Lower Pine-oak and Tropical Deciduous forests. Acahuizotla, 2800 ft. (2); 2.5 mi. S. Almolonga, 5600 ft. (3). This is discussed in detail by Milstead (1953). Other records: *ca.* Chilpancingo (Hall, 1951; Smith, 1942d); Omilteme, Amula (Milstead, 1953).

Thamnophis scalaris godmani (Günther)

TCWC (22), Cloud and Pine-oak forests. *ca.* Omilteme, 7800-8000 ft. (17); 4 mi. W. Chilpancingo, 5800 ft. (2); 5 mi. W. Mazatlán, 8000 ft. (3). Scale formula, 17—17—17 to 21—17—17; ventrals of males, 146—153 (M—148.5), of females, 136—148 (M—141.3) caudals of males, 75—84 (M—79.6), of females, 66—84 (M—73.7); supralabials, 7—7 (18), 7—8 (2), 8—8 (2), infralabials, 9—10 (5), 10—10 (12), 10—11 (4), 11—11 (1); preoculars, 1—1 (21), 1—2 (1); postoculars, 3—3; temporals, 1+2 on each side. Other records: Amula (Günther, 1894); Omilteme (Günther, 1894; Smith, 1942d; Smith, Nixon and Smith, 1950).

Family ELAPIDAE Boie

Micrurus nigrocinctus browni (Schmidt and Smith)

TCWC (8), Lower Pine-oak and Tropical Deciduous forests. Acahuizotla, 2800 ft. (7); 10 km. SW Chilpancingo, 5800 ft. (1). Scale formula, 15—15—15; ventrals of males, 211—217 (M—214.0), of female, 225; caudals of males, 48—54 (M—52.0), of female, 42; supralabials, 7—7; infralabials, 7—7; preoculars, 1—1; postoculars, 2—2; temporals, 1+1+2 on each side. Other records: Omilteme, Chilpancingo (Boulenger, 1896; Schmidt and Smith, 1943).

Family CROTALIDAE Gray

Bothrops barbouri (Dunn)

TCWC (2 females), Cloud and Humid Pine-oak forests. 2 mi. W. Omilteme, 7800 ft. (1); 2.5 mi. SW Omilteme, 8500 ft. (1). Scale formula, 19—17—15; ventrals, 146, 144; caudals, 29, 30; supralabials, 8—9, 9—9; infralabials, 9—10, 10—10; preoculars, 2—2; postoculars, 3—3. This species apparently is not restricted to the Cloud Forest as previously thought and may have a distribution similar to that of the rattlesnakes of the area. One was taken in a humid canyon within the cloud forest, the other on a rocky ridge within the pine-oak forest. Color in life: deep brown with darker brown cross bands. Other records: Omilteme (Shreve, 1938; Dunn, 1919).

Bothrops undulatus (Jan)

TCWC (3 males), Cloud Forest. 2 mi. SW Omilteme, 7800 to 8000 ft. Scale formula, 23—21—17; ventrals, 161, 163, 165; caudals, 43, 47, 52; supralabials, 10—10, 11—11, 11—12; infralabials, 11—11 (2), 12—13

(1); anal entire, all caudals divided, supraorbital spines present. This species apparently is restricted to the cloud forest in this area, and occurs mainly in damp situations. All three specimens were taken in areas of limestone outcrops and typical cloud forest flora. Color in life of two adults, greenish-yellow, heavily suffused with black flecks; ground color of juvenile gray with black spots or flecks. Dorsal pattern of adults and juvenile consists of a mid-dorsal, ''zig-zag,'' dark brown line with coincident dark areas on the sides. Other records: Omilteme (Günther, 1895; Smith, 1941); Chilpancingo (Smith and Taylor, 1945). We question the correctness of the latter locality on ecologic grounds.

Crotalus durissus culminatus (Klauber)

TCWC (6), Lower Pine-oak and Tropical Deciduous forests. Achuizotla, 2800 ft. (5); 4 mi. W. Chilpancingo, 5800 ft. (1). Scale formula, 29—29—19 to 31—30—21; ventrals of males, 176—181 (M—179.0), of females, 181, 186; caudals of males, 28—32 (M—29.5), of females, 22, 28; supralabials, 13—14 (1), 14—14 (2), 15—15 (1), 15—16 (2); infralabials, 15—15 (2), 15—16 (1), 15—17 (2), 17—18 (1); anal entire. This form apparently has a much wider ecological distribution than was previously thought. One specimen was taken in Pine-oak Forest west of Chilpancingo. Other records: Chilpancingo, 25.7 mi. S. Chilpancingo, Omilteme (doubtful), (Klauber, 1952).

Crotalus intermedius omiltemanus (Günther)

TCWC (8 females), Cloud and Humid Pine-oak forests. 1—2 mi. W. Omilteme, 7800 to 8000 ft. Scale formula, 23—21—17, ventrals, 172—183 (M—175.6); caudals, 20—26 (M—22.0); supralabials, 8—9 (1), 9—9 (6), 10—10 (1); infralabials, 8—9 (1), 9—9 (6), 9—10 (1); Anal entire. Part of this series was reported on in detail by Davis and Dixon (1957).

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PROCEEDINGS

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A NEW RACE OF RED BROCKET DEER (*MAZAMA AMERICANA*) FROM COLOMBIA

By Philip Hershkovitz

Chicago Natural History Museum

The first and only known specimen of the red brocket of the Sierra Nevada de Santa Marta, northern Colombia, appears to represent a race new to science. It is named in honor of its collector and my very dear friend, Mr. Melbourne A. Carriker, Jr.

Mr. Carriker's career as a museum collector is one of the most remarkable in the history of tropical American ornithology, mammalogy and mallophagology. It began in Costa Rica in 1902 and has continued through the years in Venezuela, Peru, Bolivia, Mexico, and Colombia, with interruptions only for the study of his specialties in the museums of Washington, Philadelphia, Pittsburgh and Chicago. I met this extraordinary man for the first time in 1942 in the little sun-baked village of Valencia at the eastern base of the Sierra Nevada de Santa Marta. We were both collecting in the same region, he birds, I mammals. Carriker was already established as dean of collectors and he had long before earned a solid reputation as an ornithologist and world authority on Mallophaga. At the time of our first meeting, Carriker was already at an age when most men retire. Nevertheless, during that year, and on into the next decade when our trails crossed again the indefatigable Carriker maintained his pace as the most active and successful bird collector in the Americas. Now, in the eightieth year of his rich and colorful life, Mr. Carriker continues to add to the thousands of Mallophaga, the nearly 100,000 birds and mammals he has already collected, and to the many scientific discoveries made known through his publications and through those of others.

The following description of the red brocket of the Sierra Nevada is a contribution to the systematic revision of all Neotropical deer being prepared by the writer. I am grateful to the authorities of the U. S. National Museum for their permission to study and describe the South American Cervidae in their charge.

Mazama americana carrikeri, new subspecies

Type.—Subadult female, skin and skull, U. S. National Museum no. 282137; collected 26 February, 1946, by M. A. Carriker, Jr.

Type locality.—Mamancanaca, a high valley just south of the snow peaks of the Sierra Nevada de Santa Marta, Department of Magdalena, northern Colombia; altitude, between 3600 and 3900 meters above sea level.

Distribution.—Known only from the temperate zone of the Sierra Nevada de Santa Marta but may range from the border zone between forest and *páramo* (3500-4000 meters) to tropical zone elevations in the Sierra Nevada.

Characters.—General color of body ochraceous tawny, shoulders and nape buffy brown, the hairs of midline of nape not reversed or forming whorls; fore and hind limbs with more brown on outer sides, ochraceous on inner; flanks and rump paler than back, the drab basal portions of the hairs showing through; belly white and defined from flanks by ochraceous orange lateral line; tail with tip missing, ochraceous tawny above and without white fringe, underside with hairs white or buff basally, buffy or ochraceous terminally; hairs of inner sides of buttocks like underside of tail; forehead, muzzle, outer side and inner border of ear brown, inner side of ear white; cheeks, throat ochraceous-buff, sides of neck and chest drab; narial and mental patches white as usual in brockets; a dark brown finely drawn mandibular patch present; external opening of preorbital gland small and hardly defined from inner canthus of eye; tarsal and metatarsal tufts present but not well defined; fore and hind hoofs short and stout, their greatest width two-thirds or more length of inner upper border. Skull not significantly different from that of other red brockets; preorbital fossa shallow, or dish-shaped, as usual in *Mazama americana;* bullae slightly smaller than average.

Measurements of type.—Head and body, 964 millimeters; tail, 111; height at shoulder, 520; weight, 32 lbs.; greatest length of skull, 165; zygomatic breadth, 75 (*c.*); braincase, 53; nasals, 50; alveolar length of upper cheek teeth, 50 (m^3- not fully erupted).

Comparisons.—*Mazama americana sheila* Thomas of northwestern Venezuela and the Sierra de Perijá (Sierra Negra; Cúcuta), northern Colombia, differs from *carrikeri* by its more reddish, less drab, coloration of head and body, upper surface of tail with conspicuous white fringe, undersurface wholly white. *M. a. reperticia* Goldman of Panamá, and its Colombian representatives in the Departments of Bolívar and Chocó, are even more deeply reddish brown on head and body than *sheila,* the tail sharply bicolor as in *sheila,* the hairs of midline of nape partially whorled. The Andean rufous brocket, *Mazama ruçna* Pucheran from the highest altitudes in the Andes inhabited by brockets, differs markedly by its dark reddish color, blackish limbs and extremely large preorbital gland and correspondingly deep preorbital fossa.

Remarks.—The long, thick, coarse drab pelage of the temperate zone *Mazama americana carrikeri* is of the "permanent winter" type. In marked contrast, the more brightly colored thinner haired coat of tropical zone red brockets, is of the "permanent summer" type.

The type specimen of Carriker's brocket was taken at an altitude far higher than that recorded for any other representative of *Mazama americana.* No other form of brocket is known to occur in the Sierra Nevada de Santa Marta proper. The lowlands surrounding the base of the Sierra Nevada are inhabited by a race of brown brocket, *Mazama gouazoubira cita* Osgood. Thus, it appears that the red brocket of the Sierra Nevada may be completely isolated from all others of its species.

Specimens examined.—One, the type. A pickup skeleton of a subadult female (U. S. National Museum no. 281434) from the Colonia Agrícola de Caracolicito, southern slope of the Sierra Nevada de Santa Marta, altitude, 335 meters, is probably referrable to *Mazama americana carrikeri.*

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THE TYPE LOCALITY OF *FELIS CONCOLOR CONCOLOR* LINNAEUS

By Philip Hershkovitz
Chicago Natural History Museum

The original description of *Felis concolor* Linnaeus (1771, Mantissa Plant., p. 522) is based on a diagnosis from Brisson and references to Marcgrave, Ray and Buffon, as follows.

"FELIS cauda elongata, corpore immaculato fulvo.

"Felis ex flavo rufescens mento et infimo ventre albicantibus. *Briss*[*on*, 1756, *Regnum Animale*] *quadr.* 272

"Cuguacu arana *Margr*[*avius*, 1648, *Historia rerum naturalium Brasiliae*], . . . 235, *Raj. quadr.* 169. *Buff*[*on*, 1761, *Hist. Nat.*] *quadr. 9 t. 19*

"*Habitat* in Brassilia."

Brisson's description of the puma is taken from Marcgrave and from several other references (Barrère, Ray, Klein) which are also based essentially on the Brazilian *cuguacuarana* of Marcgrave. Barrére (1741, Hist. Nat. France équinoxiale, p. 166), added a description of the puma of French Guiana to that of the *cuguacuarana.* On this authority, Brisson included *Guiane* as well as *Brésil* in the habitat of the cat. Buffon (supra cit., in text p. 217), gave the Guianas, Brazil, Paraguay, Peru, and eastern United States as the range. Linnaeus, nevertheless, gives only Brazil as the type locality. This action automatically restricts the type of *Felis concolor* Linnaeus to Marcgrave's *cuguacuarana.*

The precise place of origin of the puma described by Marcgrave is known. According to Thomas (1911, Proc. Zool. Soc. London, 1911: 123-124), "Marcgrave stayed at 'Moritzstadt,' now Recife, most of his time, 1640-1644, while even his excursions were limited to the coast region between 5° 45′ and 11° 11′ S., thus taking in little more than from Rio Grande do Norte to Alagoas, a region at the centre of which Pernambuco lies." Accordingly, authors have generally accepted "Pernambuco" as type locality of the animals described by Marcgrave.

In his preliminary revision of the pumas, Merriam (1901, Proc. Washington Acad. Sci., 3:593) gave "Brazil (probably southeastern Brazil)" as type locality. He regarded a skull from Piracicaba, São Paulo, as representative. Merriam had no more Brazilian material than this skull, said to be deformed, and another without particular locality. Insofar as Merriam identified his Brazilian specimens with the nominal *species,* he was absolutely correct. The same would be true, had he identified Canadian pumas as zoological representatives of the *species.* On the other hand, treatment of the Piracicaba skull as ''typical,'' by Nelson and Goldman (1929, Journ. Mammal., 10:345) and designation of the ''vicinity of São Paulo'' as type locality of the subspecies *Felis concolor concolor* Linnaeus is neither zoologically nor geographically correct.

In 1946, Goldman (in Young and Goldman, The puma, p. 202) recognized that his and Nelson's earlier designation of São Paulo as type locality was based ''on an erroneous assumption.'' Unhappily, Goldman went on to reason that inasmuch as Linnaeus' principal [!] reference is to Brisson ''who in turn cited Barrère as his first and main [!] authority,'' the type locality of *concolor* must be Cayenne, French Guiana. At the same time Goldman recognized Marcgrave's Brazilian *cuguacuarana* as the first synonym of the Linnaean *concolor* and thus nullified his own choice of French Guiana as type locality. Evidently, Goldman did not fully appreciate the fact that only Linnaeus, not Brisson or Barrère, is author of the name *concolor,* and that Linnaeus, not Goldman, is first reviser. Linnaeus' designation of Brazil as type locality and, indirectly, the *cuguacuarana* of Marcgrave as type by elimination, are unequivocal and incontrovertible.

The evidence presented here affects the status of each of several other names proposed for pumas. *Felis concolor greeni* Nelson and Goldman, based on a single specimen from Rio Grande do Norte, Brazil, is practically topotypical of the Linnaean *concolor* and becomes, therefore, an absolute synonym of it. *Felis concolor capricornensis* Goldman, based on the Piracicaba skull described by Merriam as abnormal, cannot be seriously regarded as distinct from any other Brazilian puma, particularly the nominate race.

The earliest available name for the puma of the Guianan region is *Felis discolor* Schreber. The name was proposed in 1775 in the caption to a colored plate (Säugthiere, 2: plate 104 B). The animal figured is a copy of the *black tiger* of Pennant (1771, Synopsis Quadr., pl. 181, fig. 2 [figure only, not text which is based primarily on the *jaguarété* of Marcgrave]. Schreber's formal description of *discolor* appeared two years later (1777, Säugthiere, 3:393, 586). It contains the appropriate bibliographic reference to Pennant, to the *once* of Des Marchais (1731, Voyage, 3:300) and an interrogatory reference to the Brazilian *jaguarété* of Marcgrave (1648, Hist. rerum Nat. Brasil., p. 235) which is a melanistic form of the jaguar (*Felis onca* Linnaeus). Schreber gave only South America as the habitat of *discolor.* Nothing is known of the place of origin of Pennant's *black tiger* but Des Marchais's *once,* which Schreber notes particularly, is from French Guiana. This country therefore, is here accepted as the restricted type locality of *Felis concolor discolor* Schreber.

Two names without descriptions proposed for pumas by Lesson (1842, Nouv. Tabl. Reg. Anim., p. 50), are *wavula,* from Demerara, British Guiana, and *soasoaranna* from the savannas of the Rio Orinoco, Venezuela (cf. Schomburgk, 1840, Ann. Nat. Hist., 4:325). *Felis concolor anthonyi* Nelson and Goldman (1931, Journ. Washington Acad. Sci., 21:209) from the Rio Orinoco at the base of Mt. Duida, Venezuela, is practically a topotype of *soasoaranna.* As Goldman (1946, The puma,

p. 200) places *soasoaranna* together with *wavula* in the synonymy of his *concolor* (= *discolor* Schreber) his treatment of *anthonyi* as a distinct subspecies is paradoxical. Actually the original description of *Felis concolor anthonyi* which is known from a single specimen, does not take into account either the real range of individual variation or the real geographic range of the individual and of the race to which it may belong. In any case, there is no convincing evidence that more than one kind of puma, namely, *Felis concolor discolor* Schreber, lives in the area embraced by the Rios Orinoco-Negro and Amazonas as well as the whole of the Amazonian drainage basin east of the Andes.

The above discussion may be summarized by the following classification.

Felis concolor discolor Schreber

Felis discolor Schreber, 1775, Säugthiere, 2:plite 104 B (animal *ex* Pennant, 1771, Syn. Quadr., pl. 181, fig. 2). Schreber, 1777, Säugthiere, 3:393, 586—description.

[*Felis concolor*] var. *Wavula* Lesson, 1842, Nouv. Tabl. Reg. Anim., p. 50—type locality, Demerara, Br. Guiana; nomen nudum?

Felis concolor var. *soasoaranna* Lesson, 1842, Nouv. Tabl. Reg. Anim., p. 50—type locality savannas of the Río Orinoco, Venezuela; nomen nudum?

Felis concolor var. *Niger* Lesson, 1842, Nouv. Tabl. Reg. Anim., p. 50—part, new name for *Felis discolor* Schreber.

Felis concolor anthonyi Nelson and Goldman, 1931, Journ. Washington Acad. Sci., 21:209—type locality, Playa del Rio Base, southeast base of Cerro Duida, Amazonas, Venezuela.

Felis concolor borbensis Nelson and Goldman, 1933, Journ. Washington Acad. Sci., 23:524—type locality, Borba, Rio Madeira, Amazonas, Brazil.

Felis concolor concolor, Goldman (not Linnaeus), in Young and Goldman, 1946, The puma, mysterious American cat, p. 200.

Felis concolor concolor Linnaeus

[*Felis*] *concolor* Linnaeus, 1771, Mantissa Plant., p. 522—name based primarily on the *cuguacuarana* of Marcgrave; type locality, Pernambuco, Brazil, by restriction (cf. Thomas, 1911, Proc. Zool. Soc. London, 1911:123-124).

Felis sucuacuara Liais, 1872, Climats, géologie, faune et géographie botanique du Brésil, p. 461—type locality, Brazil, here restricted to the lower Rio São Francisco whence Liais recorded most of the animals he described.

Felis concolor greeni Nelson and Goldman, 1931, Journ. Mammal., 21: 211—type locality, Curraes Novos, Rio Grande do Sul, Brazil.

Felis concolor capricornensis Goldman, in Young and Goldman, 1946, The puma, mysterious American cat, p. 246—type locality, Piracicaba, São Paulo, Brazil.

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PROCEEDINGS

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NATURAL HISTORY OF PLUMMERS ISLAND, MARYLAND[1]

XII. A Biological Note on *Trypoxylon richardsi* Sandhouse

By Karl V. Krombein

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Trypoxylon (*Trypoxylon*) *richardsi* Sandh. is one of our uncommon eastern wasps and the only described member of the Rufidens Group in the United States except for the even rarer *T. bridwelli* Sandh. from Brownsville, Texas. On September 6, 1958, I found a 2-celled nest (9658 A) in a boring in soft pith of a dead twig of the fringe tree, *Chionanthus virginica,* at Plummers Island, Maryland.

The dead twig containing the nest was 12 mm. in diameter. The nest was in a boring which measured 37 mm. in length and 1.9 mm. in diameter. There was a thin clay partition at the bottom of the boring and then two cells 10 mm. long, each closed by a clay partition ½ mm. in thickness. The boring was empty above these cells. On September 6 the bottom cell held a cocoon containing a wasp prepupa. The cocoon was 7.5 mm. long and 1.5 mm. in diameter, spun of light cream-colored silk, subopaque, and very similar in appearance and texture to that of *Trypoxylon* (*T.*) *frigidum* Sm. The other cell held a number of very small, dead, immature spiders, the prey stored by the wasp. The nest was kept outdoors from October, 1958, through March, 1959, and then

[1]The following numbers of this series have been published previously: I (Introduction), Proc. Biol. Soc. Wash. 48:115-117. 1935; II (Flowering plants and ferns), op. cit. 118-134; III (Mosses), op. cit. 135-137; IV (Birds), op. cit. 159-167; V (Fungi), op. cit. 49:123-131. 1936; VI (Reptiles and amphibians), op. cit. 50:137-139. 1937; VII (Hepaticae), 52:21-22. 1939; VII (Lichens), op. cit. 23-26; IX (Mammals), op. cit. 131-134; X (Flowering plants and ferns, Supplement 1), op. cit. 66:31-38. 1953; XI (Blue-green algae), op. cit. 67:239-241. 1954.

was brought into my office. A female of *richardsi* emerged from the cocoon on April 29.

Scanty data on specimens of the Rufidens Group in the U. S. National Museum suggest that its members usually utilize abandoned borings of other insects or other cavities in twigs or stems as nesting sites. A male of *richardsi* was reared June, 1883, by T. Pergande from a twig gall on oak from "Va.". An undescribed species from Florida was reared from Rhodes grass infested with scale insects, presumably from nests in the stems. A female of *rufidens* Cam. was reared September 19, 1935, from a stem of *Vanda* sp. (a cultivated orchid) at Balboa, C. Z., Panama. *T. richardsi* has never utilized wooden traps at Plummers Island, but perhaps the smallest boring I use (3.2 mm. diameter) is too large to at tract this small wasp.

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PROCEEDINGS
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A NEW STAR-NOSED MOLE (*CONDYLURA*) FROM THE SOUTHEASTERN UNITED STATES

By John L. Paradiso
U. S. Fish and Wildlife Service

According to Jackson (*North American Fauna*, No. 38, 1915, p. 90) the star-nosed mole exhibits but slight variation over a wide zonal range. Specimens from the Lower Austral Zone in Georgia and Virginia are subspecifically inseparable from those of the Boreal Zone in Quebec and Labrador. Since Jackson's review, however, additional specimens from the southeastern United States, as well as more abundant material from the type locality, indicate that a well-marked subspecies occurs throughout the southeastern States. It is here named:

Condylura cristata parva, subsp. nov.

Holotype.—U. S. National Museum No. 293291; adult male, skin and skull (skull well ossified, maxillary and nasal bones fused, tail enlarged); collected Dec. 2, 1939, by Leonard Llewellyn 5 mi. NW. of Stuart, Patrick Co., Virginia.

Distribution.—In the southern Appalachian mountains distribution extends from southeastern West Virginia and southwestern Virginia, south to western North Carolina and eastern Tennessee. In the Coastal Plain it occurs from Nansemond Co. (Dismal Swamp) and possibly Accomack Co., Virginia, to Georgia. (See map.)

When more intensive collecting is done in the piedmont section of the Carolinas, it may be found that there is a continuous distribution from the Coastal Plain to the mountains. At present, however, there are no valid records from this area. The southernmost piedmont specimens reported (not examined but, perhaps, representing *parva*) are from the Richmond, Virginia area (Bailey, *Mammals of Virginia*, 1946, p. 92).

Description.—Similar to *Condylura cristata cristata* but much smaller, both externally and cranially; tail shorter; upper ''unicuspid'' toothrow (anterior base of I3 to posterior base of Pm3) more crowded; upper ''molariform'' toothrow (anterior base of Pm4 to posterior base of M3) relatively larger; interorbital breadth relatively greater; cranium flatter and narrower; rostrum narrower.

Measurements.—Detailed measurements (as outlined by Jackson [loc. cit.]) of *Condylura c. parva* are given in the accompanying table.

Several specimens representing *parva* were examined from which it was impossible to obtain measurements. A skin of undetermined age, taken in 1917 (?), was obtained from a local trapper by Dr. Francis Harper at Mixons Ferry, Okefenokee Swamp, Georgia, and is in the collection at Cornell University.

Three North Carolina specimens preserved in alcohol, are in the North Carolina State Museum at Raleigh. One adult, collected by R. G. Vick on August 4, 1947, at Hayesville, Clay Co., North Carolina, is very small, with a short, swollen tail, and small feet. Two specimens (1 juvenile and 1 adult) with no exact locality data but probably those mentioned by C. E. Brimley (*Jour. Mamm.*, Vol. 4, No. 3, August 1923, pp. 183-184) as being from Garland, Sampson Co., and Wenona, Washington Co., also appear to represent this subspecies.

Comparative measurements.—The following measurements of adult *Condylura c. cristata* are given to show the size variation and as an aid in comparing it with *parva.*

Ten specimens from Cambridge, Massachusetts, measure (in millimeters; averages followed by extremes): Total length, 199.8 (195—208); tail vertebrae, 78.1 (76—83); hind foot, 28.4 (27—30); length of skull (average of 7); 34.6 (33.4—35.5); palatilar length (average of 8), 13.9 (13.3—14.3); mastoidal breadth (average of 7), 13.8 (13.5—14.1); interorbital breadth (average of 7), 7.3 (7.1—7.5); upper "molariform" toothrow (average of 7), 6.6 (6.4—6.9); upper "unicuspid" toothrow (average of 8), 7.8 (7.4—8.1); height of brain case (average of 7), 10.0 (9.6—10.3); maxillary breadth (average of 8), 8.7 (8.6—8.9).

An adult skull from Chester Co., Pennsylvania, (near the type locality of *cristata*) measures: Length of skull, 33.9; palatilar length, 13.7; mastoidal breadth, 13.2; interorbital breadth, 6.9; upper "molariform" toothrow, 6.4; upper "unicuspid" toothrow, 7.3; height of braincase, 9.8; maxillary breadth, 7.8.

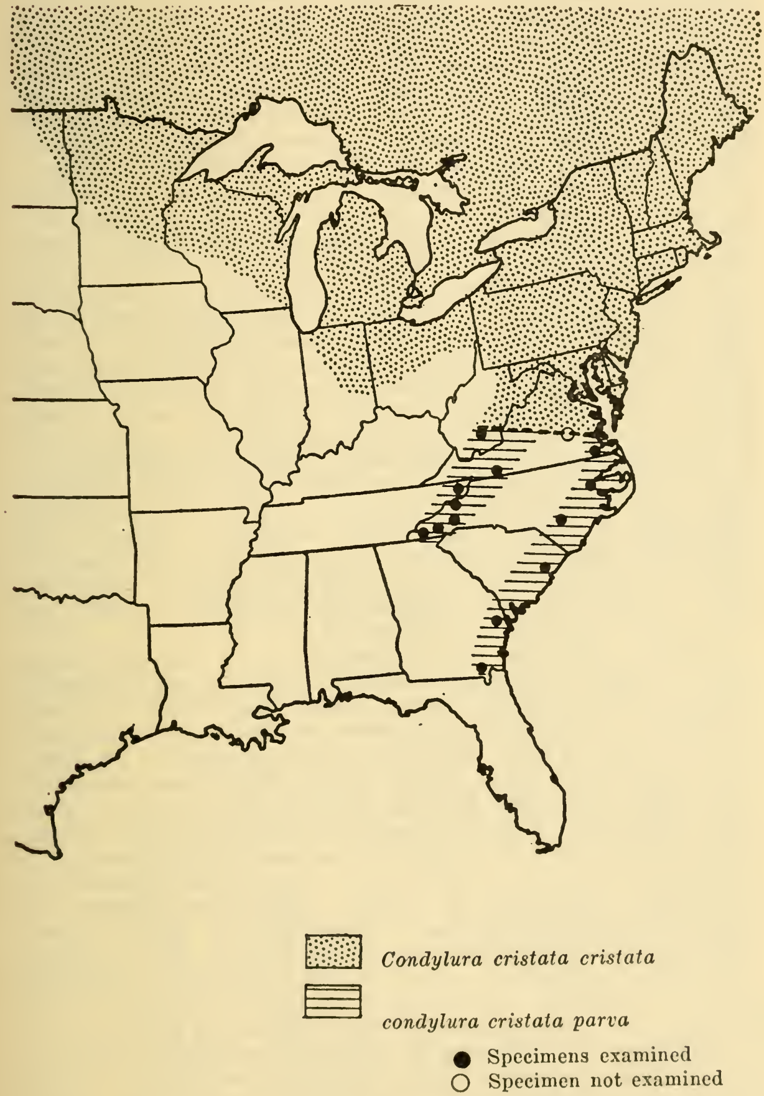
Remarks.—Condylura cristata cristata is best differentiated in the northern part of its range. Eastern Pennsylvania, the type locality, is within the zone of intergradation between *cristata* and *parva.* Intergrading populations occur also in Maryland, northeastern West Virginia and northern Virginia (south to Callao).

When more specimens become available, it may develop that the southern Appalachian mountain and southern Coastal Plain populations, which seem to be geographically isolated, are morphologically distinct. At present, however, no differences are apparent.

An entirely satisfactory aging technique was not developed during this study. The criteria used to distinguish adult animals are: Worn teeth; a distinctly swollen tail; an opaqueness and solidity of the skull; flatness of the cranium; and time of year when taken.

From examination of very young animals in the collection at the U. S. National Museum, it appears that maximum size in this species is reached at a very early age. Specimens in which fusion of the maxillaries and nasals has occurred at the anterior portion of the rostrum probably represent fully grown individuals.

Specimens examined.—Condylura cristata cristata (all in collections at U. S. National Museum; skins and skulls unless otherwise noted). 145 as follows—*Connecticut*: East Hartford, 1; Monroe, 1 (skeleton); Norfolk, 1 (alcoholic). *Delaware*: Fort Delaware, 4. *District of Colum-*



Distribution of *Condylura cristata* in the United States
(with collecting localities of *C. c. parva*)

bia: 10 (1 alcoholic). *Maine*: Eastport, 1 (alcoholic); Freeport, 1; Oakland, 1; Penobscot River (East Branch), 2; Small Point, 1. *Maryland*: Beltsville, 1; Brookville, 1; Burnt Mills, 1 (skeleton); Cabin John, 1 (alcoholic); Chevy Chase, 1; Chevy Chase Lake, 1; College Park, 2 (1 alcoholic); Ellicott City, 1 (skull only); Glendale, 1; Lanham, 1; Laurel, 2; Marshall Hall, 1; Potomac P.O., 1; Prince Georges Co., 1; Silver Spring, 1; Woodside, 2 (alcoholics). *Massachusetts*: Cambridge, 10; Gardner, 1 (alcoholic); Harvard, 1; Lunenburg, 3; Middleboro, 2; New Bedford, 1 (alcoholic); Newburyport, 2; North Abington, 1; Williamstown, 1 (alcoholic). *Minnesota*: Elk River, 1; Fort Ripley, 1; Margie, 1 (alcoholic). *New Hampshire*: Ossipee, 5. *New Jersey*: no exact locality, 1 (alcoholic); Lake Hopatcong, 5. *New York*: Cross River, 1 (alcoholic); Essex Co., 1 (alcoholic); Geneva, 2 (alcoholic); Lake George, 2; Lockport, 1; Locust Grove, 12 (5 alcoholics, 1 skin only); Lyons Falls, 1; New York City, 2 (1 alcoholic); St. Lawrence Co., 1; Sing Sing, 3 (skins only). *Ohio*: Cleveland, 1; Ellsworth, 1 (alcoholic); Garretsville, 3. *Ontario*: Hudson Bay, Moose Factory, 1 (skeleton); Ottawa, 1. *Pennsylvania*: Ardmore, 1 (skull only); Bucks Co., SW. of Falsington, near Delaware Canal, 1 (skull and partial skeleton from owl pellet); Carlisle, 2 (1 skeleton, 1 alcoholic); Chester Co., 1 (skull); Eddington, 1 (skin only); Feather Field Farm, Blueball, Montgomery Co., 1; Germantown, 1 (skin only); Hartsville, 1 (skull only); Holmesburg, Philadelphia, 1; Lake Leigh, 1; Lycoming Co., 1; Meadville, 2 (alcoholics); Radnor, 1 (skin only); Shermans Dale, Perry Co., 1; Tinicum, 1 (skull only); Williamsport, 1. *Quebec*: Grosse Isle, 1; Montreal, 1. *Vermont*: Mt. Mansfield, 2; Rutland, 1. *Virginia*: Calao, 1 (skeleton); Falls Church, 2; Lebanon, Lorton, 2. *West Virginia*: Cranberry Glades, 1. *Wisconsin*: Colby, 1; Delmar Township, Chippewa Co., 1; Herbster, 1 (skull); St. Croix Falls, 1 (skull only); Solon Springs, 4.

Condylura cristata parva (in collections at U. S. National Museum except as noted). 17 as follows—*Georgia*: Marlow, 1 adult (alcoholic, skull removed); Okefenokee Swamp, Mixons Ferry (Cornell University Collection) 1, age? (skull inside). *South Carolina*: South Island Road, 2.5 mi. S. of Georgetown, (Charleston Museum collection) 1 yg. adult. *North Carolina*: Hayesville, (North Carolina State Museum collection) 1 adult (alcoholic); Roan Mountain, Magnetic City, 1 adult, 1 young adult; Weaverville, (Museum of Comparative Zoology collection) 1 adult; Waynesville, Haywood Co., (North Carolina State College collection) 1, age?; no exact locality but presumed to be from Garland, Sampson Co., and Wenona, Washington Co., (North Carolina State Museum collection) 2 (alcoholics). *Tennessee*: Shady Valley, 1, Age? *Virginia*: Dismal Swamp, 3 young adults, 1 adult (alcoholic, skull removed); 5 mi. NW. of Stuart, Patrick Co., 1 adult (type); Accomack Co., Wattsville, 2.3 mi. E., 1 immature. *West Virginia*: Greenbrier Co., 4.2 mi. NE. of Richwood, (West Virginia Mammal Survey collection) 1 immature.

I am grateful to the following for the loan of material: The Charleston Museum, Charleston, South Carolina; The North Carolina State Museum, Raleigh, North Carolina; North Carolina State College, Raleigh, North Carolina; The West Virginia Mammal Survey; Cornell University, Ithaca, New York; The Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; and The Academy of Natural Sciences of Philadelphia.

EXTERNAL AND CRANIAL MEASUREMENTS OF *CONDYLURA CRISTATA PARVA*

Locality	Collection	Cat. No.	Sex	Age	Date	Total length	Tail	Hind foot	Greatest length of skull	Palatilar length	Mastoidal breadth	Interorbital breadth	Upper "molariform" toothrow (Pm4 to M3)	Upper "unicuspid" toothrow (I3 to Pm3)	Height of braincase	Maxillary breadth
South Carolina: South Island Rd., 2½ mi. S Georgetown	Charleston Museum	54.54	♂	ad.	3 IV 1954	165	58	25	32.4	12.4	12.6	6.9	6.3	6.7	9.0	7.8
North Carolina: Weaverville	MCZ	5399	♂	ad.	6 II 1896	----	----	----	----	12.3	----	6.7	6.5	6.1	----	7.7
North Carolina: Roan Mt., Magnetic City	USNM	66300	♂	ad.	15 III 1894	158*	57*	26*	31.6	12.1	----	6.9	6.4	6.5	8.8	7.9
North Carolina: Roan Mt., Magnetic City	USNM	91519	♂	ad.	15 VIII 1895	----	----	----	31.4	12.6	12.2	6.9	----	6.8	9.2	7.8
Virginia: Patrick Co., 5 mi. NW Stuart	USNM	293291	♂	ad.	2 XII 1939	160	60	25	32.2	12.4	12.6	6.9	6.4	7.0	8.7	7.9
Virginia: Dismal Swamp	USNM	78041	♂	ad.	1 V 1896	----	58#	25#	----	12.8	----	6.8	6.2	6.9	----	7.8
Virginia: Dismal Swamp	USNM	77815	♂	yg. ad.	7 V 1896	165	63	25	----	12.4	13.4	6.8	6.2	6.5	9.4	7.7
Virginia: Dismal Swamp	USNM	77813	♀	yg. ad.	24 IV 1896	170	62	25	32.2	12.8	13.1	7.0	6.2	6.9	9.2	8.0
Virginia: Dismal Swamp	USNM	77814	♀	yg. ad.	5 V 1896	165	62	25	31.3	11.9	12.9	6.9	5.8	6.5	9.3	7.4
Virginia: Wattsville, 2 3/10 mi. E	USNM	307428	♂	imm.	11 VI 1958	169	59	25	31.0	11.4	12.4	6.5	6.0	6.4	9.5	7.5
Tennessee: Shady Valley	USNM	267140	?	?	13 VI 1937	----	----	----	----	12.4	----	----	----	----	----	7.8
West Virginia: Richwood, 4.2 mi. NE	Mamm. Surv. W. Va.	WVMS 900	♀	imm.	--------	166	57	24	30.8	12.2	12.0	6.5	6.0	6.5	9.2	----
Georgia: Marlow	USNM (alc.)	180989	♀	ad.	2 III 1913	----	56#	25#	----	----	----	----	6.0	6.4	----	----

* inches transposed to mm.

\# from alcoholic skin

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PROCEEDINGS

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A NEW SPECIES OF TOAD, *BUFO CATAULACICEPS*, FROM THE ISLA DE PINOS AND WESTERN CUBA

ALBERT SCHWARTZ*

The genus *Bufo* is represented in Cuba by four species: *Bufo peltacephalus* Tschudi, *Bufo empusus* Cope, *Bufo gundlachi* Ruibal, and *Bufo longinasus* Stejneger. The latter species has been considered (Barbour, 1937:96) as composed of three subspecies: *longinasus* Stejneger, known only from the unique type from El Guamá, Pinar del Río Province; *ramsdeni* Barbour, known from a small series from the type locality in Oriente, and *dunni* Barbour, known from the vicinity of the type locality in the Sierra de Trinidad in Las Villas Province. Of the four Cuban species, *B. peltacephalus, B. empusus,* and *B. gundlachi* have been reported from the Isla de Pinos (Barbour, 1916:307-308 and Ruibal, 1959:5).

Under the auspices of a National Science Foundation grant, large numbers of *Bufo* were taken throughout Cuba and the Isla de Pinos in 1957 and 1958. Study of these fresh specimens has necessitated an evaluation of the other Cuban species of *Bufo;* this study has been based primarily on materials collected by myself and party, but additional material has been loaned by Dr. Doris M. Cochran, Mr. Charles M. Bogart, and Dr. Ernest E. Williams, curators respectively of the United States National Museum (USNM), the American Museum of Natural History (AMNH), and the Museum of Comparative Zoology (MCZ). Their courtesy in loan of specimens has aided the present study greatly. Dr. Richard G. Zweifel has graciously supplied me with sonograms of the voices of several species of *Bufo,* and Miss Sandra L. Bressler has ably executed the illustrations. All these persons deserve my sincere thanks for their assistance in preparing the present paper.

On the night of July 4, 1958, after a very heavy afternoon rain, which persisted until long after nightfall, a chorus of *B. gundlachi* was heard along the highway from Nueva Gerona to Santa Fé on the Isla de Pinos. Since *B. gundlachi* had not been heard chorusing on the Isla, it seemed pertinent to collect a series of this toad. As the chorus site was approached, it was evident that another anuran was calling; the second call was that of a tiny toad, of which calling males are less than an inch in length. Later during the month of July, we collected additional individuals of this new species from four other localities

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on the Isla de Pinos, and a total number of 68 specimens was amassed. In addition, two specimens had been taken on December 27, 1957, by Edwin B. Erickson and George R. Zug from beneath pine logs and rocks in pine land on the Isla. Thus a total of 70 specimens is available from six localities on the Isla de Pinos.

In August, 1958, again after heavy rain, this same species of toad was heard calling at three localities in southern Pinar del Río Province. During August in Cuba the toads were much less common than in July on the Isla; it is probable that the maximum chorusing occurs in July, and the small choruses in Pinar del Río were due to the fact that the peak of the breeding season was already past. As a result, only 7 specimens were collected in Cuba.

Of the three subspecies of *B. longinasus* only the eastern *ramsdeni* has not been seen in life. We have studied, however, a single topotype of *ramsdeni;* this is an old specimen, collected by Charles T. Ramsden, and most indications of dorsal pattern have long since disappeared. Consequently, all comments on this race in the present paper may be considered as provisional, depending upon the acquisition of fresh material.

Ruibal (*op. cit.*) has made careful comparisons of *B. gundlachi* with all other West Indian toads. His data have been utilized in the present paper. However, I have examined extensive series of most Cuban forms, and pertinent comments on these are made in the paragraphs below. The new species of *Bufo* from the Isla de Pinos and western Cuba may be called.

Bufo cataulaciceps, new species

Type: AMNH 61982, from 7.9 miles north of Santa Fé, Isla de Pinos, Habana Province, Cuba, taken July 4, 1958, by Albert Schwartz and George R. Zug. Original number 5612.

Paratypes: AMNH 61973-81, 61983-91, same data as type.

Distribution: the northern two thirds of the Isla de Pinos, and western Cuba from the vicinity of La Fé east to the vicinity of Pinar del Río city, all in Pinar del Río Province.

Diagnosis: A species of *Bufo* distinguished from all other West Indian species by its small adult size (maximum size of males, 30 mm.; maximum size of females, 27 mm.), pronounced wrinkles on the lores and at the angle of the mouth, contrasting pattern of pale dorsolateral stripes against a dark background, prominent cranial crests, lateral position of the paratoid glands, and slightly webbed feet with three phalanges of the fourth toe completely free of web.

Description of type: An adult male, with the following measurements (all measurements in millimeters): snout-vent length, 23.5; length of head from snout to posterior margin of tympanum, 6.6; greatest width of head, 7.3; longitudinal diameter of eye, 2.0; naris to eye, 2.2; femur, 6.6; tibia, 7.0; fourth toe, 7.8; interorbital distance, 3.1; length of paratoid, 4.7.

The coloration of the type is dark gray (almost black) dorsally (see figure 1). There is a median fine, somewhat expanded posteriorly above the vent, gray line, in the very center of which is a pale yellowish hair line, both extending from the snout to the vent. Between the

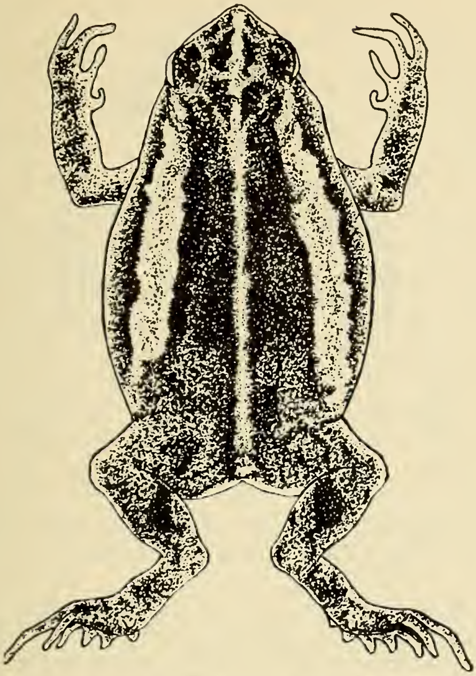

Fig. 1. *Bufo cataulaciceps,* new species, type, (AMNH 61982), dorsal aspect; snout-vent length 23.5 mm.

eyes, this median line is expanded into an irregular triangle, its apex pointed posteriorly, and its anterior side irregular and incised medially. Behind the apex of the triangle the median line is broken. Pale gray dorsolateral stripes begin at the posterior corner of the eye and extend posteriorly to the groin where they terminate by gradually becoming obscured. The dorsolateral stripes are boldly delineated both medially and laterally against the dark dorsal and lateral color, and the stripes are themselves a bit darker centrally than laterally. The lateral coloration is like that of the dorsum, and extends from the posterior margin of the eye to the groin as a sharply delineated band anteriorly, which becomes increasingly obscure posteriorly. The upper lip is dusky with a few scattered small black blotches; the supralabial line continues to above the axilla where it is white. The lower lip is immaculate. The forelimbs are dusky gray with one darker bar on the antibrachium and various irregular blotches on this same member. There is a single darker and diffuse blotch on the thigh, another on the crus, and a third on the pes, which, when the leg is flexed, combine to produce a single transverse bar across the entire dusky hindlimb. The venter is creamy white, with about twelve dusky spots on the abdomen.

The snout is relatively short and blunt, with the canthus rostralis emphasized by a prominent crest, which continues as a supraorbital

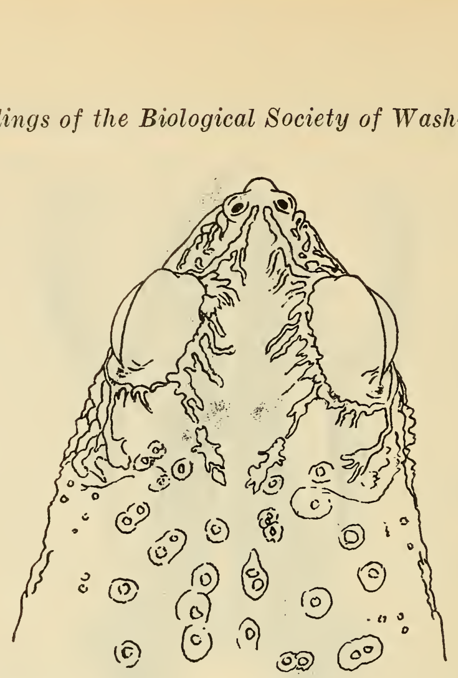

Fig. 2. *Bufo cataulaciceps*, type, dorsal aspect of head; details of pattern omitted to show structure only.

bony ridge both above and behind the eye. The median cranial crest and the supratympanic crest are both prominent and directed mesiad and are expanded posteriorly. The interorbital space, enclosed by the supraorbital crests, is completely smooth (see figure 2). The longitudinal diameter of the eye is slightly less than the distance of the eye from the naris, and the tympanum is small, inconspicuous, and close to the posterior margin of the eye. The lores, subocular area, and area above the angle of the mouth are raised into a series of prominent wrinkles or rugae (see figure 3). The dorsum is pustulose, the pustules relatively smooth and low, closely appressed to one another, and with a single

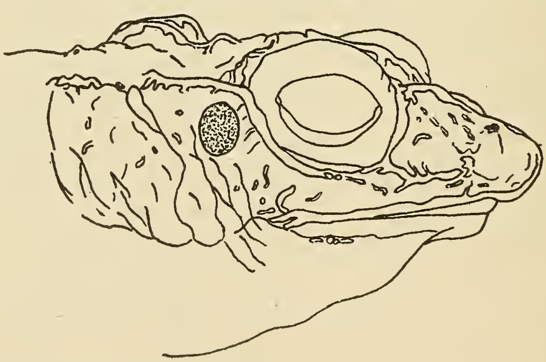

Fig. 3. *Bufo cataulaciceps*, type, lateral view of head; details of pattern omitted to show structure only.

central low spine in each wart. The dorsal surfaces of both fore- and hindlimbs are likewise pustulose with short but prominent spines. The skin of the belly and ventral surface of the limbs is covered with flattened, pavement-like granules without spines. The inner metatarsal tubercle is not keratinized. The fingers are relatively long, unwebbed, and 3-2-4-1 in order of decreasing length; the toes are slightly webbed, with the three distal phalanges of toe 4 completely free of the web. The toes are 4-5-3-2-1 in order of decreasing length.

Variation: The paratypes include 17 males and one female. From the Isla de Pinos there are, including the type and paratypes, 66 males and six females; from Pinar del Rio there are seven males. The Isla de Pinos and Pinar del Río specimens will be discussed separately.

Measurements (means and extremes) of 64 Isla de Pinos males are: snout-vent length, 23.6 (21.5—25.6); and head length, 6.9 (6.0—7.5); head width, 7.8 (7.1—8.6); longitulinal diameter of eye, 2.4 2.1—2.8); naris to eye, 2.3 (2.0—2.6); femur, 6.5 (5.5—7.5); tibia, 7.0 (6.3—7.8); fourth toe, 7.4 (6.5—8.6); interorbital distance, 3.2 (2.7—3.8); length of paratoid, 4.1 (3.2—5.6). All males but one (AMNH 61222) taken by us were calling or at least associated with choruses. Measurements of six Isla de Pinos females are: snout-vent length, 24.9 (21.3—27.2); head length, 7.0 (6.4—7.7); head width, 7.9 (7.1—8.5); longitudinal diameter of eye, 24 (2.0—2.6); naris to eye, 8.4 (2.2—2.8); femur, 6.6 (6.3—7.0); tibia, 7.3 (7.0—7.6); fourth toe, 7.9 (74—85); interorbital distance, 3.3 (3.1—3.5); length of paratoid, 4.5 (3.6—5.2). One female (AMNH 61223) was not taken from a chorus, and also shows no ovarian activity; it is the smallest of the females (snout-vent 21.3) and is likely immature. Sexual differences in size are not pronounced; females reach a slightly larger snout-vent length than males, and in general average slightly greater in all measurements taken. The vocal sac in males is spherical when distended, and not more darkly pigmented than the remainder of the venter in preserved specimens. Throats of females are white to creamy. Males have a patch of tiny dark gray to brown rugosities on the dorsal surface of the first digit of the forelimb; this patch may cover all the phalanges of this digit, and there may be an accessory but smaller patch adjacent to the base of the thumb on the palmar surface of the hand.

The coloration of the entire Isla de Pinos series is quite variable. The paratypic lot was recorded in life as being dark brown to dull olive dorsally, with the middorsal line tan to yellowish tan. The dorsolateral stripes varied from tan to yellowish tan as well, and on a single individual the dorsolateral and median bands are unicolor. The venter was recorded as white to grayish. In preserved material all dorsa are some combination of shades of browns, grays, and black. In all there is some indication of a middorsal line, varying from an incomplete hairline to the fully expressed pattern as in the type. The dorsal color is usually darker than the dorsolateral stripes, but occasional specimens show the stripes very faintly, and one is now almost black dorsally. If the dorsal color is light gray, rather than dark gray or black, there is a dorsal pattern consisting of three pairs of blotches, one scapular, one sacral and one anal; these blotches extend from the inner border of the dorsolateral stripes to the middorsal line, and may be rectangles, rhombs, diamonds, or irregular in shape. The interocular figure is present in most specimens, but it may be more extensive than that of the type. In dark individuals, the figure may be poorly demonstrated or even absent (AMNH 62014). The banding on the hindlimbs is more pronounced in lighter specimens than it is in the type, and there may be an additional band across the knee on both thigh and crus. The forelimbs as well may have the banding more prominent than the type. There are no differences between males and females in coloration and pattern.

The bellies vary greatly in pattern. Of the entire Isla de Pinos series, the majority have the bellies immaculate creamy white; at the other extreme are five specimens in which the bellies are heavily mottled or blotched with dark gray to black. All conditions of intermediacy occur in the lot.

Structurally, the series resembles the type closely. The cranial crests are always distinct and enclose a smooth interorbital space. Occasionally there is an accessory transverse ridge partially separating the interorbital area from the remainder of the dorsum. The dorsum is always pustulose with small spines. The loreal, subocular, and supra-angular rugae are prominent in all specimens. The venter is without spines in all individuals. The lack of extensive webbing on the hindfeet is likewise characteristic of all specimens.

The paratoids are lateral in position, and directed obliquely dorsomedially from the angle of the jaws toward the posterior termination of the median cranial crest. The surface of the paratoids is smooth and they are relatively inconspicuous; posteriorly the glands merge almost imperceptibly into the spinose pustules of the dorsum. The oblique orientation of the paratoids and their inconspicuousness makes measurement of these glands difficult and unreliable.

Seven males from western Cuba have the following measurements: snout-vent length, 26.4 (23.6 — 29.6); head length, 7.7 (6.9 — 8.2); head width, 8.8 (7.9 —9.6); longitudinal diameter of eye, 2.5 (2.2 — 2.8); naris to eye, 2.5 (2.3 — 2.7); femur, 7.6 (7.0 — 8.0); tibia, 8.2 (7.3 — 8.7); fourth toe, 8.8 (7.6 — 10.2); interorbital distance, 3.7 (3.3 —3.9); length of paratoid, 5.6 (4.5 — 6.3). These figures indicate that the mainland Cuban population of *B. cataulaciceps* males reaches a larger size than their Isla de Pinos relatives. It is interesting to note that the smallest of the Cuban toads, AMNH 62045, is from near the southern coast of Cuba (near La Fé); were it not for this one specimen, the Cuban and Isla populations (as far as males are concerned) would be almost completely separable on the basis of size (maximum snout-vent length in Isla males, 25.6; minimum snout-vent length in Cuban males, 25.5). In addition, there is a difference in pattern in the Cuban toads which does not occur in any of the Isla series. In all Cuban *B. cataulaciceps*, the dorsolateral stripes send a median broad extension from the inner margins toward the midline between the position of the scapular and sacral blotches; when well expressed (AMNH 62046) the extension divides the dorsum into an if the crossband is not prominent, its position is indicated by irregular and diffuse edges of the dorsolateral stripes in the area between the anterior and a posterior dark area, separated by a wide crossband. Even scapular and sacral blotches. Two Cuban specimens (AMNH 62043—44) have the dorsal pattern even more complex; here the dorsolateral stripes are almost completely obliterated by irregular black blotches, but the position of the Cuban crossband is still indicated. No Isla de Pinos specimens show any indication of this feature, and it is possible that larger size and the crossbanded pattern of Cuban toads will distinguish them subspecifically from their Isla de Pinos relatives. However, more specimens must be taken in Cuba before such a course is adopted. Certainly the situation as presently known is indicative.

Comparisons: *B. cataulaciceps* needs comparison only with the small species of Cuban toads, *gundlachi* and *longinasus* (with its races *longinasus, dunni,* and *ramsdeni).* Comparison with adult *peltacephalus* and *empusus* is unnecessary; both reach a much larger adult size (142 in *peltacephalus* males, 76 in *empusus* males). From juveniles of these two forms, *cataulaciceps* can be distinguished by having a middorsal pale line which is absent in both these species. In addition, juveniles of *B. peltacephalus* have either a vivid emerald green or reddish-fawn ground color in life and three relatively prominent paired blotches on the dorsum, and a black rather than pale interocular triangle. Juvenile *empusus* are variegated dorsally, and are much shorter limbed and narrower headed than *cataulaciceps.*

Pertinent comparisons are between *B. cataulaciceps,* and *B. longinasus* and *B. gundlachi. B. gundlachi* and *cataulaciceps* are similar in many ways, but are just as different in other. Both are small with laterally placed paratoids. Both have spinose dorsa, although the dorsa of *gundlachi* are conspicuously more spiny than those of *cataulaciceps.* The posterior medial cranial crests on *gundlachi* are usually composed of several isolated excrescences, whereas those of *cataulaciceps* are composed of a single rather regular bony ridge. The interorbital space in *gundlachi* is concave and has scattered isolated bony tubercles; this space is smooth in *cataulaciceps.* Calling male *gundlachi* from the Isla de Pinos (70 individuals) vary between 25.7 and 33.7 mm. in snout-vent length (mean, 30.0), and are thus all higher in this measurement than Isla de Pinos *cataulaciceps.* Length of tibia and length of fourth toe likewise show that the two species can be separated on this basis as well, with *gundlachi* having the higher measurements. The ratio of snout-vent length to hindlimb length will not separate the two species; Ruibal (*op. cit.*) gives the range of this ratio in *gundlachi* as 1.57 to 1.93. The ratio in *cataulaciceps* varies between 1.66 and 2.13; this is slightly higher than for *gundlachi,* but is not diagnostic. Patternwise, both *gundlachi* and *cataulaciceps* are comparable; however, the pattern elements in the latter are much more contrasting. Also, the entire snout of *gundlachi* is pale, instead of the pale color being restricted to an interocular figure as in *cataulaciceps.* Finally, the individual flattened granules on the belly of gundlachi are spinose, whereas these granules in *cataulaciceps* are without spines.

From the three races of *B. longinasus, B. cataulaciceps* can be distinguished at once by the lateral, rather than dorsal, paratoid glands. In the races of *longinasus* the cranial crests are very low and inconspicuous, in contrast to the high and conspicuous crests of *cataulaciceps.* All races of *B. longinasus* are distinctly long-snouted. The dorsa of most specimens of *dunni* and an adult female *l. longinasus* are relatively smooth, with short and inconspicuous spines in the tubercles; however, an adult female *dunni* (AMNH 60820) and an adult male *ramsdeni* (USNM 63230) are extremely spinose dorsally, and a juvenile *dunni* (AMNH 60818) is spinose as well. Apparently the degree of spinosity is a variable character within the subspecies of *B. longinasus.* The impression is that *B. cataulaciceps* is intermediate in spinosity, and that it is more spinose than most specimens of *dunni* and the seven known specimens of *l. longinasus,* but less so than some *dunni,* and *ramsdeni.*

No specimens of *B. longinasus* have the dorsolateral stripes strongly contrasting as are those of *cataulaciceps.* Rather the dorsolateral stripes in these forms merge gradually medially with the dorsal color, and are not sharply delineated from the more central dark pigment. Some *dunni* have a median light area, and, if present, this line may expand into a rhombic interorbital figure; this is roughly comparable to the condition in *cataulaciceps.* Ventrally, *ramsdeni* is much mottled with black, *dunni* is usually so mottled, but less extensively so than *ramsdeni,* and *longinasus* has a pure white belly, with three short dark brown dashes on the chest. In life, *l. longinasus* has yellowish-orange feet, inner side of arm, and jaws; this bright coloration does not occur in *cataulaciceps.* Judging from the limited material of *B. longinasus* at present available, I suspect that *ramsdeni* and *dunni* are more closely related to one another than both are to *l. longinasus.*

The lores and angle of the jaw are smooth in most *dunni* and *l. longinasus,* spinose in *ramsdeni,* and tuberculate in *gundlachi;* no other Cuban species has these areas wrinkled as does *cataulaciceps.*

The combined snout-vent/hind limb ratio for the various subspecies of *B. longinasus* from Ruibal (*op. cit.*) varies between 1.27 and 1.54; this ratio is thus well below that of *B. cataulaciceps* (1.66 to 2.13). However, the recently collected adult female *B. l. longinasus* has a ratio of 1.79, within this ratio in *cataulaciceps* but certainly nearer the lower than the higher extreme. The relatively and actually longer hindlimbs of the races of *B. longinasus* is a conspicuous feature of this species in life and easily separates them from other Cuban toads.

Comparisons of *B. cataulaciceps* with the Hispaniolan *Bufo guntheri* Cochran and the Puerto Rican *Bufo lemur* Cope are hardly necessary. These two West Indian toads are much larger than *B. cataulaciceps,* and are distinctly different structurally.

Remarks: *Bufo cataulaciceps* is, by virtue of its short and lateral paratoid glands and well developed cranial crests, a member of the *peltacephalus-empusus-gundlachi* group of Cuban toads. It shows little resemblance to *B. longinasus* and, of the *peltacephalus* group, is obviously most closely related to *gundlachi.*

On the Isla de Pinos, *cataulaciceps* was taken chorusing with both *gundlachi* and *empusus,* never with *peltacephalus.* In such choruses, *cataulaciceps* calls from the margins of temporary pools, seated either in very shallow water or on merely moist earth or gravel at the pool's edge. Males are extremely shy, and cease calling at any disturbance; this behavior is in contrast to that of both *gundlachi* and *empusus,* which customarily continue calling loudly when approached. The spherical vocal sac is rather small, and about the size of a pea in diameter.

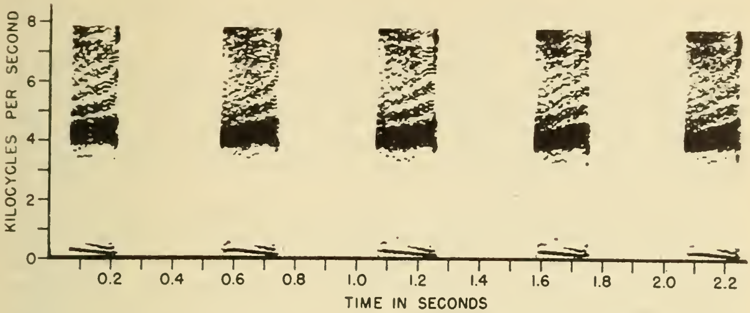

Fig. 4. Songram of call of *Bufo gundlachi*, recorded 2.8 mi. E La Mulata, Pinar del Río Prov., Cuba, 17 June 1957; temperature 23°C.

The call however, is relatively loud for such a small creature, and can be readily detected in a mixed chorus, although the ventriloqual quality of the call makes locating calling males difficult. In deep grass, *cataulaciceps* is difficult to locate, due to its shyness, small size, and very dense herbaceous cover. No choruses of *cataulaciceps* equalled in volume or number of calling males those of either *gundlachi* (which may have extensive choruses involving hundreds of vocalizing males) or *empusus* (which may have as well large choruses, both as to number of individuals and geographic area).

The calls of *B. cataulaciceps* and *B. gundlachi* are quite different. Inspection of figures 4 and 5, which are sonogram records of tape recordings of these two species, reveals that in the smaller species, the dominate frequency is 4500 kilocycles per second, as against 3000 kilocycles per second in *gundlachi*. The duration of the individual call is 0.2 seconds in *cataulaciceps* with an interval between calls of about 0.35 seconds; the individual call of *gundlachi* lasts about 1.3 seconds with a 0.2 interval between calls. The calls are thus seen to differ in dominant frequency, duration, and interval. Aurally, the call of *cataulaciceps* is reminiscent of that of *B. quercicus*, but lacks the whistling or peep-like

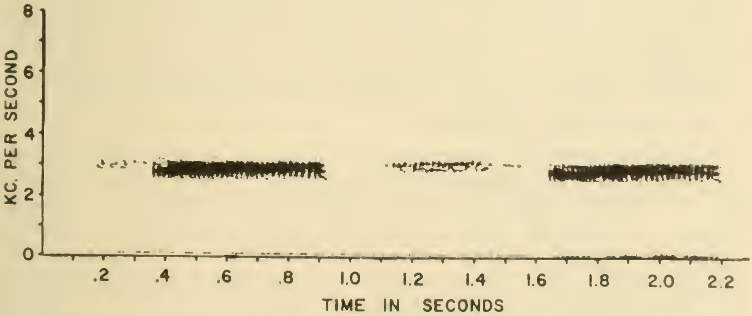

Fig. 5. Sonogram of call of *Bufo cataulaciceps*, recorded 18 mi. SSW Nueva Gerona, Isla de Pinos, 18 July 1958; temperature 25°C.

quality of the latter species; sonograms of the calls of *cataulaciceps* and *quercicus* are not at all similar.

Amplexing pairs of *cataulaciceps* as well as eggs were both collected. Amplexus is *axillary;* eggs of this species are smaller than those of *gundlachi,* and remarkably appear to be deposited in clumps rather than in typical *Bufo*-like strings. Tadpoles were raised from the eggs, and descriptions of these portions of the life history must await additional data.

The relationships of the fauna of the Isla de Pinos and western Cuba have been pointed out by other workers and by myself (Schwartz, 1959 :38). The occurrence of *B. cataulaciceps* in these two areas adds another species common to the two regions. I suspect that this diminutive *Bufo* will be found to range as far east as the vicinity of Batabanó, Habana Province, along the south coast and south of the Sierra de los Organos and Sierra del Rosario; the occurrence on the Isla de Pinos and in western Cuba of some plants such as *Pinus tropicalis, Colpothrinax wrighti,* and *Byrsonima coccolobaefolia,* all of which are typical of the habitat which *B. cataulaciceps* occupies, may well be found to delimit the area occupied by this small toad on the Cuban mainland.

Only two specimens of *B. cataulaciceps* have been taken which were not associated with choruses. These two toads were collected from beneath rocks lying on Mal Pais gravel on the Isla de Pinos, adjacent to a then dry depression in pine woods. These two individuals are the basis for Ruibal's (*op. cit.*:5) records of *B. gundlachi* from the Isla de Pinos. Although these toads are actually referrable to *B. cataulaciceps, B. gundlachi* does occur on the Isla de Pinos, as previously noted. Since *B. cataulaciceps* has seldom been taken when not involved in sexual activities, it is not improbable that it spends much of its time underground, coming to the surface to breed during extremely wet weather in midsummer.

All localities for *B. cataulaciceps* in Pinar del Río are in the lowlying Southern Coastal Plain of Pinar del Río (Llanura costera del sur de Pinar del Río) and in the Península de Guanahacabibes subregion (see Marrero, 1951). On the other hand, the type locality of *B. l. longinasus* is apparently in the Alturas de Pizarras, a pine-clad piedmont both north and south of the Sierra de los Organos. The six new specimens of this rare species were all collected in the Alturas, in gently rolling pine woods. It is possible that in Pinar del Río, *cataulaciceps* occupies the low coastal plain and *longinasus* the higher, but still xeric, piedmont. Much collecting in the very mesic Sierra de los Organos has yielded no *longinasus,* despite the fact that *dunni* (and apparently *ramsdeni* as well) are both forest inhabiters.

Specimens examined (specimens of *B. empusus* and *B. peltacephalus* not listed) *Bufo cataulaciceps*: *Isla de Pinos,* 7.9 miles north of Santa Fé, 19 (AMNH 61973—91): 12.7 miles south southwest of Nueva Gerona, 10 (AMNH 61992—62001); 18 miles southwest of Nueva Gerona, 3 (AMNH 622002—04); 5.8 miles northeast of Siguanea, 30 (AMNH 62005—34); 5 miles northeast of Siguanea, 2 (AMNH 61222—23); 2 kilometers north, 14.4 kilometers west of Santa Fé, 6 (AMNH 62035—40); Júcaro, 1 (MCZ 30860); Santa Fé 1 (MCZ 30862). *Cuba,* Pinar del Rio, 6.5 miles southeast of Pinar del Río, 4 (AMNH 62041—

44); 6.4 miles southwest of Isabel Rubio, 2 (AMNH 62046—47); 1 mile southeast of La Fé, 1 (AMNH 62045).

Bufo gundlachi: *Isla de Pinos,* 2.1 miles north of Santa Fé, 33 (AMNH 63152); 1.3 miles south southwest of Nueva Gerona, 15 (AMNH 63153); 2 kilometers east of Santa Barbara, 10 (AMNH 63154); 7.9 miles north of Santa Fé, 9(AMNH 63151); nr. Sante Fé, 3 (MCZ 30859, 30861, 30863); 1.8 miles south of Nueva Gerona, 4 (AMNH 63155). *Cuba, Pinar del Río,* 2.3 miles east of La Mulata, 4 (AMNH 60821—24); 2.8 miles east of La Mulata, 4 (AMNH 60825—28); 2.9 miles east of Isabel Rubio, 1 (AMNH 60829); 6.5 kilometers southeast of Pinar del Río, 6 (AMNH 62050); 2.5 miles south, 7 miles east of Herradura, 55 (AMNH 60830—56, 61474—75, 61830—39, plus sixteen untagged specimens); 5.5 miles east of Candelaria, 29 (AMNH 60890—918); *Habana,* 1.5 kilometers east of Campo Florido, 59 (AMNH 63156); *Matanzas,* 1.5 miles west of Canasí, 5 (AMNH 62049); Las Villas, 28 kilometers east of Trinidad, 6 (AMNH 60884—89); 2 kilometers southeast of Aguada de Pasajeros, 19 (AMNH 62048); *Camagüey,* Embarcadero de Morón, 1 (AMNH 60857); 9.4 miles south of Contramaestre, 26 (AMNH 60858—83).

Bufo l. longinasus: *Cuba, Pinar del Río,* El Guamá, 1 (USNM 27419); 19.5 kilometers northeast of Pinar del Río, 6 (AMNH 61648—52, 61972)

Bufo l. dunni: *Cuba, Las Villas,* 4 kilometers west, 12 kilometers north of Trinidad, 14 (AMNH 60806—19); Topes de Collantes, 1 (AMNH 60820); 0.9 miles south of Topes de Collantes, 4 (AMNH 60802—05).

Bufo l. ramsdeni: *Cuba, Oriente,* Los Hondones, Guantánamo, 1 (USNM 63230).

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PROCEEDINGS

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TWO NEW SUBSPECIES OF BIRDS FROM THE SAN LUIS MOUNTAINS OF VENEZUELA AND DISTRIBUTIONAL NOTES

By William H. Phelps and William H. Phelps, Jr.

The San Luis Mountain Range is in the extreme northern part of the State of Falcón at the base of the Paraguaná Peninsula. It is isolated and has a lower subtropical fauna but the altitudes are not greater than 1400 meters. The range is 35 miles long from east to west and not more than 7 miles wide. We have previously described a number of new endemic forms from there. The affinity of the avifauna is more towards the Caracas Region than to the Mérida Region.

Besides describing the new subspecies we have added some taxonomic and distributional notes. We wish to thank the Curators of the U. S. National Museum and American Museum of Natural History for access to their collections.

Specimens listed are in the Phelps Collection, Caracas, unless otherwise specified. Names of colours are capitalized when direct comparison has been made with Ridgway's ''Color Standards and Colour Nomenclature,'' 1912. Wing measurements are of the chord.

Oceanites oceanicus oceanicus (Kuhl)

Procellaria oceanica Kuhl, Beitr. Zool., Vergl. Anat., *1*, p. 136, 1820. (South Atlantic.)

♂. Placer de La Guayra, high seas 15 kilometers off the north coast, July 26, 1958.

This specimen extends the range of the species to the high seas off the northern coast. Sight records have been cited by Cory and by Beebe; see Phelps and Phelps, Jr., Lista de las Aves de Venezuela con su Distribución[1].

Coeligena coeligena zuloagae, new subspecies

Type: From Curimagua, Sierra de San Luis, Estado Falcón, Venezuela; 1300 meters. No. 63357, Phelps Collection, Caracas. Adult male collected April 18, 1957, by Ramón Urbano. (Type on deposit at American Museum of Natural History.)

[1]Tomo 2, Parte 1, Bol. Soc. Ven. Cien. Nat., No. 90, p. 16, 1958.

Diagnosis: Nearest to *C. c. coeligena* (Lesson) of the Caracas Region but differs from all races by chin and breast being dusky olivaceous, with feathers faintly margined with whitish, giving a lined appearance, instead of whitish with olivaceous spots; bill shorter.

Range: Known only by the type specimen, from the Subtropical Zone.

Description of Type: Top of head, neck and mantle nearest to Claret Brown; lower back and rump greenish, feathers basally barred with bronze; upper tail-coverts brownish bronze; lores black. Chin and throat dusky olivaceous, feathers narrowly margined with grayish white, giving a lined appearance; breast, sides and abdomen bronzy, faintly barred with greenish; a white patch on anal area, feathers brown basally; under tail-coverts bronze heavily margined with Sanford's Brown. Remiges and greater upper wing-coverts Dark Vinaceous Drab; lesser coverts and bend of wing Claret Brown. Tail shiny bronze.

Bill (in life) "black;" feet "black;" iris "dark." Wing, 71 mm.; tail, 48; exposed culmen, 27; culmen from base, 31; tarsus, 6.

Remarks: Size similar to *C. c. coeligena.* Measurements of *coeligena*: four adult males—wing (3), 74—78 (76.7) mm.; tail, 47—52 (49.7); exposed culmen 30—32 (30.5.).

Specimens Examined

C. c. coeligena—VENEZUELA: Caracas Region, 8[2]; El Junquito, Dist. Federal, 2 (?); Cerro El Avila, 2 ♀, 1 (?).

C. c. zuloagae.—VENEZUELA: Curimagua, Sierra San Luis, Falcón, 1 ♂ (type).

C. c. zuliana.—VENEZUELA: Perijá Mountains, Zulia, 6[2].

C. c. columbiana.—VENEZUELA: Mérida Region, 4[2]; Río Chiquito, Táchira, 5 ♂, 2 ♀, 4 (?). COLOMBIA[3]: 11[2].

C. c. ferruginea.—COLOMBIA[3]: 18[4].

C. c. obscura.—ECUADOR[3]: 23[4].

C. c. boliviana.—BOLIVIA[3]: 5[4].

Myrmeciza disjuncta Friedmann

Proc. Biol. Soc. Wash., No. 50, p. 83, June 30, 1945. (Cerro Yapacana, Upper Orinoco, Venezuela.)

3 ♂, 2 ♀, Cerro Yapacana, April and May, 1947.

Friedmann had only an immature ♂ and an adult ♀. The imm. ♂ was chosen as the type. The adult male had been unknown until we collected these specimens at the same locality sixteen years later. The coloration of these is very different from that of the immature type and we describe it here.

Adult ♂. Phelps Collection No. 39340. Top of head, neck, back and uropygium Blackish Brown; a large concealed white patch on back; sides of head, neck, throat, breast, abdomen and thighs white; under

[2]For localities see Phelps and Phelps, Jr., Proc. Biol. Soc. Wash., *66*, p. 1, March 30, 1953.

[3]Specimens in American Museum of Natural History.

[4]For localities see Zimmer, Am Mus. Nov., No. 1513, p. 25, May 31, 1951.

tail-coverts grayish white; remiges Fuscous; upper wing-coverts blacker, tipped with white, making three interrupted wing-bands.

Measurements: three adult males—wing, 60—61 (60.3) mm.; tail, 44—46 (45); culmen from base, 19—20 (19.6); tarsus, 24—24 (24); two adult females—wing, 59—59 (59), tail, 45—45 (45); culmen from base, 20—20 (20); tarsus, 23—24 (23.5).

Corapipo gutturalis (Linné)

Pipra gutturalis Linné, Syst. Nat., 12° ed., *1*, p. 340, 1766. (Cayenne.)

Corapipo gutturalis carminae Barnés, Auk, p. 412, 1955. (Cerro Marahuaca, Terr. Amazonas, Venezuela.)

Of the 15 ♂, 17 ♀ and 2 ♂ juv. in our collection, collected from 1938 to 1948[5], the senior author took the 17 ♀ and the 2 ♂ juv. to the U. S. National Museum in 1957 for comparison with the type of *C. g. carminae,* listed as an adult ♀. He found the type similar to our 2 ♂ juv.

Specimens in our Collection

VENEZUELA: Cerro Auyan-tepui, Bolívar, 2 ♂; Carabobo, Río Cuyuni, 5 ♂. 1 ♀; Cerro Paurai-tepui, 4 ♂, 8 ♀; Salto Maiza, Río Paragua, 1 ♂, 1 ♂ juv., 1 ♀; Salto María Espuma, 1 ♀; Cerro El Negro, Río Cuchivero, 2 ♂, 1 ♂ juv., 5 ♀; Taracuniña, Alto Caura, 1 ♂. BRITISH GUIANA: Paruma Mission, Kamarang River, 1 ♂.

Cotinga nattererii (Boissonneau)

Ampelis nattererii Boissoneau, Rev. Zool., *3*, p. 2, 1840. ("Bogotá.")

1 ♀, Santa Elena, Rio Frío, Mérida; forest at 20 meters altitude.

This specimen constitutes an extension of range of the species to Venezuela from the Magdalena Valley in Colombia.

Rynchocyclus fulvipectus (Sclater)

Cyclorhynchus fulvipectus Sclater, Proc. Zool. Soc. London, *28*, p. 92, 1860. (Nanegal, Ecuador.)

1 ♂, Río Chiquito, Estado Táchira, Feb. 19, 1956; 1800 meters.

This specimen constitutes an extension of range to Venezuela from the western slopes of the Eastern Andes of Colombia. Río Chiquito is a forested region in extreme southwestern Táchira on the eastern slopes of the Páramo de Tama massif.

Tyranniscus uropygialis (Lawrence)

Mecocerculus uropygialis Lawrence, Ann. Lyc. Nat. Hist. New York, *9*, p. 266, 1870. ("Ecuador.")

2 (?), Páramo de La Negra, Mérida, Nov. 2 and 3, 1958, 3,100 meters.

These specimens extend the range of the species to Venezuela, in

[5]Phelps and Phelps, Jr. Lista de las Aves de Venezuela con su Distributión. Bol. Soc. Ven. Cien. Nat.. No. 75, p. 137, 1950.

the Temperate Zone, from the Bogotá region of Colombia where it is known in the Subtropical Zone.

Henicorhina leucophrys sanluisensis, new subspecies

Type: From Curimagua, Sierra de San Luis, Estado Falcón, Venezuela; 1300 meters. No. 63465, Phelps Collection, Caracas. Adult male collected April 17, 1957, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

Diagnosis: Differs from the other four Venezuelan subspecies of *H. leucophrys* (Tschudi) by darker back and uropygium, more brownish, less reddish; from *H. l. venezuelensis* Hellmayr, of the Caracas Region, differs additionally by darker breast and abdomen, more grayish, less whitish; from *H. l. meridana* Todd, of the Mérida Region, differs additionally by immaculate throat, instead of streaked and darker flanks and crissum; from *H. l. tamae* Zimmer and Phelps, of the Tamá Region, differs additionally by immaculate throat and in having the brown of flanks and crissum darker and more restricted; and from *H. l. manastarae* Aveledo and Ginés, from the Perijá Region, differs additionally by darker brown flanks and crissum.

Range: Known from the San Luis Mountains in northern Falcón, in the Subtropical Zone at 1300 meters.

Description of Type: Top of head dusky with dark olivaceous blotches; back, scalpulars and uropygium darker than Auburn; superciliary stripe from bill to neck white; lores and ear-coverts black; malar region, cheeks and sides of neck black, heavily streaked with white. Chin and throat white merging into near Light Mouse Gray of breast and sides which becomes more whitish on abdomen; flanks and crissum Antique Brown. Remiges Benzo Brown; outer webs of tertials barred Auburn and black; wing-coverts margined with Auburn; under wing-coverts and axillaries grayish. Rectrices olivaceous barred with black.

Bill (in life) "black;" feet "grayish brown;" iris "dark." Wing, 58 mm.; tail, 28; exposed culmen, 15; culmen from base, 18; tarsus, 26.

Remarks: Sexes alike. Size similar to *venezuelensis*. Range of measurements: two adult males (including type)—wing, 54—58 (56) mm.; tail, 24—24 (24); culmen from base, 18—18 (18); two adult females—wing 52—54 (53); tail, 24—26 (25); culmen from base, 16—17 (16.5). Measurements of *H. l. venezuelensis*: five adult males—wing, 54—57 (56); tail, 26—28 (27.5); culmen from base, 18—19 (18.5); five adult females—wing, 52—54 (53); tail, 25—27 (25.6); culmen from base, 17—18 (17.6).

Specimens Examined

H. l. manastarae.—VENEZUELA: Cerro Pejochaina, Perijá, Zulia, 2 ♂, 6 ♀, 8 (?); Kunana, 1 ♀, 3 (?); Cerro Mashirampé, 1 ♂, 2 (?); Divisorio ríos Macoita y Apón, 1 ♂, 1 ♀.

H. l. tamae.—VENEZUELA: Páramo de Tamá, Táchira, 7 ♂, 6 ♀, 1 (?); Río Chiquito, 15 ♂, 6 ♀, 10 (?).

H. l. meridana.—VENEZUELA: Mesa de Lino, Santo Domingo, Mérida, 2 ♂, 1 ♀, 2 (?); Mérida Region, 20[6].

H. l. sanluisensis.—VENEZUELA: Curimagua, Sierra San Luis, Falcón, 2 ♂ (inc. type), 1 ♂ juv., 2 ♀, 1 (?), 1 (?) juv.

H. l. venezuelensis.—VENEZUELA: Caracas Region, 28[6]; Bucaral, Yaracuy, 1 ♂, 1 ♀; El Junquito, Dto. Federal, 1 (?); Cerro El Avila, 1 ♂, 2 (?); Cerro Negro, Miranda, 1 ♂, 2 ♀, 2 (?).

Hylocichla minima bicknelli Ridgway

In our Check List[7] we listed this form from Venezuelan localities and also gave it a Colombian range. All this was in error as our specimens are *H. m. minima.*

Vermivora chrysoptera X Vermivora pinus

Helminthophaga leucobronchialis Brewster, American Sportsman, *5*, p. 33, Oct. 17, 1874. (Newtonville, Mass.)

1 (?). Río Chiquito Hacienda La Providencia, Estado Táchira; forest at 1800 meters.

This specimen of the hybrid Brewster's Warbler, with pure white under parts, is similar in color to these two specimens in the American Museum of Natural History: ♂. Valle, Mérida, Venezuela and ♂, Bonilla, Costa Rica. The latter specimen, which he calls a ''back-cross,'' is illustrated by Kenneth C. Parkes[8] in the plate facing page 5 of his exhaustive exposition on the genetics of this hybrid.

As far as we know, this is the second specimen of Brewster's Warbler collected in Venezuela or in South America. One of the parent species, *V. chrusoptera,* occurs regularly during the winter in Colombia and in Venezuela but the other, *V. pinus,* is known from South America only by a specimen taken in March at Chirúa, in the Santa Marta Mountains of Colombia[9].

Parkes lists a specimen of Lawrence's Warbler, *V. lawrencii* (Merrick), hybrid between *V. pinus* and *V. chrysoptera,* in the American Museum of Natural History, from Cumbre de Valencia, Venezuela, January 31, 1910. We believe that this is the only record from South America.

Arremon tocuyensis (Todd)

Arremonops tocuyensis Todd, Ann. Carnegie Museum, p. 198, 1912.

Following de Schauensee[10], in our Check List[11] we listed this bird as a subspecies of *A. conirostris* (Bonaparte). de Schauensee says that *tocuyensis* is found in the Río Hacha region of Colombia at Arroyo

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[6]For localities see Zimmer and Phelps, Am. Mus. Nov., No. 1270, p. 11, Dec. 26, 1944.

[7]Lista de las Aves de Venezuela con su Distribución. Bol. Soc. Ven. Cien. Nat., 75, p. 249, 1950.

[8]The Genetics of the Golden-winged X Blue-winged Warbler Complex. Wilson Bulletin, *63*, No. 1, pp. 5-15, March, 1951.

[9]R. M. de Schauensee. The Birds of Colombia, p. 965, 1951.

[10]The Birds of Colombia. Caldasia, 5, No. 25, p. 1108, Aug. 31, 1951.

[11]List de las Aves de Venezuela con su Distribución, Pt. 2, Passeriformes. Bol. Soc. Ven. Cien. Nat., *12*, No 75, p. 307, 1950.

de Arenas, only eight miles distant from Loma Larga where *A. c. conirostris* occurs.

We now find that the two birds occur in Venezuela in the same locality at Mirimire on the eastern coast of the State of Falcón at 250 meters altitude. On December 6, 1957, we collected a male of *A. tocuyensis* there and on the 11th a male of *A. c. conirostris.* On the 3rd we had already collected a male of *A. tocuyensis* at San Juan de los Cayos, 27 miles to the east. We also have specimens of *tocuyensis* from Paraguaipoa at the base of the Goagira Peninsula, Cerro Santa Ana on the Paraguaná Peninsula and San Miguel, Lara, near Barquisimeto.

A. c. conirostris is a common bird throughout Venezuela from the Orinoco River northward. From the semi-arid region occupied by *A. tocuyensis* we have specimens of *A. c. conirostris* from the San Luis Mountains and Quebrada Arriba, Lara; also from Cerro Alto del Cedro on the border of Colombia at the foot of the Goagira Peninsula.

Inasmuch as *A. tocuyensis* is a larger bird in wing, bill and tarsus, and has differences in coloration, and as it has now been found in the same locality as *A. c. conirostris,* we agree with Hellmayr[12] that *tocuyensis* should rank as a species.

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[12]Catalogue of Birds of the Americas, etc., Part XI, p. 443, 1938.

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TAXONOMY AND NOMENCLATURE OF SOME POCKET GOPHERS FROM SOUTHEASTERN ARIZONA

Kenneth I. Lange, c/o U. S. National Museum

This paper is based upon a taxonomic and distributional study of pocket gophers in southeastern Arizona, namely, Cochise County, Santa Cruz County, and the eastern third of Pima County. Because of the marked sexual dimorphism of pocket grophers, a holotype and an allotype have been designated for each new form. Measurements are in millimeters and color standards are after Ridgway (1912). The following abbreviations are used in the lists of specimens examined:

BS—Biological Surveys Collection of the Fish and Wildlife Service, U. S. National Museum, Washington, D. C.

KU—Museum of Natural History, University of Kansas, Lawrence.

UA—Department of Zoology, University of Arizona, Tucson.

UI—Museum of Natural History, University of Illinois, Urbana.

I wish to thank the authorities in charge of the mammal collection at the U. S. National Museum for their courtesies, and E. Raymond Hall at the University of Kansas and Donald F. Hoffmeister at the University of Illinois for the loan of specimens.

Two species of pocket gophers, *Thomomys bottae* and *Thomomys umbrinus,* are believed to occur within the study area (Lange, MS., Univ. Ariz. Libr., 1958). *T. bottae* is represented by nine subspecies and *T. umbrinus* by the following two:

Thomomys umbrinus intermedius Mearns

Thomomys fulvus intermedius Mearns, Proc. U. S. Nat. Mus., 19:719, July 30, 1897, type from summit of the Huachuca Mountains, 9,000 feet, Cochise County, Arizona.

Thomomys burti Huey, Trans. San Diego Soc. Nat. Hist., 7:158, July 28, 1932, type from Madera Canyon, 6,000 feet, Santa Rita Mountains, Santa Cruz County, Arizona.

Thomomys umbrinus intermedius, Nelson and Goldman, Jour. Mamm., 15:117, May 16, 1934.

Thomomys umbrinus burti, Nelson and Goldman, Jour. Mamm., 15:117, May 16, 1934.

Thomomys burti burti, Burt and Campbell, Jour. Mamm., 15:151, May 16, 1934.

Thomomys umbrinus burti, Goldman, N. A. Fauna 59:34, June 12, 1947.

Thomomys umbrinus intermedius, Goldman, N. A. Fauna 59:35, June 12, 1947.

Thomomys bottae proximus, Hoffmeister and Goodpaster, Ill. Biol. Monog., 24(1):98, December 31, 1954 [in part; specimens from Canelo Gate and one mile north of Fort Huachuca].

Thomomys umbrinus quercinus Burt and Campbell

Thomomys burti quercinus Burt and Campbell, Jour. Mamm., 15:150, May 16, 1934, type from Pena Blanca Spring, 4,500 feet, near Mexican boundary, north of monument 128, Pajarito Mountains, Santa Cruz County, Arizona.

Thomomys umbrinus quercinus, Goldman, N. A. Fauna 59:35, June 12, 1947.

Burt and Campbell (Jour. Mamm., 15:150, 1934) distinguished *quercinus* from *burti* (*T. burti burti* = *T. umbrinus burti*) in the following manner: ". . . color of sides distinctly paler with a yellowish instead of a deep chestnut cast; dark median dorsal stripe less pronounced and extending only to the rump. Skull differs in slightly larger size; larger interparietal; termination of nasals farther anteriorly with respect to the zygomatic arm of the maxillary . . .; pterygoids, as viewed from ventral surface, weaker and V-shaped instead of U-shaped as in *burti,* and lacking the distinct process which projects laterally and ventrally from each wing in *burti.*" Examination of the available material reveals that of these characters the following will distinguish *quercinus,* known only from the type locality, from *burti* from the Santa Rita and Patagonia mountains: color of the sides; less pronounced dorsal stripe; in most specimens, the more anterior termination of the nasals; and the nature of the pterygoids.

Gophers referable to *T. umbrinus* from the Huachuca Mountains, however, exhibit intergradation between *quercinus* and *burti.* Specimens of *T. umbrinus* from Brown Canyon, from eight miles west of Fort Huachuca, and from one mile north, four miles west of Fort Huachuca resemble *quercinus* on the basis of the pterygoids; some resemble *quercinus* while others are like *burti* in nasal termination; and the specimens from eight miles west of the Fort resemble both *quercinus* and *burti* in pelage color, whereas specimens from Brown Canyon and from the Santa Rita Mountains are indistinguishable in pelage color.

The type specimen of *T. fulvus intermedius* (= *T. umbrinus intermedius*) exhibits the same morphological features indicative of intergradation between the more definable *quercinus* and *burti*: this specimen is like *quercinus* in the nature of the pterygoids; is almost intermediate in respect to nasal termination; and resembles *burti* from the Santa Ritas in pelage color, being only slightly darker on the dorsum and only slightly deeper Hazel on the sides. It measures as follows: total length, 200; tail, 66; hindfoot, 26; basilar length, 31.6; least interorbital constriction, 6.9; mastoidal breadth, 16.4; length of nasals, 12.1; breadth of rostrum, 7.1; length of rostrum, 16.0; alveolar length of maxillary toothrow, 7.3; and palato-frontal depth, 14.3.

Pocket gophers referable to *T. umbrinus* from the Santa Ritas and Patagonias and those from the Huachucas are thus placed under one subspecies, viz., *intermedius*. These areas and Pena Blanca Spring are the only localities from which *T. umbrinus* is known in Arizona at the present time. The species *umbrinus* has not been reported from Sonora, Mexico; the subspecies *quercinus* is known only from Pena Blanca Spring. However, *quercinus* may have a larger range than is presently known: it may range through oaks (the usual habitat of *T. umbrinus* in Arizona) from Pena Blanca Spring into Sonora on the south and west sides of the Santa Cruz Valley and come back into Arizona in such localities as the oak zone of the Huachuca Mountains. Further, *T. umbrinus* may range through oaks from the Santa Rita and Patagonia mountains to the Huachucas. Gene exchange between these gophers might be taking place by such a route. Although the type specimen of *intermedius* comes from an aspen and spruce zone, the preferred habitat of *T. umbrinus* appears to be in the vicinity of oak growth.

The following specimens are referred to *T. u. intermedius*. Total, 41, distributed as follows: *Pima County*: Santa Rita Mts.: NW slope, 1-1-½ m. S, 1-1-½ m. E Old Parker Ranch, 4,300-4,500 ft., 5 (KU); 9-½ m. SE Continental [near mouth Madera Canyon], 4,300 ft., 2 (KU); Madera Canyon, 4,600 ft., 4 (KU); Madera Canyon, 5,000 ft., 4 (KU). *Santa Cruz County*: Santa Rita Mts.: Madera Canyon, 6,000 ft., 1 (KU); Madera Canyon, 6,200 ft., 1 (KU); Agua Caliente Canyon, 7-½ m. E Amado, 4,500 ft., 4 (UA). Patagonia Mts.: 1 m. E Guajolote Corral, 5 m. N, 13 m. E Nogales, 5,500 ft., 1 (KU); Guajolote Corral, 5 m. N, 12 m E Nogales, 5,800 ft., 1 (KU). *Cochise County*: Huachuca Mts.: summit, 9,000 ft., 1 (BS); E slope, Brown Canyon (between Ramsay Canyon and Ft. Huachuca Reservation), 5,700 ft., 3 (KU); Brown Canyon, 5,400 ft., 2 (KU); Brown Canyon, 5,300 ft., 6 (KU); W slope, Panama Mine, Canelo Gate (= 8 m. W Ft. Huachuca), 5 (UI); 1 m. N, 4 m. W Ft. Huachuca, 1 (UI).

Hoffmeister and Goodpaster (Ill. Biol. Monog., 24:95, 1954) believe that: ". . . in the Huachucas, and perhaps in all of southern Arizona, gophers regarded as *T. umbrinus* by Goldman (1947) are best referred to *T. bottae*." (If these two forms are conspecific, the earliest name would be *T. umbrinus*). They thus refer specimens of gophers from the northwest slope of Carr Peak, 8,400 feet, to the species *T. bottae* and to the subspecies *T. bottae intermedius* Mearns, regarding *T. fulvus intermedius* Mearns as a synonym. However, *T. bottae* and *T. umbrinus* are now believed to be distinct, and, accordingly, *T. fulvus intermedius* Mearns (*T. umbrinus intermedius* Mearns) is retained. A new name thus becomes necessary for the Carr Peak population of *T. bottae*. This form is named and described as follows.

Thomomys bottae carri, new subspecies

Thomomys bottae intermedius, Hoffmeister and Goodpaster, Ill. Biol. Monog., 24(1):95, December 31, 1954 (not *Thomomys fulvus intermedius* Mearns).

Holotype:—Male, skin and skull, no. 4185, University of Illinois, Department of Zoology, Urbana, Illinois; Huachuca Mountains, northwest slope, Carr Peak, 8,400 feet, Cochise County, Arizona; collected by Richard G. Van Gelder, original number 183.

Allotype:—Female, skin and skull, no. 4186, University of Illinois, Department of Zoology, Urbana, Illinois; Huachuca Mountains, northwest slope, Carr Peak, 8,400 feet,, Cochise County, Arizona; collected by Donald F. Hoffmeister, original number 1544.

Description:—A relatively small form for the study area. Study material consisted of eight males and four females. The holotype measures as follows: total length, 220; tail length, 60; hindfoot, 30; basilar length, 31.4; zygomatic breadth, 22.1; least interorbital constriction, 6.3; mastoidal breadth, 16.6; length of nasals, 12.4; breadth of rostum, 7.3; length of rostrum, 16.3; alveolar length of maxillary toothrow, 7.5; and palato-frontal depth, 15.1. In the same order, the males, including the holotype, give average, minimum, and maximum measurements as follows (only five measurements of zygomatic breadth; seven of mastoidal breadth; seven of nasal length; and seven of rostral length): 209.3 (190-220); 62.1 (50-71); 28.5 (26-30); 31.8 (30.2-33.2); 22.3 (21.9-23.6); 6.6 (6.2-6.9); 16.7 (16.0-17.6); 12.7 (11.7-13.7); 7.4 (6.9-8.0); 16.0 (15.4-16.4); 7.6 (6.9-8.2); and 14.1 (13.3-15.1). The allotype measures as follows: total length, 215; tail length, 60; hindfoot, 28; basilar length, 30.0; zygomatic breadth, 21.3; least interorbital constriction, 6.4; mastoidal breadth, 16.4; length of nasals, 11.9; breadth of rostrum, 7.6; length of rostrum, 15.3; alveolar length of maxillary toothrow, 7.7; and palato-frontal depth, 13.1. In the same order, the females, including the allotype, give average, minimum, and maximum measurements as follows (only two measurements of zygomatic breadth): 203.3 (190-215); 63.5 (59-68); 28.0 (25-30); 29.6 (28.6-31.2); 20.7 (20.0-21.3); 6.5 (6.1-7.1); 16.3 (15.7-17.0); 12.0 (10.9-13.2); 7.0 (6.5-7.6); 15.3 (14.4-16.5); 7.6 (7.4-7.9); and 13.3 (12.6-14.2).

These gophers have grayish dorsums and sides with varying expression of a bright pigment. The bright pigment, between Ochraceous-Tawny and Sayal-Brown, is conspicuous in two males and noticeable in one male and one female, these individuals being less overlaid with gray and resembling *T. b. hueyi* from the Rincon Mountains, Pima County, in pelage color. The remaining five males and three females of *T. b. carri* are not as bright as *T. b. hueyi* and not as dark as *T. b. catalinae* from the Santa Catalina Mountains, Pima County.

Comparisons:—In comparison with *T. b. proximus*, the race of *T. bottae* inhabiting the middle elevations of the Huachucas and Santa Ritas, *T. b. carri* differs in: braincase less inflated; skull less rounded, more flattened; and pelage color less variable. *T. b. carri* differs from *T. b. hueyi* in the following features: zygomatic arches not curved; auditory bullae inflation more variable, both dorsoventral and lateral in *carri*, tending to be lateral in *hueyi*; and in most specimens, pelage not as bright. There is also an indication of sexual dimorphism in pelage color and skull curvature in *hueyi*, which is lacking in *carri*: the bright pigment in *hueyi* tends to be less conspicuous on the sides of the females and the skulls of male *hueyi* tend to have a greater curvature than those of the females. From *T. b. catalinae*, *carri* differs in: zygomatic arches not curved; auditory bullae inflation more variable; and brighter pelage.

Remarks:—This subspecies is known only from the type locality. See Hoffmeister and Goodpaster (1954:96-98) for notes on habitat and habits and for a photograph of the trapping locality.

Specimens examined:—Total, 12: Cochise County, Arizona; Huachuca Mountains, northwest slope, Carr Peak, 8,400 feet (UI).

Study of pocket gophers from southeastern Arizona revealed another population sufficiently distinct to warrant subspecific recognition. This race of *T. bottae* is named and characterized as follows.

Thomomys bottae caneloensis, new subspecies

Holotype:—Male, skin and skull, no. 51788, University of Kansas, Museum of Natural History, Lawrence, Kansas; Huachuca Mountains, west foothills, Canelo, 10 miles south of Elgin, 5,100 feet, Santa Cruz County, Arizona; collected by G. H. Heinrich, original number 5551.

Allotype:—Female, skin and skull, no. 51786, University of Kansas, Museum of Natural History, Lawrence, Kansas; Huachuca Mountains, west foothills, Canelo, 10 miles south of Elgin, 5,100 feet, Santa Cruz County, Arizona; collected by G. H. Heinrich, original number 5549.

Description:—A large subspecies for the study area. Study material consisted of five males and seven females. The holotype measures as follows: total length, 228; tail, 68; hindfoot, 30; basilar length, 37.0; zygomatic breadth, 26.6; least interorbital constriction, 6.5; mastoidal breadth, 21.3; length of nasals, 13.5; breadth of rostrum, 8.9; length of rostrum, 16.5; alveolar length of maxillary toothrow, 7.4; and palato-frontal depth, 15.7. The males, including the holotype, give average, minimum, and maximum measurements as follows: total length, 224 (208-233); tail, 65 (60-68); hindfoot, 30 (30-31); basilar length, 36.1 (32.8-38.2); and zygomatic breadth, 26.5 (23.3-28.7). The allotype measures as follows: total length, 198; tail, 55; hindfoot, 27; basilar length, 32.6; zygomatic breadth, 24.0; least interorbital constriction, 6.7; mastoidal breadth, 19.1; length of nasals, 11.9; breadth of rostrum, 7.8; length of rostrum, 15.3; alveolar length of maxillary toothrow, 7.6; and palato-frontal depth, 13.5. The females, including the allotype, give average, minimum, and maximum measurements as follows: total length, 208 (198-214); tail, 63 (48-76); hindfoot, 28 (26-30); basilar length, 32.8 (30.8-34.4); and zygomatic breadth, 23.5 (22.2-24.7). The skulls are large and massive, with spreading zygomatic arches.

In pelage color, *T. b. caneloensis* most resembles *T. b. proximus* from Ramsay Canyon, 5,500 and 5,700 feet, Huachuca Mountains. The expressed pigment on the back is closest to Sayal Brown; the sides are between Clay Color and Cinnamon. The dorsum has varying amounts of dark coloration, the dark colors being more evident in worn pelage than in fresh pelage. One specimen (KU no. 51781) is unusual in having a posteriorly widening, deep black, median dorsal stripe.

Comparisons.—From *T. b. proximus, T. b. caneloensis* differs in: larger skull size; heavier and more spreading zygomatic arches; less inflated but larger braincase; and wider rostrum. From *T. b. modicus, caneloensis* differs in: less-inflated braincase; and darker pelage color. From *T. b. alienus, caneloensis* differs in: larger braincase; and darker pelage color.

Remarks:—This form is known only from the type locality. Gophers referable to *caneloensis* were obtained in deep soil in a grassland-oak swale.

Specimens examined.—Total, 12: Santa Cruz County, Arizona; Huachuca Mountains, west foothills, Canelo, 10 miles south of Elgin, 5,100 feet (KU).

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THE OSTRACOD GENUS *POTAMOCYPRIS* WITH THE DESCRIPTION OF A NEW SPECIES[1]

Edward Ferguson, Jr.
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Brady (1870) established the genus *Potamocypris* and designated *Potamocypris fulva* (= *Bairdia fulva* Brady 1868) the type species. The genus includes cyprid ostracods having the following characteristics: Valves compressed; right valve projects beyond the left dorsally; valves usually hairy. Natatory setae of second antennae well developed, frequently extending beyond the tips of the terminal claws; ultimate podomere of maxillary palp short, broadened distally and provided with a short claw-like seta. The respiratory plate of the first thoracic leg with a maximum of two setae.

Members of the genus have been found in Europe, Asia, Africa, South America, and North America. Seven of the nineteen species recorded in this paper have been reported from North America. When possible the length, height, and color of the valves and the geographical distribution have been recorded for a species.

SPECIES OF POTAMOCYPRIS

P. almasyi Daday 1904
- *Size:* Length of female 0.58-0.61 mm; height 0.34 mm. Males unknown.
- *Color:* Grass green.
- *Distribution:* Turkestan.

P. arcuata (Sars 1903) Müller 1912
- *Distribution:* China

P. comosa Furtos 1933
- *Size:* Length of female 0.68 mm; height 0.37 mm. Length of male 0.55 mm; height 0.29 mm.
- *Color:* Light green with two conspicuous, bright green dorso-lateral stripes.
- *Distribution:* North America (Ohio).

P. dentatomarginata Daday 1902
- *Distribution:* Patagonia.

[1]The author acknowledges the assistance of Mrs. Corinne A. Ferguson who prepared specimens for study, and of Miss Alice Boatright, Staff Artist, Department of Zoology, University of Illinois, who prepared the drawing.

P. *elegantula* Furtos 1933
Size: Length of female 0.55 mm; height 0.38 mm. Males unknown.
Color: Light green with two dark-green dorso-lateral stripes.
Distribution: North America (Ohio).

P. *fulva* Brady 1870 (= Bairdia fulva Brady 1868)
Size: Length of female 0.70-0.72 mm. Males unknown.
Color: Greenish-yellow.
Distribution: Europe.

P. *hyboforma* Dobbin 1941
Size: Length of female 0.70 mm. Males unknown.
Color: Not recorded.
Distribution: North America (State of Washington; Idaho).

P. *illinoisensis* Hoff 1943a
Size: Length of female 0.55-0.56 mm; height 0.30-0.32 mm. Length of male 0.54 mm; height 0.30 mm.
Color: Green.
Distribution: North America (Illinois).

P. *islandgrandensis* Hoff 1943b
Size: Length of female 0.58-0.63 mm; height 0.32-0.38 mm. Length of male 0.54-0.58 mm; height 0.29-0.35 mm.
Color: Dusky greenish-brown.
Distribution: North America (Louisiana).

P. *montevidea* (Vávra 1898) Daday 1900
Size: Length of female 0.60 mm. Males unknown.
Color: Not recorded.
Distribution: Uruguay.

P. *pallida* Alm 1914
Size: Length of female 0.71 mm; height 0.37 mm. Males unknown.
Color: Green with clear area in ocular region.
Distribution: Sweden; North America (Ohio).

P. *reniformis* (Brady 1907) Müller 1912
Size: Length of female 0.50 mm. Males unknown.
Color: Not recorded.
Distribution: Africa.

P. *similis* Müller 1912
Size: Length of female 0.55 mm. Males unknown.
Color: Yellowish-white with two dark patches in dorsal region.
Distribution: Switzerland.

P. *smaragdina* (Vávra 1891) Daday 1900
Size: Length of female 0.56-0.66 mm; height 0.35-0.38 mm. Length of male 0.52-0.61 mm; height 0.28-0.32 mm.
Color: Yellowish-green; eggs orange-red.
Distribution: Bohemia; Europe; North America.

P. *unicaudata* Schäfer 1943
Size: Length of female 0.81 mm; height 0.46 mm. Males unknown.
Color: Bright grayish-green.
Distribution: Europe.

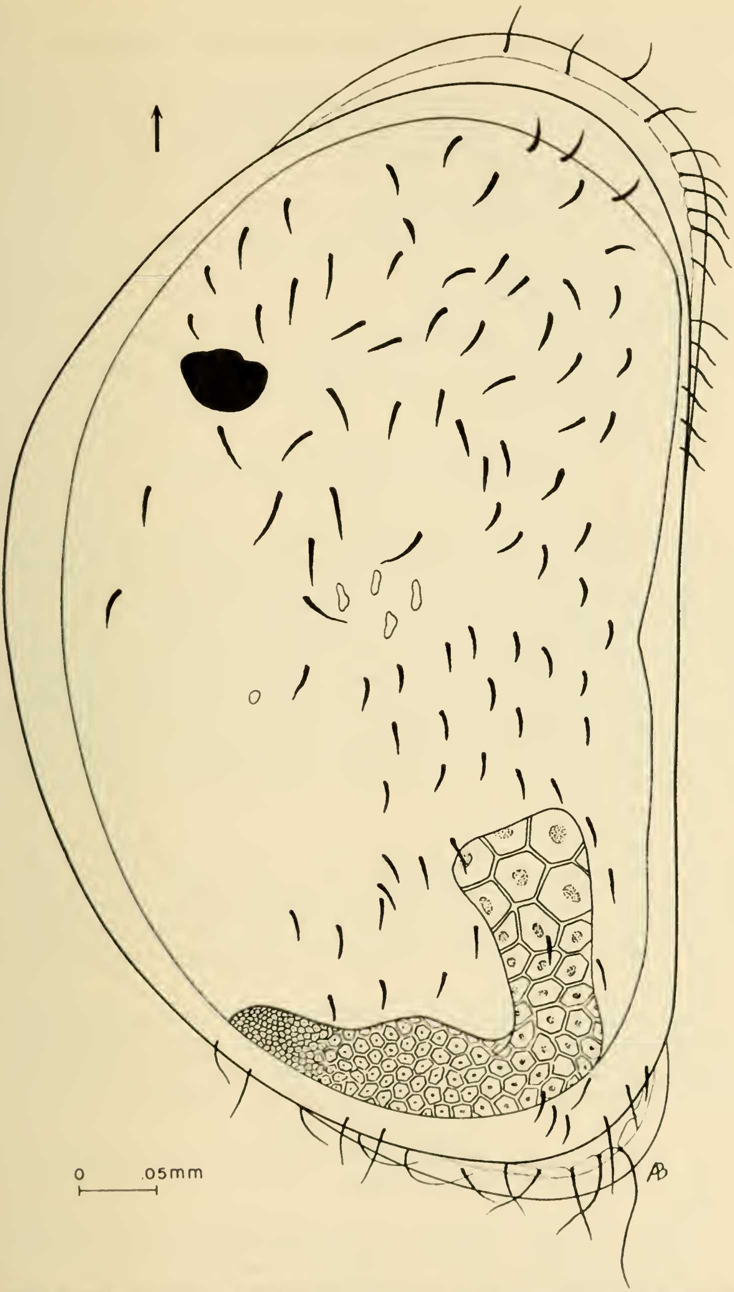

Fig. 1. *Potamocypris saskatchewanensis* n. sp.—Lateral view of the right valve with eye and ovary conspicuous. The drawing was made from a specimen stained in a 1% alcoholic solution of eosin Y and mounted in Canada balsam.

P. variegata (Brady and Norman 1889) Daday 1900
Size: Length of female 0.51-0.56 mm. Males unknown.
Color: Yellow with black bands.
Distribution: Europe.

P. villosa (Jurine 1820) Müller 1912
Size: Length of female 0.68-0.75 mm. Males unknown.
Color: Green.
Distribution: Europe; Asia.

P. wolfi Brehm 1920

P. zschokkei (Kaufman 1900) Müller 1912
Size: Length of female 0.77 mm. Males unknown.
Color: Bright green.
Distribution: Europe.

Potamocypris saskatchewanensis n. sp.

Fig. 1

Specific characters.—Female. Eye prominent. Natatory setae of second antennae reaching considerably beyond the tips of the end-claws. Valves compressed; length 0.75-0.81 mm; greatest height 0.42-044 mm; anterior and posterior ends broadly rounded, the posterior border sloping from dorsal margin to an acute angle ventrally; dorsal margin evenly arched; ventral margin almost straight; submarginal line prominent anteriorly and posteriorly. The surfaces of the valves are armed with strong spines; antero-ventral and postero-ventral margins with heavy setae; right valve with flanges at posterior and anterior ends. The shell is green, with a concentration of pigment in the ocular region.

Males.—Unknown.

Type locality.—P. saskatchewanensis n. sp. was collected by Dr. Richard W. Coleman on August 14, 1957 from a pool located along Highway No. 54 about 4.7 miles south of Regina Beach, Saskatchewan, Canada. *Cypridopsis vidua* (Müller 1776) and *Cypria ophthalmica* (Jurine 1820) were present in collections containing *P. saskatchewanensis* n. sp.

Type specimens.—A stained microscopic mount of the holotype female, USNM Catalogue No. 102574, and four female paratypes, USNM Catalogue No. 102575, are deposited in the United States National Museum. Paratypes (females) are retained in the author's collection.

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THREE NEW SUBSPECIES OF THE LIZARD *LEIOCEPHALUS MACROPUS* COPE FROM CUBA

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Cope (1862), Gunlach (1880), Barbour (1914, 1937), Stejneger (1917), Barbour and Ramsden (1919), Cochran (1934), Alayo (1951, 1955), and Hardy (1958a, 1958b) gave locality records of *Leiocephalus macropus* which confined this species to the province of Oriente. Specimens have, however, been taken in the provinces of Camagüey, Las Villas, and Pinar del Río by Dr. Albert Schwartz and associates, John R. Feick, William H. Gehrmann, Armando García, and myself, while making herpetological collections in Cuba during the summers of 1957 and 1958 under the sponsorship of a National Science Foundation grant. It was considered possible that all or some of this freshly collected material might represent populations which differ from *L. macropus* as known from Oriente, and study of these lizards was initiated.

Stejnger (*op. cit.:* 275) gave the following description of a specimen (USNM 26769) collected at Santiago de Cuba, Oriente: "Upper side vinaceus cinnamon with a coppery gloss; head more cinnamon; tail with blackish crossbars narrowly edged with white posteriorly; from nostrils through eye along sides of neck and body to above and behind insertion of hind leg a broad blackish-brown band narrowly edged with pale above and below; upper labials, suboculars, and lower temporals to ear white; below whitish; throat and fore neck with numerous gray dots; lower labials dusky."

Comparison of USNM 26769 with the other Oriente specimens shows that this description is fairly accurate, if the length of time in preservation is considered. Although several of the Oriente specimens do not have the dotted throat or the lateral band quite so blackish-brown as Stejneger's specimen; this may be due to fading brought on by the preservation.

I have examined fifty-three specimens of *L. macropus* as follows: Oriente, 37; Camagüey, 5; Las Villas, 1; Pinar del Río, 9; Isla de Pinos, 1. I wish to thank the following for allowing me to examine the specimens of this species in their care: Dr. Doris M. Cochran, United States National Museum (USNM), Mr. Charles M. Bogert, American Museum of Natural History (AMNH), Dr. Norman E. Hartweg, Museum of Zoology, University of Michigan (UMMZ), Dr. Ernest E. Williams, Museum of Comparative Zoology (MCZ), Dr. Carlos Guillermo Aguayo y de Castro, and Dr. Isabel Pérez Farfante, Museo Poey (MP), and Sr. Miguel L. Jaume García, Museo y Biblioteca de Zoología de La Habana (MBZH). Dr. Albert Schwartz has kindly allowed me to work over his material of this species, which has been deposited in the American Museum of Natural History, and the use of his field notes as well. The drawings are the work of Ronald F. Klinikowski, and he also deserves my thanks for his assistance. Both Mr. Klinikowski and myself have an undergraduate National Science Foundation grant which has in part supported the present research.

The usual scale counts have been made on all specimens of *L. macropus;* these counts include number of median head scales, number of prefrontals, number of frontoparietals, number of temporals, dorsal scales in occiput-vent and occiput-axilla distance, number of loreals, number of postmentals, subdigital carinate scales of fourth toe, and number of scales on one half body at midbody. Table I reveals that apparently none of the non-Oriente populations differs in scalation from those from extreme eastern Cuba. Although there is no noticable difference in the scalation, I feel, after comparison of the Camagüey, the Las Villas, and the Pinar del Río specimens with Stejneger's color description and specimens from Oriente, that the three population represent three new subspecies, the first of which may be known as

Leiocephalus macropus hoplites, new subspecies

Type: AMNH 78020, collected at 12 miles east of Morón, Loma de Cunagua, Camagüey Province, Cuba, by John R. Feick on August 6, 1957. Field number 3706.

Paratypes: AMNH 78016-19, with same data as type, except collected by W. H. Gehrmann and A. Schwartz.

Diagnosis: A subspecies of *L. macropus* distinguished by a distinct black striped throat pattern on a grayish-yellow background. The throat pattern consists of two black paramedian stripes, bordered anteriorly by a black stripe on each side which extends posteriorly in the direction of the axilla. Equidistant between the paramedian stripe and the diagonal stripe is a shorter black stripe (see figure 1). This race is also characterised by a L shaped white bar above the foreclimb insertion (see figure 2).

Distribution: known only from type locality.

Description of type: An adult male with the following measurements (all measurements in millimeters): snout-vent length 78; tail 68 (regenerated); hindleg 63; snout-ear 19.5; head width 15. Scalation: median head scales 4; prefrontals 3; frontoparietals 5; supraoculars 6/6; loreals 7; temporals 16; auricular scales 3/3; postmentals 2; dorsals in occiput-vent distance 61; dorsals in occiput-axilla distance 23; scales around one half body at midbody 39; vertical rows of scales in each tail whorl 3; subdigital carinate scales of fourth toe 27/28; prefrontal and frontoparietal rows complete; parietals in contact; supraorbital semicircles incomplete; frontonasals not in contact.

The two outstanding characteristics of *L. m. hoplites* are the striped throat pattern and the markings above the forelimbs. The black striped throat pattern is on a grayish-yellow background and consists of two black paramedian stripes bordered anteriorly by a black stripe on each side which extends posteriolaterally in the direction of the axilla; equidistant between the paramedian and the diagonal stripe is a short black stripe. The stripes are bounded at the base of the throat by a group of small broken stripes on a bronze background which extends slightly onto the chest (see figure 1). The markings above the forelimb insertion are composed of a vertical white bar confluent ventrally with a horizontal white bar (equal to the length of the vertical white bar) which extends anteriorly and slightly dorsally. Anterior to the vertical white bar is a large black area which is dorsal to the horizontal white bar. The large black area is bordered anteriorly by a vertical row of white spots which are just dorsal to the end of the horizontal white bar; anterior to the row of white spots is a small black area. Posterior to the vertical white bar, there is a group of black spots on an area unicolor with the side (see figure 2).

The color of *L. m. hoplites* in life was quite striking. The surface of the head was dark brown with the side of the head and the neck grayish to black. All face and head marking were white, except that the eyelids were yellow and the postmentals pink. The dorsum of the body was bronzy tan intermixed with darker brown, in contrast to the pale yellow of the venter and the underside of the limbs. Scattered throughout the venter were green and maroon scales. On the pale tan upper surface of the forelimbs were yellow spots, whereas the dark brown upper surface of the hindlimbs was spotted with tan. The proximal portion (unregenerate) of the tail was almost a pale violet dorally and laterally, whereas the underside was pink with pale greenish scales.

The color of *L. m. hoplites* after preservation is dull. The surface of the head is gray with the side of the head and the neck a dark grayish-brown. The loreals and the labials are a light brown. Intermixed on the dorsum are gray and bronze which continue down the sides and become a lighter gray until reaching the faded white of the venter. Extending onto the venter from the sides but not reaching the midline are pale blue rows of scales. The underside of the limbs is the same color as the venter, but the upper surface of the forelimbs is gray with black spots in contrast to the brownish-gray upper surface of the hindlimbs with pale blue spots. The background of the throat pattern has become a darker gray with a few white spots scattered throughout. The upper and lateral surfaces of the tail are a dark gray except for the light brown regenerated section. The venter of the tail is a lighter gray which becomes almost white on the regenerated section. A black nuchal

Fig. 1. *Leiocephalus m. hoplites,* throat pattern, type (AMNH 78020), snout-vent length 78 mm.

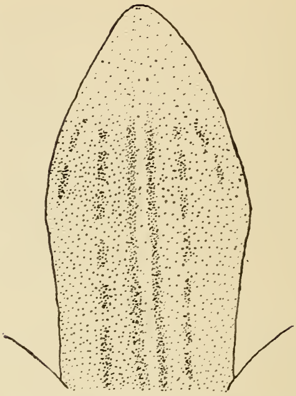

Fig. 3. *Leiocephalus m. macropus,* throat pattern, (USNM 59167), snout-vent length 73 mm.

Fig. 2. *Leiocephalus m. hoplites,* shoulder pattern, type (AMNH 78020).

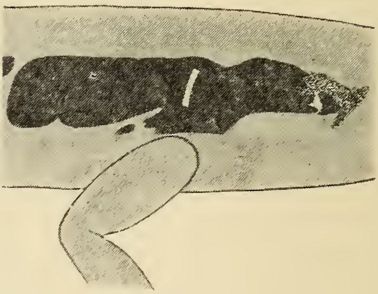

Fig. 4. *Leiocephalus m. macropus,* shoulder pattern, (USNM 59167).

bar, confluent with the large black area of the shoulder marking, is present on the dorsum above the forelimb insertion; on the dorsum above the hindlimb insertion are two short black bars which do not reach the dorsal ridge.

The four paratypes (AMNH 78016-19) are females with the following measurements respectively: snout-vent 65, 62, 60, 64; tail 94, –, 110, 92; head width 12.8, 13.1, 11.6, 12.7; snout-ear 16.0, 15.9, 14.7, 16.7; hindleg 53, 55, 46, 54. Scalation: median head scales 4, 4, 4, 4; prefrontals 3, 3, 3, 3; frontoparietals 5, 5, — 4; supraoculars 7/7, —/5, 6/6, 6/6; loreals 6, 8, 7, 8; temporals 15, 13, 13, 12; auricular scales 3/1, 4/4, 3/4, 4/3; postmentals 2, 1, 1, 2; dorsals in occiput-vent distance 56, –, –, 56; dorsals in occiput-axilla distance 26, 19, –, 21; scales around one half body at midbody 38, 31, –, 35; vertical rows of scales in tail whorls –, 3, 3, 3; subdigital carinate scales of fourth toe 28/26, –/27,

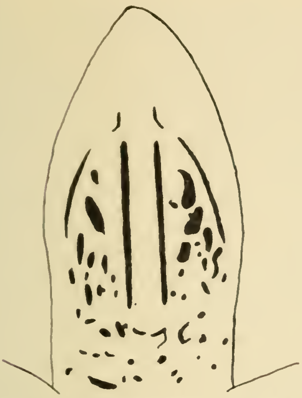

Fig. 5. *Leiocephalus m. hyacinthurus*, throat pattern, type (AMNH 78015), snout-vent length 88 mm.

Fig. 7. *Leiocephalus m. koopmani*, throat pattern, paratype (AMNH 81188), snout-vent length 87 mm.

Fig. 6. *Leiocephalus m. hyacinthurus*, shoulder pattern, type (AMNH) 78015).

Fig. 8. *Leiocephalus m. koopmani*, shoulder pattern, paratype (AMNH 81188).

26/–, 28/28. All specimens, on which determinable, have prefrontals and frontoparietals rows complete, parietals in contact, supraorbital semicircles incomplete, and frontonasals not in contact.

The black paramedian stripe of the throat pattern is entire in all the paratypes, but the diagonal stripe and the stripe between the paramedian stripe and diagonal stripe are broken in some specimens. The background of the throat pattern varies from darker to lighter than that of the type. The row of vertical white spots anterior to the large black area of the shoulder marking described for the type is lacking in all paratypes, although this area is lighter in color than that anterior to it. In place of the small black area of the shoulder marking there is a dark brown area which extends to the posterior corner of the eye; this dark brown area is also present in the type, but in this single specimen it extends from the anterior edge of the small black area to the posterior corner of the eye. In the paratypes the dorsum is much darker than in the type, and the nuchal black bars of the dorsum are not confluent with the large black area of the shoulder markings. The sacral black bars are identical. The tails possesses dark whorls which are not evident in the type. The forelimbs have black spots, and the hindlimbs have either light spots or none.

Comparison: In contrast to the definite black throat stripes of *hoplites,* males of the race *macropus* have faint gray paramedian stripes with no diagonal stripe, and also lack a stripe just lateral to the paramedian stripe; instead this area is covered by short gray longitudinal stripes (see figure 4). Also in some individuals the pattern is so light as to be unnoticeable; this may be due to the fading effects of the preservative. The throat patterns of female *macropus* are in general slightly darker, but again the pattern fades out although remaining relatively conspicious as a series of short gray longitudinal stripes. The throat pattern in the males of the race *immaculatus* is absent in the specimens I have examined; the female throat pattern is similar to that of the females of the race *macropus* but is not as dark.

The shoulder markings of *macropus* are extremely variable compared to that of *hoplites.* The markings of *macropus* vary from a large black area with a small vertical thin white bar above the forelimb insertion, to an area slightly darker than the sides with a faint vertical white bar. This bar is not confluent with the horizontal white bar (see figure 4). Also, the horizontal white bar, if present, may extend upon the supralabials, may stop at the posterior end of the labials, or may extend no farther than the anterior edge of the black area. The shoulder markings of *immaculatus* are virtually nonexistent, consisting of a very faint vertical white bar above the forelimb insertion on an area slightly darker than the sides. A few black spots may be scattered anterior and posterior to the bar, but these spots are not present in all specimens. The white bar is absent in some specimens.

The dorsum of preserved *macropus* varies from dark blackish-brown in some specimens to light greenish-brown in others. In preserved *immaculatus* the dorsum is generally greenish-brown, but may be gray with a greenish-brown suffusion. Transverse bands of dark and light scales on the dorsum of the female *macropus* are a typical character of that sex, whereas banding on the dorsum of males is infrequent. The banding continues on the tail whorls, and again is more evident in the females than in the males. Banding in *immaculatus* is completely absent. The nuchal black bar of the race *macropus* is not confluent with the black area of the shoulder region, and is bordered posteriorly, as is also the black sacral bar, by a narrow white bar. In two females and one male *macropus* a caudal black bar is present; and in some specimens of *macropus* the nuchal and the sacral bars are absent. The nuchal and sacral black bars are small or absent in *immaculatus.*

Leiocephalus macropus hyacinthurus, new subspecies

Type.—AMNH 78015, collected at Finca La Pastora, 2 kilometer northwest of Trinidad, Las Villas Province, Cuba, by A. Echevarría, on July 30, 1957. Field number 3391.

Diagnosis.—A subspecies of *L. macropus* distinguished from the other described races by a black striped throat pattern on a purplish background. The throat pattern consists of two black paramedian stripes bordered anteriorly on each side by a black stripe which extends posteriorly in the direction of the ear opening. Between the diagonal stripe and the paramedian stripe is a group of small black stripes (see figure 5). This race also possesses a thin vertical yellow bar above forelimb insertion, and a thicker yellow bar which extends from the forelimb insertion dorsally and anteriorly (see figure 6).

Distribution.—Known only from type locality.

Description of type.—An adult male with the following measurements: snout-vent length 88; tail 108 (regenerated); hindleg 69; snout-ear 21.8; head width 6.7. Scalation: median head scales 4; prefrontals 3; frontoparietals 5; loreals 8; temporals 15; supraoculars 6/6; auricular scales 4/4; postmentals 3; dorsals in occiput-vent distance 54 dorsals in occiput-axilla distance 21; scales around one half body at midbody 36; vertical rows of scales in each tail whorl 3; subdigital carinate scales of fourth toe 30/28. The prefrontal and frontoparietal rows are complete; parietals and frontonasals in contact; supraoribital semicircles incomplete.

The throat pattern is on a purplish background with two black paramedian stripes bordered anteriorly by a black stripe which extends posteriorly in the direction of the ear opening. A group of ununiform short black stripes lies between the paramedian stripe and the diagonal stripe; this group of stripes continues posteriorly onto the chest (see figure 5). The markings above the forelimb insertion consist of a thin vertical yellow bar bordered posteriorly by a group of black spots which are somewhat longitudinally arranged upon an area unicolored with the side. Anterior to the vertical yellow bar is a small triangular shaped black area with a short heavy yellow bar at its ventro-anterior edge.

In life the dorsum was tan with the scales becoming increasingly black posteriorly. Above the hindlimb and extending posteriorly onto the sides of the tail and around the vent as well, the scales were purple. The underside of the chest and the limbs was yellow with some pink on the hindlimbs. The side of the face, auriculars, and the side of the neck were whitish. The throat is purple with a rusty suffusion on the mentals and anterior labials.

After preservation, the dorsum is gray intermixed with bronze. The dorsum of the limbs is tannish-gray with black spots scattered throughout. The throat has lost its purple luster and is now a dark gray which blends into bluish-gray at the base of the throat. The venter is dirty bluish-white and, the underside of the limbs is whitish. The nuchal bar is small and almost absent (possibly due to fading), and the sacral bar is absent. The yellow bars of the shoulder marking are now white, and anterior to the shoulder markings along the sides of the neck are black spots with a small black triangular area above them. Auriculars, lower temporals, and loreals are steel gray in color. The upper temporals are dark brown, and upper and lower labials are dark gray.

Comparison.—The throat pattern of *hyacinthurus* differs from that of *hoplites* in that the diagonal stripe of *hoplites* is heavier and makes a lesser angle with the paramedian stripe than that of *hyacinthurus.* Also *hoplites* has a black stripe between the paramedian and the diagonal stripes; whereas this area in *hyacinthurus* is occupied by a group of small black stripes. The throat pattern of both *macropus and immaculatus* is faint in comparison to that of *hyacinthurus.*

In the shoulder markings of *hoplites* the vertical white bar is thicker; the black area anterior to the vertical bar is larger and is bordered on its anterior edge by a vertical row of white spots which are not present in *hyacinthurus.* None of the shoulder patterns of the variable *macropus* is similar to that of *hyacinthurus,* and the shoulder patterns of *immaculatus* is almost non-existent.

Anterior to the shoulder markings and along the sides of the neck are a few black spots in *hoplites;* these black spots are more numerous in *hyacinthurus,* and are lacking in both *macropus* and *immaculatus.*

Leiocephalus macropus koopmani, new subspecies

Type.—MCZ 55541, collected near the base of Cabo Corrientes, Pinar del Río Province, Cuba, by Karl F. Koopman on July 4, 1956.

Paratypes.—AMNH 78014, collected on the north shore of Ensenada de Corrientes, Pinar del Río Province, Cuba, by A García on July 10, 1957; AMNH 81184-86 and 81188-89, collected on north shore of Ensenada de Corrientes, 40 km. west of Cayuco, Pinar del Río Province, Cuba, by A. Garcia and myself on August 19, 1958; AMNH 88190, collected on north shore of Ensenada de Corrientes, 45 km. west of Cayuco, Pinar del Río Province, Cuba, by A. García.

Diagnosis.—A subspecies of *L. macropus* distinguished by a black striped throat pattern on a yellowish green background. Two black paramedian stripes which may be broken are present. On either side of the paramedian stripes are black stripes of varying length which usually lie parallel to the paramedian stripes (see figure 7). A vertical greenish white bar lies above the forelimb insertion with black spots both anterior and posterior to the bar.

Distribution.—Around Ensenada de Corrientes and the Peninsula de Guanahacabibes.

Description of type.—An adult male with the following measurements: snout-vent 84; tail 94 (regenerated); hindleg 70; snout-ear 19; head width 14.2. Scalation: median head scales 4; prefrontals 3; fronto-parietals 4; supraoculars 6/6; loreals 8; temporals 14; auricular scales 5/4; postmentals 2; dorsals in occiput-vent distance 53; dorsals in occiupt-axilla distance 20; scales around one half body at midbody 43;

vertical rows of scales in each tail whorl 3; subdigital carinate scales of fourth toe 28/28; prefrontal and frontoparietal rows complete; parietals in contact; supraorbital semicircles incomplete; frontonasals in contact.

The black striped throat pattern lies on a dark gray background which becomes lighter in color at the base of the throat. The throat pattern consists of two black paramedian stripes bordered at the anterior edge by a short diagonal black stripe on each side. Lateral to the paramedian stripes and posterior to the diagonal stripe this area is covered by black spots and small black stripes (see figure 7).

A vertical gray bar above the forelimb insertion is bordered posteriorly and anteriorly by a group of small black spots on an area slightly lighter than the sides. A thick short gray bar extends anteriorly and laterally from the forelimb insertion (see figure 8). On the dorsum above the forelimb insertion a heavy black nuchal bar is present; the sacral black bar is not conspicious; since it is smaller and is broken into two parts by the dorsal ridge.

The dorsum is dark gray, suffused with black; the dorsum of the unregenerated section of the tail is grayish-green and the dorsum of the regenerated tail is greenish-brown. The dorsum of the limbs is brownish-gray with black scales scattered throughout. The venter is grayish-yellow with the venter of the limbs a little brighter. The sides are a lighter gray than the dorsum and are spotted; these spots are black near the dorsum and become brown as they near the venter.

A dark brown band extends posteriorly from the upper temporals almost to the shoulder pattern. The lower temporals are gray, and this color extends onto the supralabials. The chin is a whitish-gray.

Variation of the paratypes.—The four males (AMNH 78014, 81185-86, 81188) are about one third larger than the females (AMNH 81184, 81189-90). The variation in scale characters is insignificant (Table I).

In life the specimens were a bright grayish-green, almost iridescent. The dorsum was grayish-green and becomes iridescent purplish-green on the sides and the tail. The sides had scattered yellow spots; the dorsum of the hindlimbs had greenish-yellow spots. Posterior to the greenish-yellow throat the venter was an orangish-yellow. The midventral line was slightly green, and the upper eyelids had two bright yellow bars.

The specimens after preservation lose their bright coloration. The dorsa vary from dark grayish-green to tan. The sides are slightly lighter than the dorsum and have black spots. The venters are whitish, but some specimens retain the green midventral line. If prominent, the spots on the hindlimbs are pale blue; black spots on the forelimbs are prevalent in the males but are absent in the females.

The shoulder pattern is almost identical in all specimen, except for a variation in color of the vertical bar. The bar varies from a whitish-green to almost white. On the throat, the paramedian black stripes are broken in several specimens, and the black stripes parallel to the paramedian stripes differ in size and number. The throat backgrounds range from brownish-green to pale grayish-green.

The nuchal black bar and the sacral black bar are present and follow the same pattern as the type. The tips of the unregenerated tails have alternating light and dark brown banding. The band that extends posteriorly from the upper temporals almost to the shoulder pattern varies from dark to light brown. The auricular scales and the lower temporals are dark blue in some specimens and grayish-white in others.

Comparison.—To distinguish *marcropus* and *immaculatus* from *koopmani*, the throat pattern and the shoulder markings are sufficient; neither *macropus* or *immaculatus* has a definite black striped throat pattern as does *koopmani*. The shoulder pattern of *macropus*, in which a thin vertical white bar is present upon a large area of black, will readily distinguish this subspecies from *koopmani;* when *macropus* has a vertical white bar on an area unicolor with the sides no black spots are present, and this again will differentiate it from *koopmani*. The shoulder pattern of *immaculatus* differs from that of *koopmani* by either lacking the vertical white bar, or, if the white bar is present, the black spots are lacking.

The throat pattern of *hoplites* has the definite black diagonal stripe and the black lateral stripe beside the paramedian stripe. The diagonal stripe may be present in *koopmani*, but it is not so definite as in *hoplites*. The lateral stripe is lacking in *koopmani*. The vertical white bar confluent with the horizontal white bar in *hoplites* is not found in *koopmani*, nor is the large black area anterior to the vertical bar present in *koopmani*.

Again, in *hyacinthurus* the diagonal black stripe of the throat pattern is present. The area between the paramedian stripe and diagonal stripe is occupied by black spots in *hyacinthurus;* whereas this area in *koopmani* has short black stripes. The shoulder markings differ in that *hyacinthurus* has a black area anterior to the vartical bar, and *koopmani* has black spots anterior to the vertical bar.

Isla de Pinos specimen.—An uncatalogued specimen of *L. macroups* has been borrowed from the Universidad de la Habana collection. The locality of the specimen is supposedly Punta del Este, Isla de Pinos. I have examined the specimen, and it has the faintly marked throat of the race *macropus;* also the shoulder marking consists of a small vertical white bar surrounded by a large black area, another characteristic of the nominate race. The scale counts fall within the range of *macropus* (Table I).

Collections were made at Punta del Este in the summer of 1958 by Dr. Schwartz and myself; no *L. macropus* were obtained. The habitat is ideal for *L. macropus*, but the area is occupied by *L. cubenis*. As yet *L. macropus* has not bee found anywhere in the same habitats occupied by *L. cubenis* or *L. stictigaster*.

I regard the specimen as having been mislabeled, and it is probably a specimen of *L. m. macropus* from Oriente.

Table I: Data on scalation of five populations of *Leiocephalus macropus*.

	Oriente	Camagüey	Las Villas	Pinar del Río	Isla de Pinos
Number of specimens	13♀, 16♂, 1?	4♀, 1♂	1♂	3♀, 5♂, 1?	1♂
Median head scales	3-7	4	4	4-5	6
Prefrontals	3-4	3	3	3-4	4
Frontoparietals	4-10	4-5	5	4-6	6
Temporals	11.9 (11-16)	13.8 (12-16)	15	13.0 (11-15)	12
Loreals	7.2 (6-8)	9.2 (4-11)	8	8.6 (7-11)	9
Postmentals	3.3 (2-5)	1.5 (1-2)	3	2.4 (2-3)	2
Occiput-vent	61.4 (56-61)	57.6 (56-61)	54	54.6 (53-55)	63
Occiput-axilla	23.0 (19-27)	22.2 (19-26)	21	21.2 (20-22)	24
Axilla-vent	38.0 (25-45)	34.5 (31-39)	33	33.7 (33-34)	39
½ midbody	32.5 (27-41)	35.8 (31-39)	36	33.0 (25-43)	36
Fourth toe	27.3 (24-31)	27.2 (26-28)	29	27.8 (27-29)	27
Subspecies	*macropus*	*hoplites*	*hyacinthurus*	*koopmani*	cf. *macropus*

Specimens examined.—*L. m. macropus: Oriente:* Cabo Cruz, 2 (USNM 81688-89); Río Puerco, 3 (USNM 81671-72, 81674); Punta Icacos, 4 (USNM 81681-84); Santiago de Cuba, 1 (USNM 26769); Ciudamar, near Santiago de Cuba, 3 (UMMZ 90732); Juraguá, 2 (MBZH 155); San Luis, 1 (USNM 29793); U. S. Naval Base, Guantánamo, 1 (UMMZ 115731); Guantánamo Bay, 6 (USNM 59156-57, 59160-61, 59167-68); Baracoa, 2 (USNM 29795, 29847); Puerto Tánamo, 3 (USNM 80402-04); Banes, 1 (UMMZ 114408).

L. m. immaculatus: Oriente: mouth of Río Magdalena, 1 (USNM 81680); Ocujal, 7 (USNM 138395, 138397, 138411, 138413-14, 138416-17).

L. m. hoplites: Camagüey: 12 mi. E. Morón, Loma de Cunagua, 5 (AMNH 78016-20).

L. m. hyacinthurus: Las Villas: Finca La Pastora, 2 km. NW Trinidad, 1 (AMNH 78015).

L. m. koopmani: Pinar del Río: near the base of Cabo Corrientes, 1 (MCZ 55541); north shore of Ensenada de Corrientes, 1 (AMNH 78014); north shore of Ensenada de Corrientes, 40 km. W. Cayuco, 6 (AMNH 81184-89); north shore of Ensenada de Corrientes, 45 km. W, Cayuco, 1 (AMNH 81190).

L. m. cf. *macropus: Isla de Pinos:* Punta del Este, 1 (MP).

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW RECORDS OF *ONOMERIS UNDERWOODI* COOK (DIPLOPODA: GLOMERIDA: GLOMERIDAE)

By Nell B. Causey
Fayetteville, Arkansas

Four species representing three genera of the opisthandrous family Glomeridae have been collected in the United States. Three are in the Southern States and the fourth is in California. There probably are others. They are small, dark, easily confused with isopods, and difficult to collect.

KEY TO THE FAMILY GLOMERIDAE IN THE SOUTHERN STATES BASED ON THE MALE

1. The telopodite of the seventeenth legs is composed of four small segments. None of the mesial processes on the telopodite of the gonopods (nineteenth legs) are corrugated .... *Trichomeris sinuata* Loomis

   The telopodite of the seventeenth legs is composed of three small segments. The last two of the mesial processes on the telopodite of the gonopods are finely corrugated .... (*Onomeris*) 2

2. The body surface is without pubescence. There is no mesial process on the first segment of the telopodite; segments two and three have three processes, of which none has a long seta at the apex .... *O. australora* Hoffman

   The body surface is finely pubescent. There are one mesial process on the first segment and three on segments two and three of the telopodite; the two proximal processes each bears a single long seta at its apex .... *O. underwoodi* Cook

Onomeris underwoodi was the first opisthandrous milliped collected in North America. Dr. O. F. Cook (1896) established a new genus and a new family for it and named it after his friend, Prof. L. M. Underwood, with whom he collected more than 100 specimens at Auburn, Lee County, Alabama. His family Onomeridae has been rejected; the differences between *Onomeris* and the European genus *Glomeris* are even less than the differences between some of the other genera of the Glomeridae. Until now, *Onomeris underwoodi* has been known only from Cook's description of the species, for the type specimens have been misplaced in the United States National Museum for many years and no additional collections have been reported. Within the past year I have collected it from the type locality and from four other sites in Alabama, Florida, and Mississippi. It probably occurs in western Georgia, also. No preference for any particular type of woods has been observed, but each collection site is deeply shaded, very humid, and usually well drained. The oniscoid polydesmid *Desmonus earlei* has been collected with it at four sites.

The new collection records for *O. underwoodi* are listed below:

Alabama: *Choctaw Co.* Bladon Springs State Park, under magnolia leaves, 1 ♀; 3 miles northwest of Bladon Springs on highway 6, 2 ♂, 6 ♀, June 19, 1959. *Lee Co.* Chewacla State Park, 5 miles south of Auburn, in humus in dense mixed woods to the right of the bath house, 4 ♂, 2 ♀, June 14, 1959.

Florida: *Jackson Co.* Florida Caverns State Park, near Marianna, under a layer of moss on a rock at the entrance to the Natural Bridge, 3 ♂, 1 ♀, May 27, 1958.

Mississippi: *Jackson Co.* Ocean Springs, under 3 or 4 inches of fallen bark from a pine stump in marshy ground across Halstead Road from the entrance to the Gulf Coast Research Laboratory, 1 ♂, 6 ♀, mating, 3 larvae, Oct. 1, 1958. The following June I visited this site again; it was dry, and I found no more millipeds.

The body surface of *Onomeris underwoodi* is smooth and shining and covered with a fine pubescence that can easily be seen on dry specimens with a stereomiscroscope; Cook reported that it is ''finely punctate'' and did not mention the pubescence. Specimens in which the color is developed are brown or black-brown with two large, lateral, almost colorless, ovoid areas on segments 2 through 11. The margins of all tergites, most of the head, the antennae, the legs, and the venter are also colorless. The almost colorless first segment is crossed by two horizontal brown lines. Five colorless ocelli are in a single series, and at the posterior end of the series and slightly below it is one black ocellus. Segments 1 and 2 are as in *Trichomeris sinuata* except that on segment 2 there are 4 or 5 striae across the dorsum. Segment 2 through 11 have the posterior margins of the tergites straight. The combined length of segments 10 and 11 is equal to the length of segment 9. The last segment is large and hood-like, with the posterior margin straight in the female and slightly concave in the male. This character makes it possible to distinguish the sexes even when the animals are tightly coiled. The body width is from about 2.1 to 2.7 mm. The length is between about 4.1 and 5 mm. The male is usually about ten per cent smaller than the female.

In the male, the seventeenth legs consist of a lamellar, divided coxosternum and a telopodite composed of three small segments. The eighteenth legs consist of a lamellar, undivided coxosternum and a telopodite composed of four small segments; the thickness of the distal segment is slightly less than that of the others and it is covered with short setae. The nineteenth legs, or gonopods, are much larger than the two preceding pairs; between them is a single, medial sternal process that is rounded at the apex, and adjacent to it is a pair of slightly longer processes that are acute at the apex and setose along the mesial surface. The telopodite of the gonopods is composed of four segments. Each of the first and second segments bears a mesially directed, finger-like process with a single long seta at the apex; the processes are similar except that the first one is about twice as thick and twice as long as the second. The second and third segments bear two mesially directed processes that are finely and inconspicuously corrugated; both are narrowed at the apex, but the proximal one is much broader at the base than the more distal one. The terminal segment of the telopodite is curved mesiad, resembling in shape and in length the processes of the three basal segments; it bears a small, inconspicuous subterminal spine.

Variation. One of the three males from Florida Caverns State Park has been dissected. It differs from all of the others in my collection in that the medial sternal process between the gonopods is slightly broader and the ventral margin is slightly indented in the middle. The indentation is not all as deep as in *O. australora.*

Relationship. The only other species in the genus, *Onomeris australora,* is similar to *O. underwoodi* in size and color pattern, but it is reported (Hoffman, 1950) to differ in the absence of pubescence on the body surface and in the absence of the following details from the telopodite of the gonopods: a mesial process on the first segment, a long seta on the apex of the mesial process of the second segment, and a subterminal spine on the terminal segment. So many differences suggest that the two species may not be congeneric. I have never seen *O. australora.*

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RACE OF NIGHTHAWK FROM THE UPPER MAGDALENA VALLEY OF COLOMBIA

By Alden H. Miller

Museum of Vertebrate Zoology, University of California

Previous studies of the birds of the upper Magdalena Valley of Colombia (Miller, Auk, 64: 351-381, 1947; *ibid.*, 69: 450-457, 1952) have shown that this semi-arid basin is the center of several racial differentiates some of which show pale coloration in one form or another (Miller, Proc. Biol. Soc. Wash., 65: 13-17, 1952). The nighthawks of the species *Chordeiles acutipennis* of this area have been restudied following the assemblage of comparative material that is more adequate than that previously available. This has revealed that there is a pale differentiate of this species also which breeds in the Magdalena basin.

The manifestation of reduced pigmentation in the Magdalena sample of *Chordeiles acutipennis* is almost entirely in the ventral plumage unlike the situation in the races *C. a. aequatorialis* and *C. a. exilis* in the arid belts of Ecuador and Perú, which are pale dorsally. The pallor is variably expressed in the six available specimens of the Magdalena population. It is most consistent in the under tail coverts by reason of the greatly reduced barring of this area, but it also is evident in the reduced width of the dark bars and stripes of the belly and breast. The light ground color of the underparts becomes very pale, particularly on the breast, in certain individuals, notably in two of the four males. One of these two is an adult and the other a first-year bird judged by the criteria for age established by Selander (Condor, 56:58-62, 1954) for this genus. Also in adults the white wing spot equals or exceeds the maximum in *C. a. acutipennis* and the white tail spot of the adult males does likewise. These white areas are so difficult to measure consistently and are individually so variable that statistical treatment and validity of an evident trend cannot be offered. The aggregate effect of the several, non-correlated features of paleness is such as to set off the Magdalena group rather distinctly. No one individual in the sample is without expression of one or more of these attributes which distinguish it from other populations of the species that lie nearest geographically.

The race of the upper Magdalena basin may be known as

Chordeiles acutipennis crissalis new subspecies

Type.—Adult male, no. 120493 Mus. Vert. Zool., taken 5 kilometers north of Villavieja, 1400 feet, Huila, Colombia, on February 27, 1949, by A. H. Miller; weight 40.1 gm.; testis 5 mm. long; original no. 7334.

Diagnosis.—Similar in dark dorsal coloration to *Chordeiles acutipennis acutipennis* of Venezuela, the Guianas, and northern and eastern Colombia, but differs in reduced barring of crissum and under tail coverts, the bars either obsolete or the area immaculate; dark bars of underparts to varying degree narrower; ground color of underparts average paler buff. Size as in *C. a. acutipennis.*

Range.—Tropical Zone of the upper Magdalena Valley in the Department of Huila, Colombia.

Specimens examined.—*C. a. crissalis,* 6: vicinity of Villavieja, Huila, Colombia (3 ad. ♂♂, 1 1st-yr. ♂; 1 ad ♀, 1 1st-yr. ♀). *C. a. acutipennis,* 20: Surinam (1 ♂); Venezuela (5 ♂♂, 5 ♀♀); northern Colombia, Dept. Magdalena and Dept. Norte de Santander (4 ♂♂, 4 ♀♀); southeastern Colombia, Putumayo (1 ♀). *C. a. aequatorialis,* 5: coastal Ecuador (3 ♂♂, 2 ♀♀). *C. a. exilis,* 4: Perú.

Compared with *C. a. aequatorialis, crissalis* is much darker dorsally, especially in the extent of the dusky markings. In ventral coloration there is overlap between these races, although no example of *aequatorialis* closely approaches in palor the two extreme males of *crissalis. Aequatorialis* shows a less extreme tendency than *crissalis* to reduce the barring of the crissum. The race *exilis* is even paler dorsally than *aequatorialis,* but it does not show reduction of the crissal barring.

Chapman (Am. Mus. Novitat. No. 67: 2, 1923) has pointed out that *aequatorialis* is intermediate between *exilis* and *C. a. acutipennis.* Broadly speaking this is true but it is consistently and well set off from both and is not merely a segment of a cline. It is better characterized as an annectent form rather than an intergrade. *Crissalis* is in a sense annectent also but its combination of dark and light features of coloration suggests it is a modification independent of *aequatorialis,* a separate offshoot of *C. a. acutipennis* in which some elements of pigment reduction ventrally have gone farther than in its southern desert relatives. There is no connection of suitable habitat known or likely to be found between the Magdalena basin and coastal Ecuador, as the great Andean mountain mass with its subtropical and temperate forest belts intervenes in southern Colombia and central Ecuador.

In the Magdalena basin, nighthawks were common in the badlands north of Villavieja near our camp in 1949. They also had been found earlier at gravel patches in pastureland near town. The semiarid scrub environment here contrasts strongly with the humid tropical area in the Putumayo district where I recently took a specimen of *C. a. acutipennis* in an opening near the river. The four males taken near Villavieja were obtained in January and February and had active testes, 5 or 6 mm. in length; one female on February 9 was not laying but the other on February 5 had an enlarged yellow ovum, 4 mm. in diameter.

Grateful acknowledgment is made to Dean Amadon of the American

Museum of Natural History and to Herbert Friedmann of the United States National Museum for the opportunity to borrow and examine specimens in their charge. I am also indebted to Alexander Wetmore for drawing to my attention the need for comparing certain features of the nighthawks of the Magdalena basin.

Transmitted July 26, 1959.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RED-TAILED HAWK FROM HONDURAS

By Harry C. Oberholser

Identification of hawks in the collection of the late Herbert W. Brandt has revealed a very distinct new subspecies of the Red-tailed Hawk from Honduras.

The Brandt collection is now in the Department of Biological Sciences of the University of Cincinnati, under the jurisdiction of the University of Cincinnati Museum at Cincinnati, Ohio. The curator of the bird collection of this university, Mr. Emerson Kemsies, has graciously given the present writer permission to publish a description of this new hawk.

In view of the remarkable results that Mr. Kemsies has accomplished in creating and building up the ornithological collection of the University of Cincinnati, it seems very appropriate to call this interesting new bird

Buteo jamaicensis kemsiesi, new subspecies

Subspecific characters.—Resembling *Buteo jamaicensis costaricensis* in size, but with upper surface, including the tail, paler; light bars of tertials and secondaries usually with more buff and rufous; lower parts much lighter (more whitish), particularly the abdomen, thighs, and under tail coverts; and upper abdomen much less heavily streaked, sometimes even practically without streaks. Similar to also *Buteo jamaicensis calurus,* but above darker, more blackish (less brownish); below lighter, with fewer and less heavy dark brown streaks on the upper abdomen.

Measurements.—Adult male (1 specimen): extent of wing, 1200 mm; wing (3 specimens), 357-380 (average, 367) mm.; adult female (4 specimens): 381-405 (392.8).

Type.—Adult male, No. 9676, University of Cincinnati; Tegucigalpa, Honduras; April 15, 1937; C. F. Underwood, original number, A 938.

Geographic Distribution.—Honduras; possibly to Chiapas, Mexico.

Remarks.—The 7 examples from Honduras, above measured, were all obtained by the well known collector C. F. Underwood, at the following localities: Tegucigalpa, April 15, 1947; Muin, Intibuca, January 6, 1937; La Laguna, Archaga, June 28, 1937; Las Flores, Archaga, November 10, 1934; La Flor, Archaga, April 3, 1937, May 18, 1937, and June 23, 1935.

There is in the United States National Museum a single Red-tailed Hawk from Teopisca, central Chiapas, Mexico, which looks very much like the race here described. This specimen is even a little more whitish (less buffy) below; but darker above, almost as much so as *Buteo j. costaricensis.* It is here tentatively assigned to *Buteo j. kemsiesi;* but further pertinent material may show it to belong to another and undescribed subspecies.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THE GENUS *VELOIDEA* GOULD (HEMIPTERA: VELIIDAE)

BY CARL J. DRAKE
Smithsonian Institution, Washington, D. C.
and
DAVID R. LAUCK
University of Illinois, Urbana, Illinois[1]

The Genus *Veloidea* Gould (1934) was created to hold *Rhagovelia gigantea* Gould (1928) from Colombia and *Velia vivida* Buchanan-White (1878) from Nicaragua; *Rhagovelia reposita* Drake and Harris (1931) was suppressed therein as a synonym of *vivida* White. Since 1934, only *Veloidea venezolana* Drake and Roze from Venezuela has been described.

Veloidea vivida (Buchanan-White) (fig. 1) is known solely from the type specimen, an apterous female, in the British Museum (Natural History). Mr. Arthur Smith, artist, of the above museum has kindly figured the type for us. This specimen has also been seen by the senior author.

Although closely related and rather similar in general aspect, *Veloidea reposita* (Drake and Harris) differs from *V. vivida* (Buchanan-White) in having the seventh connexival segments on each side prolonged backwards into a sharp spine, instead of truncated (fig. 1). The armature on the inferior side of the hind femora of the female (figs. 1 and 9) is also slightly different in the two species. The male of *vivida* is unknown, also the alate female. On account of these differences, the authors are here restoring *V. reposita* to the specific status.

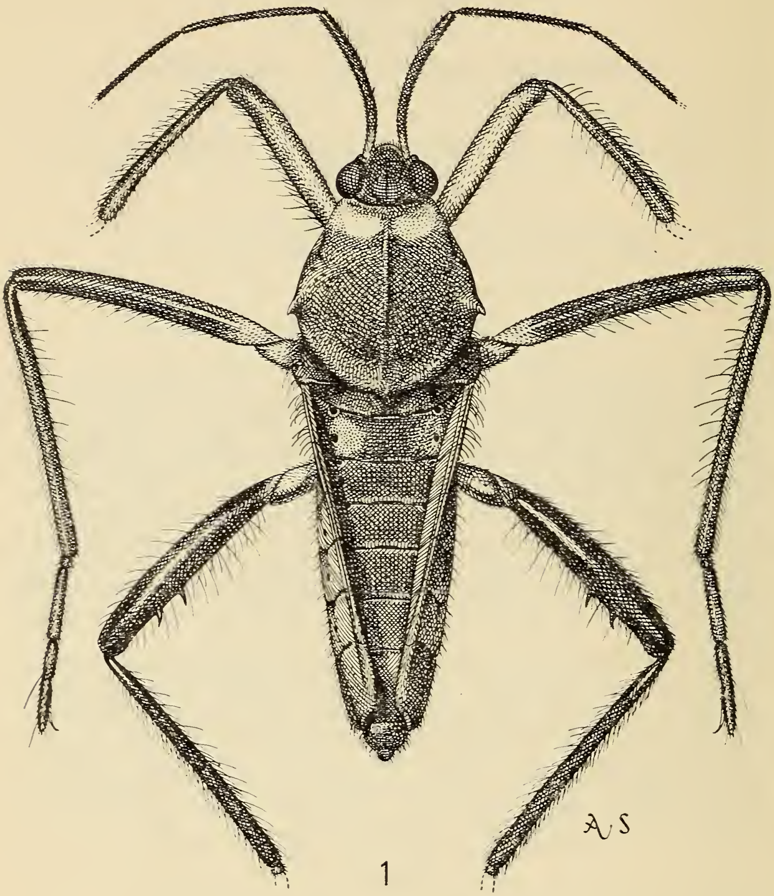
Genus **Veloidea** Gould

Veloidea Gould, Jr. Kansas Ent. Soc., Vol. 7, p. 57, 1934.

Veloidea is an American genus of water-striders inhabiting the Neotropical Region. The members of this genus are quite large and robust. The structural characteristics are very pronounced, especially the modified tarsal claws of the middle and hind legs (fig. 5) and the male genital segments (figs. 2-4) as shown in the illustrations. The species of other American genera of water-striders furnished with blade-like, tarsal structures (*Euvelia* Drake, *Oiovelia* Drake and Hottes, and *Husseyella* Herring) are much smaller, are less robust, and have very different genital structures.

Veloidea is closely related to the genera *Velia* Latreille (1804) and *Rhagovelia* Mayr (1865). Its members can be separated at once from those of the latter genera by having four, broad, thin, laminate or

[1]Completed in tenure of a National Science Foundation Fellowship.



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blade-like structure (fig. 5) on the third tarsal segments of the middle and hind pairs of legs, instead of the paired claws.

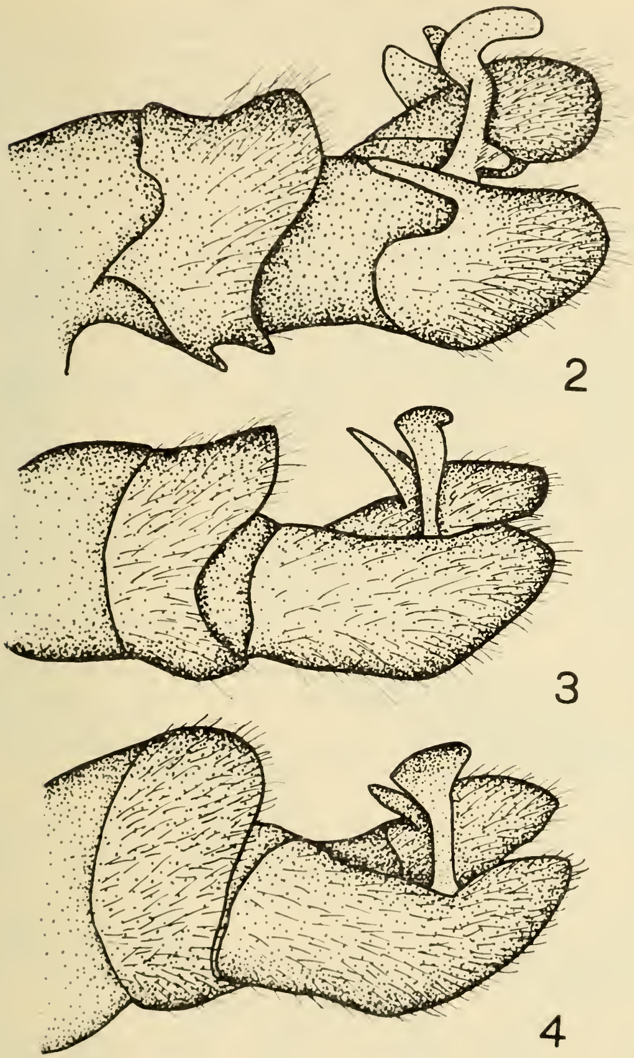
None of the four described species of *Veloidea* is represented in our collections by all of the pterygopolymorphic forms, and the male of one species and the female of another are unknown. On this account, we have prepared a brief compendium with illustrations of each species for specific differentiation.

Veloidea gigantea (Gould) (Figs. 4, 8, 10, and 13)

Rhagovelia gigantea Gould, Ann. Ent. Soc. Amer., Vol. 21, p. 417, 1928; Univ. Kansas Sci. Bull. Vol. 20, p. 46, pl. 5, fig. 1, 1931.

Veloidea gigantea Gould, Jr. Kansas Ent. Soc., Vol. 7, p. 59, 1934

Color stramineous to brown. Length, 8.4 mm.; width 2.2 mm. Pronotum slightly elevated at humeral angles, but not spinosely produced.



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median length about equal to humeral width. Seventh connexival segment of each side spinosely produced caudally. Legs hairy, hind femora of female two-spined (fig. 10) as in *V. virida* (Buchanan-White). Genital segments, parameres, and suranal structures as shown in figs. 4, 8, and 13, respectively.

The apterous and macopterous forms of both sexes are known. Specimens are known only from Colombia (Cincinnati and Sierra S. Lorenz).

Veloidea vivida (Buchanan-White) (Fig. 1)

Velia vivida Buchanan-White, Jr. Linn. Soc. London, Vol. 14, p. 486, 1879; Lethierry et Severin, Cat. Gen. Hemiptera-Heteroptera, Vol. 3, p. 58, 1896; Champion, Biol. Centr.-Americana, Rhynchota Hemiptera-Heteroptera, Vol. 2, p. 143, 1898; Kirkaldy and Terre-Bueno, Proc. Ent. Soc. Washington, Vol. 10, p. 205, 1909.

Rhagovelia vivida Hungerford, Ann. Ent. Soc. America, Vol. 22, p. 761, 1929; Gould, Univ. Kansas Sci. Bull., Vol. 20, p. 46, 1931.

Veloidea vivida Gould, Jr. Kansas Ent. Soc., Vol. 7, p. 56, 1934 (in part).

Color blackish brown. Length, 7.5 mm.; width, 2.5 mm. Pronotum spinosely produced upward at humeral angles, median length about equal to humeral width. Seventh connexival segment of each side not produced caudally. Legs hairy; hind female femora two-spined (fig. 1).

Known only from the apterous, female type from Nicaragua in the British Museum (Natural History).

Veloidea reposita (Drake and Harris) (Fig. 2, 5, 6, 9, and 11)

Rhagovelia reposita Drake and Harris, Pan-Pacific Ent., Vol. 8, p. 33, 1931.

Veloidea vivida Gould, Jr. Kansas Ent. Soc., Vol. 7, p. 56, 1934 (in part).

Color blackish brown. Length, 9.1-9.8 mm.; width 2.8-3.0 mm. Pronotum spinosely produced upwards at humeral angles, median length about equal to humeral width. Seventh connexival segment of each side spinosely produced caudally. Legs hairy; hind female femora two- to four-spined, with 1st spine near middle (fig. 9). Genital segments, parameres, and suranal structures as shown in figs. 2, 6, and 11, respectively.

Apterous male and macopterous forms of both sexes have been described. Known only from the type series of many specimens from Guatemala (Chiquimula).

Veloidea venezolana Drake and Roze (Figs. 3, 7, and 12)

Veloidea venezolana Drake and Roze, Bull. Brooklyn Ent. Soc., Vol. 50, p. 106, 1955.

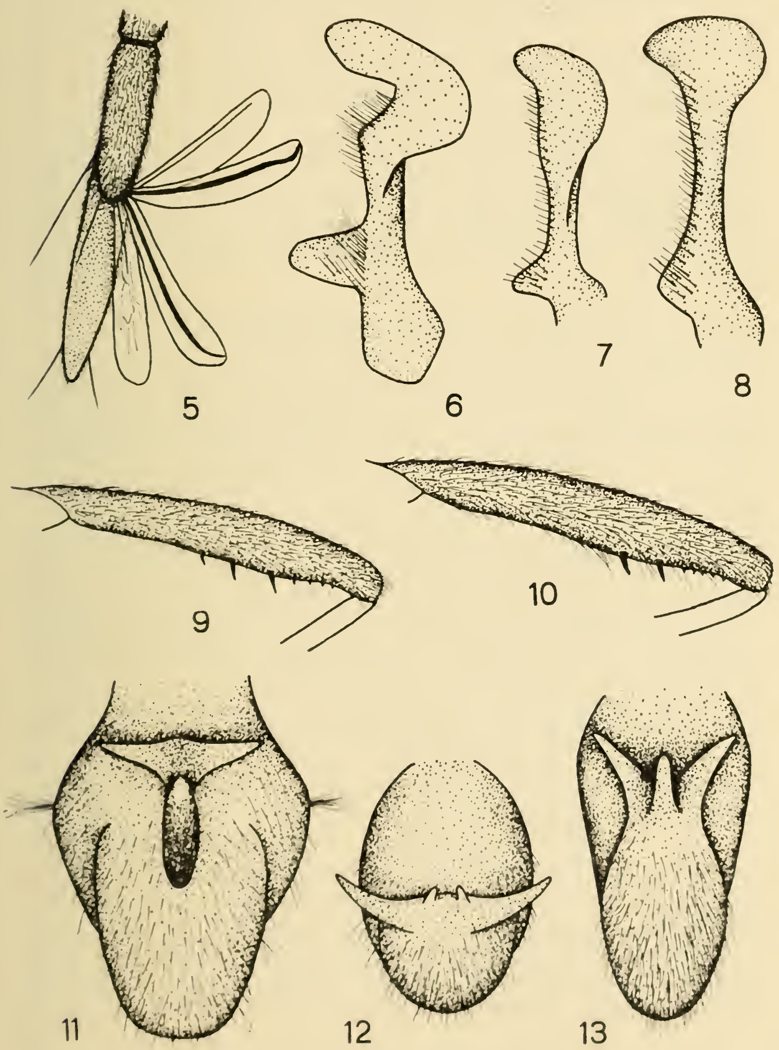
Color stramineous. Length 7.25 mm.; width 2.30 mm. Pronotum extremely coarsely punctate, reduced with median length greater than humeral width, not produced at humeral angles. Seventh connexival segment, parameres, and suranal structures as shown in figs. 3, 7, and 12, respectively.

Known only from the apterous, male holotype from Venezuela (Quinagvina) in the Drake Collection (USNM).

Explanation of Figures

Fig. 1. *Veloidea vivida* (Buchanan-White) (apterous ♀ type).
Fig. 2. *Veloidea reposita* (Drake and Harris), ♂ genital segments.
Fig. 3. *Veloidae venezolana* (Drake and Roze), ♂ genital segment.
Fig. 4. *Veloidea gigantea* (Gould), ♂ genital segment.
Fig. 5. *Veloidea reposita* (Drake and Harris), hind tarsus showing lamillate plates.
Fig. 6. *Veloidea reposita* (Drake and Harris), right ♂ paramere.
Fig. 7. *Veloidea venezolana* Drake and Roze, righ ♂ paramere.
Fig. 8. *Veloidea gigantea* (Gould), right ♂ paramere.
Fig. 9. *Veloidea reposita* (Drake and Harris), right ♀ femur.

Fig. 10. *Veloidea gigantea* (Gould), right ♀ femur.
Fig. 11. *Veloidea reposita* (Drake and Harris), ♂ anal segment showing suranal structures.
Fig. 12. *Veloidea venezolana* (Drake and Roze), ♂ anal segment showing suranal structures.
Fig. 13. *Veloidea gigantea* (Gould), ♂ anal segment showing suranal structures.



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PROCEEDINGS

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TWO NEW SUBSPECIES OF *PEROMYSCUS DIFFICILIS* FROM MEXICO

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Museum of Natural History, University of Illinois

Recently we have studied the variation within the species *Peromyscus difficilis.* A review of the individual and geographic variation throughout the range of this species indicates there occur two groups of populations which in our opinion represent undescribed geographic races. These are as follows:

Peromyscus difficilis petricola new subspecies

Type.—Female, adult, No. 33239, Univ. Kansas Mus. Nat. Hist., from 12 mi. E. San Antonio de las Alazanas, 9000 ft., Coahuila, Mexico, collected by W. Kim Clark, August 2, 1949, original no. 979.

Range.—The Sierra Madre Oriental of southeastern Coahuila and southwestern Tamaulipas and probably northern San Luis Potosí and southern Nuevo León.

Diagnosis.—A race of *Peromyscus difficilis* characterized by long body, relatively short tail with head and body averaging about 95 per cent of tail length (in topotypes), relatively short hind foot (in topotypes), greatly inflated auditory bullae, broad braincase, broad interorbital region, long skull (particularly long nasals, toothrow, and palatine slits), dark color and lacking the ochraeceous of some subspecies.

Comparisons.—From *P. d. difficilis, petricola* differs as follows: pelage on dorsum has peppery appearance and slightly less ochraceous; cheeks less buffy; underparts more blackish as a result of shorter white tips on the hairs; body longer, especially relative to tail; hind foot smaller (in topotypes of *petricola*); auditory bullae larger; braincase broader; skull slightly longer, as reflected by longer nasals, palatine slits, diastema, upper toothrow, and postpalatal region.

From *P. nasutus nasutus* from Coahuila, *petricola* differs as follows: color darker, with more blackish, less ochraceous, and a more pronounced peppery appearance; cheeks less buffy; underparts darker; body longer; ear larger; auditory bullae larger; skull longer, especially as *petricola* as a distinct species. Increased inflation of the auditory bullae seems to be the only feature that might set *petricola* aside as a distinct species, and, on the basis of one feature, which is not distinctive in all shown by longer nasals, diastema, palatine slits, postpalatal region, and upper toothrow; braincase broader.

Remarks.—*P. d. petricola* is a dark-colored, large-sized race with greatly inflated auditory bullae. The bullae are larger than in most other populations of *P. difficilis,* and some persons might elect to regard specimens, we regard it as a race of *P. difficilis.*

The large series from Miquihuana, Tamaulipas, is similar to topotypes in color and in large size. In some other features, such as relative length of tail, they differ from these topotypes and possess some of the characteristics of *difficilis.* This difference of the Tamaulipan population suggests that intergradation occurs between *petricola* and *difficilis.*

We have not seen specimens from San Luis Potosí, and the inclusion of any part of this state within the range of *petricola* is tentative.

The name *petricola* is here used as a noun meaning "rock dweller."

Measurements.—Three males, four females, from the type locality: total length, 224.3; length of tail, 115.5; length of hind foot, 23.4; length of ear from notch (dry), 21.4; greatest length of skull, 30.0; basilar length, 22.6; greatest breadth of braincase, 13.9; interorbital constriction, 4.6; length of nasals, 11.5; shelf of bony palate, 4.4; length of palatine slits, 6.4; diastema, 7.7; post palatal length, 10.7; alveolar length of maxillary toothhow, 4.8.

Specimens examined.—Total, 21. COAHUILA: 12 mi. E San Antonio de las Alazanas, 9000 ft., 9 (KU). TAMAULIPAS: Miquihuana, 12 (USBS).

Peromyscus difficilis saxicola new subspecies

Type.—Female, adult, No. 15963, Univ. of Illinois Mus. Nat. Hist., from Cadereyta, 2100 meters, Querétaro, México, collected by Helmuth O. Wagner, July 14, 1948, original no. 839.

Range.—Querétaro and northern half of Hidalgo.

Diagnosis.—A race of *Peromyscus difficilis* characterized by brownish red or ochraceous color, with a reduced overlay of black permitting much of the ochraceous to show; ears more brownish than in other southern subspecies; dorsal tail stripe a mottled brownish; tail long; head and body averages 70.5 to 77 per cent of tail; hind foot not especially long; palate short.

Comparisons.—From *P. d. petricola, saxicola* differs as follows: color more ochraceous with a less peppery effect; underparts lighter; sides of face buffier; tail more brownish, less blackish; ears browner; body shorter and tail longer; auditory bullae less inflated; upper toothrow shorter; skull slightly smaller, including nasals, palate, palatine slits; braincase slightly narrower; interorbital region narrower.

From *P. d. difficilis, saxicola* differs as follows: dorsum more ochraceous; sides of face buffier; ears slightly more brownish; tail longer; hind foot smaller; braincase slightly broader; postpalatal region longer; nasals and palate shorter.

From *P. d. amplus, saxicola* differs as follows: color on dorsum paler;

ears lighter; dorsal tail stripe browner; pectoral spot less evident; tail longer; skull smaller in several features including shorter upper toothrow, nasals, palate, and postpalatal region.

Remarks.—The race *saxicola* is recognizable by its distinctive dull, ochraceous color. It lacks the blackish on the dorsum which adjacent races possess. *P. d. saxicola* approaches *P. d. amplus* in color, but has much less blackish and is a smaller animal with a longer tail.

Specimens from northern Hidalgo (Encarnación) are large for the subspecies and in this respect show intergradation with or at least tend toward *P. d. petricola.* The larger size is not only in external features, but is also reflected by a larger skull, including a long toothrow. Although the specimens are intermediate in some morphological features, in color they are most like *saxicola,* being only slightly darker than topotypes.

The name *saxicola* is here used as a noun meaning "rock dweller."

Measurements.—Four males, five females from the type locality: total length, 232.5; length of tail, 134.7; length of hind foot, 23.7; length of ear from notch (dry), 21.6; greatest length of skull, 29.3; basilar length, 22.4; greatest breadth of braincase, 13.5; interorbital constriction, 4.5; length of nasals, 11.2; shelf of bony palate, 4.2; length of palatine slits, 6.1; diastema, 7.5; postpalatal length, 10.7; alveolar length of maxillary toothrow, 4.5.

Specimens examined.—Total, 62. QUERÉTARO: Cadereyta, 2000 m., 26 (UI). HIDALGO: Encarnación, 7 (USBS); Zimapán, 9 (USBS); 26 km. E Zimapán, 2 (UM); San Agustín (Metzquitilán), 7 (UI); 7 mi. S Puente de Tasquilla, 5700 ft., 5 (MVZ); Ixmiquilpán, 6 (USBS).

We wish to thank Stanley P. Young, U. S. Fish and Wildlife Service, and Sydney Anderson and E. Raymond Hall, Museum of Natural History, University of Kansas, for the loan of material.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE BACULUM IN THE WOOD RAT *NEOTOMA STEPHENSI*

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The wood rat *Neotoma stephensi* has frequently been confused with similar species, especially *Neotoma lepida, N. albigula,* and *N. mexicana.* Originally described as a species (Goldman, Proc. Biol. Soc. Wash., 18: 32, 1905), it was shortly thereafter designated as a subspecies of *N. lepida* (Goldman, No. Amer. Fauna, 31: 80, 1910). A decade later, the same author again regarded *stephensi* as a distinct species (Goldman, Jour. Mamm., 13: 66, 1932). More recent workers (Hooper, Miscell. Publ. Univ. Mich. Mus. Zool., 51: 35, 1941, and others) have intimated that *stephensi* was conspecific with *lepida.* The taxonomic status and characters of *N. stephensi* have thus been far from clear.

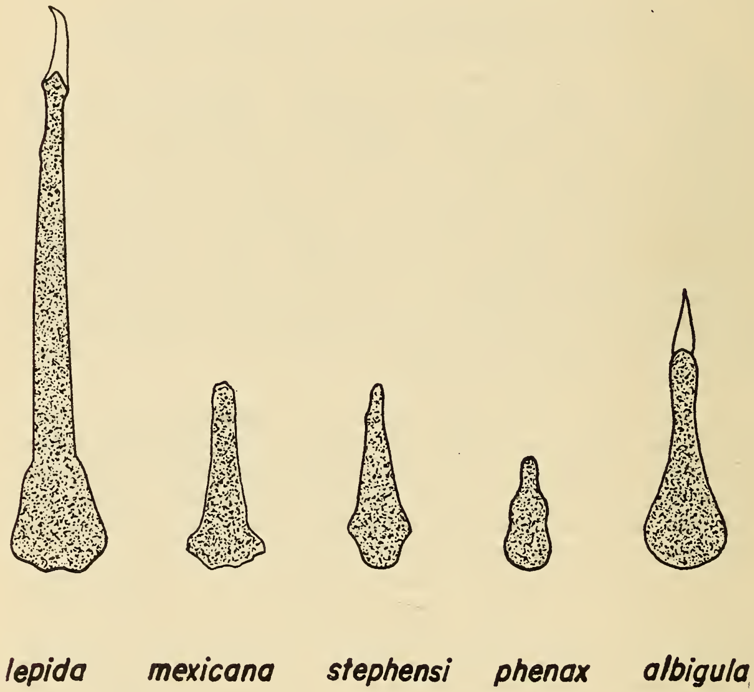
By employing a combination of characters, including color, hairiness of tail, and features of the skull, *N. stephensi* can be distinguished from *N. lepida, N. albigula,* and *N. mexicana.* Recent study of *N. stephensi* shows that its baculum is distinct from that of all other *Neotoma* and not only serves to distinguish this species from *lepida, albigula,* and *mexicana,* but clearly demonstrates its specific distinctness.

The baculum in *stephensi* is exclamation-mark-shaped or wedge-shaped (see fig. 1A). It is smaller than in any species known to occur in the United States. In one fully adult specimen the bone is 5.0 mm. long. In four young adults, the length is 4.1, 3.5, 3.1, and 3.1 mm., respectively. In an immature, the length is 2.4 mm. The bone in the immatures and young adults follows the basic plan of that in adult specimens. One adult has the baculum unusually broad along the proximal half, although still wedge-shaped. Its length is only 2.9 mm.

The baculum in *N. stephensi* is one-fifth the length of that in *lepida* and differs from it markedly in shape. The basal portion is much narrower than in *albigula* and of a different shape than in *mexicana.* It is of about the same size as in *Neotoma* (*Teanopus*) *phenax,* except the sides are not indented and thus not violin-shaped.

If, on the basis of the structure of the baculum alone, one were to estimate the relative taxonomic position of *N. stephensi,* the conclusion would be that it is nearest to *N. mexicana* and *N. phenax.* However, as to which of these it is most closely allied, one should not judge solely on the basis of this evidence.

Fig. 1. Bacula of various species of *Neotoma,* all 4.2 *N. lepida,* UI no. 14499, Mohave Co., Arizona; *mexicana,* after Burt and Barkalow, Jour. Mamm., 23: 293, 1942; *stephensi,* UI no. 18682, Yavapai Co., Arizona; *phenax,* M.V.Z. no. 76182, Sinaloa, Mexico; *albigula,* UI no. 8554, Gila Co., Arizona.



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PROCEEDINGS
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A NEW DIPLOPOD GENUS FROM GUATEMALA, CLOSELY RELATED TO DESMONUS, AND ITS EFFECT ON THE VALIDITY OF THE FAMILIES DESMONIDAE AND CYCLODESMIDAE (POLYDESMIDA: SPHAERIODESMIDAE)

Richard L. Hoffman
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The species of Diplopoda are still so poorly known that the unusual is commonplace, particularly in collections from tropical regions, but despite having become somewhat inured to the unexpected I was astonished upon recently discovering abundant material of two milliped species that O. F. Cook had collected in Guatemala and identified as "*Desmonus,* n. sp." These specimens were found hidden in a large jar of Sphaeriodesmids making up part of the huge backlog of unidentified myriapods which has accumulated at the U. S. National Museum for more than 70 years, and were kindly loaned to me for study by Dr. Ralph E. Crabill, Associate Curator in the Division of Insects.

Despite the striking superficial resemblance of the new species to *Desmonus earlei* Cook and its congeners, they differ in so many ways that full generic rank must be admitted as necessary. Aside from their interest from both systematic and zoogeographic points of view, these creatures are also singular in casting light on the origin and significance of the curious segmental cavities previously considered characteristic of *Desmonus* and a few related genera.

Hybocestus, new genus

Type species—*Hybocestus octonodus*, new species (here designated).

Diagnosis—A genus of small, relatively slender sphaeriodesmoids, the length about four times the greatest width, in which the paranota of segment 3 are much the largest, the metatergites of segments 5 to the penultimate are provided with a transverse ridge bearing 6 or 8 conical tubercules, and segments 4 to the penultimate with rudimentary cavities at the base of the paranota. Male gonopods very simple, the coxae with a moderately distinct apophysis, and joined by a narrow transverse sternal remnant; telopodites simple, without accessory processes, the seminal groove running out to the tip of a long flagelliform tibiotarsal portion. Anterior legs of males without knobs or glandular openings, but the femora and postfemora of legs 1-7 conspicuously enlarged, and the coxae of legs 3-6 produced into distinct conical lobes.

Remarks—The obvious similarity of this genus to *Desmonus* is noteworthy, considering the fact that related species and genera occurring between Texas and Guatemala are rather dissimilar in body form. We have two alternative choices to make on the basis of existing knowledge. Either *Hybocestus* and *Desmonus* represent terminal convergence at two extremities of the range of the ancestral stock, or they represent relicts of the original widespread prototype, with loss of ornamentation and other modifications occurring in specialized species evolving more rapidly in the region between them.

The generic name is derived from the Greek *hybos*, hump-backed + *kestos*, a girdle, the latter being especially appropriate in the sense of its extension into the Latin *cestus*, a knobbed contrivance worn on the fists of gladiators.

Species—Two, both from Guatemala.

Hybocestus octonodus, new species

Figures 1-4

Type specimens—Male holotype and female paratypes, U. S. Nat. Mus. Myriapod Type No. 2594, from Coban, Baja Vera Paz, Guatemala, collected in May, 1904, by O. F. Cook.

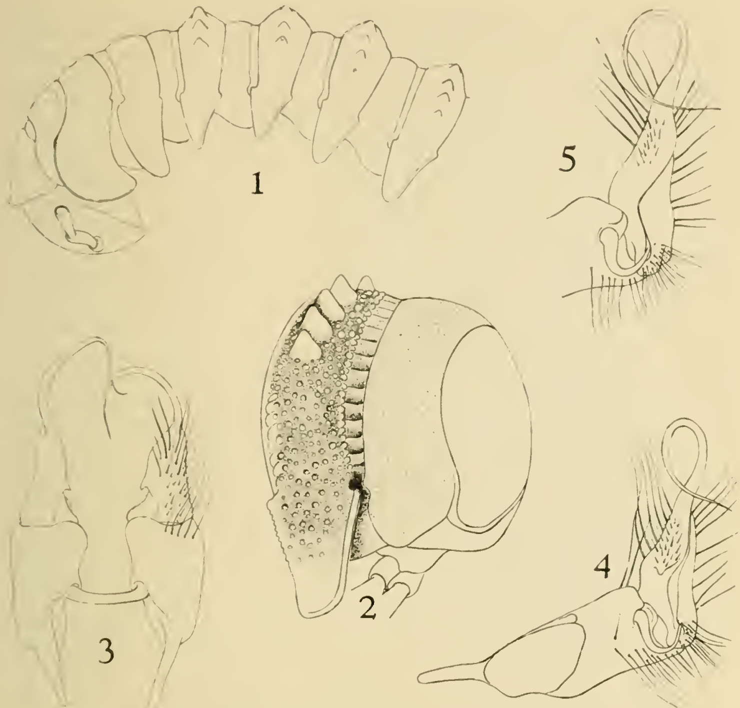
Description—With the characters of the genus. The following notes were made from the holotype after removal of all adherent dirt and debris:

Coloration uniformly testaceous, the tubercules and larger granules grayish white, legs yellowish.

Body slender, composed of head and 19 segments, capable of rolling into a compact flattened sphere, widest near the anterior end, tapering gradually back to 16th segment, thence abruptly to end. Length, ca. 11.0 mm., width, 2.7 mm.

Head fairly large, slightly wider than collum, moderately and evenly convex, the vertex smooth and glabrous but for two pairs of long paramedian vertigial setae, the innermost seta of each pair set distinctly lower on the head than the outer; surface of head below level of antennae becoming densely setose. Genal surfaces continuing the convexity of the frons, not medially swollen to form a subantennal ridge, laterally sloping off to a straight, thin, immarginate edge. Interantennal isthmus slightly broader than length of 1st antennal article but much narrower than length of 2nd; lower part of vertex without a median carina (such as reported by Loomis for several species of *Desmonus*) but with a broad flat elongate area set off by two indistinct grooves which extend dorsad from inner angles of antennal sockets and appear to converge abruptly about the level of the vertigial setae.

Antennae long and slender, extending caudad nearly to caudal margin of 3rd segment, all of the articles setose but most distinctly so distally, where the terminal four are invested with (1) dense, short setae, almost pubescence, (2) numerous more widely spaced and longer setae, and (3) an apical whorl of even longer sensory hairs. Antennae slightly compressed distally, the 6th article largest and longest, somewhat fusiform; 7th small and bluntly conical, with 4 long slender sensory



cones. Outer sides of articles 5 and 6 (perhaps also 7) with small, rounded, apical sensory areas. Lengths of articles in descending order: 6-2-3-5-4-1-7.

Collum subtrapezoidal, twice as wide as long, the anterior and posterior margins nearly transverse but the latter turned forward laterally; anterior corners rounded and depressed somewhat. Surface of collum smooth, with broad, low, faintly convex areas each with a median seta, four across the caudal margin, one on each side along the lateral margin, and two paramedian near the center of the collum.

2nd segment smooth, its paranota slender and enclosing collum, extending cephaloventrad as far as its anterior corners; both margins of the paranota slightly turned up to impart a somewhat flatly concave effect; dorsum of segment with a series of 8 setae along the caudal margin and out onto the paranotal bases.

3rd segment with greatly expanded paranota, these about twice as wide as those following, metatergites of this and all subsequent segments finely but densely granular, the prozonites smooth. Surfaces of these subsegments concordant at a narrow suture line; the 8 transverse setae of the metazonite near the midlength of the subsegment instead of near the caudal margin.

Segments 4 and 5 similar in shape, but former entirely smooth and flat, while the metazonite of the latter is elevated above level of prozonites and carries a median transverse series of 3 distinct high conical tubercules on each side of the middorsal line, and a much smaller tubercule on each side about halfway from the outermost large tubercule to the level of the paranotal bases.

Segments 6-17 subsimilar, the prozonites and metazonites separated by a deep constriction which becomes narrower and deeper on the lower sides, and which is ornamented by a series of subcontiguous ovoid pits. Surface of prozonites smooth and polished, that of metazonites beset with profuse, erect, conical microtubercules which accumulate a coating of dirt and organic debris in the living animals; the transverse dorsal series of large processes increasing in size and acuteness back to the 17th segment where they are at least twice as high as their basal diameter. Paranota relatively small and set low on sides, arching slightly ventrolaterad and then directly ventrad, the ends vertical; those of segments 5 and 6 acutely pointed, from segment 7 on caudad first becoming rounded and then truncate with the anterior corners obtusely-angled, the posterior acutely-angled. Anterior and lateral edges of paranota very thin and smooth, the posterior edge ornamented with a series of 8 to 12 or more denticles which increase in size toward the body. Anterior margins produced gradually cephalad toward the body, culmnating in a blunt lobe or *tragus* (a new term, selected with reference to the similarity to the tragus of the mammalian ear) which almost contacts the adjacent surface of the prozonite across the deeply impressed interzonal groove; the posterior edge also produced caudad at the base into an acute lobe which, when the animal is coiled, overlaps the tragus of the following segment.

Segment 18 reduced in size, its dorsal processes very low but still evident and discrete. Segment 19 small, profusely studded with coarse, boletoid granules, a large paramedian setiferous tubercule on each side near the middle, and provided with 6 long setae along the caudal edge. Basal half of segment nearly vertical, the distal half very slightly flared outward. Profile of 19th segment in ventral aspect slightly acute medially rather than evenly rounded.

Anal valves flat, each with two long medially directed setae, hypoproct large, subtriangular, longer than wide, the sides convex. Median length of hypoproct greater than the line of contact between the anal valves.

Pleural and sternal areas completely glabrous and smooth, the interzonal groove conspicuous and deep except in its course in curving forward in front of the anterior legpair, level of prozonite elevated above that of metasternum. No podosternal development, the legs attached to coxal sockets virtually flush with the sternal surface, the coxae of each pair in contact medially but well-separated from those of the other pair. Stigmata very small, ovoid, not auriculate, on the anterior lateral side of each coxal socket. Length of prozonite at midventral line about 2/3rds that of metazonite.

Legs long and slender, the coxae nearly glabrous but the distal articles moderately setose, especially the tarsus. Joints in descending order of length: 3-6-2-4-5-1. Pregonopodal legs somewhat shorter and heavier than the others, the femora and postfemora of legs 1-7 distinctly enlarged, but not provided with any ventral lobes or glandular openings. Coxae of 2nd legs produced into long slender conical processes extending back between coxae of 3rd pair, the sternite of 2nd legpair pivoted on pleurotergite on each side and freely moveable. Coxae of legs 3-6 produced ventrad into conspicuous subtriangular lobes, those of pairs 3 and 6 separated, of 4 and 5 almost in contact.

Gonopod aperture very large and transverse, occupying most of sternum of 7th segment, the prozonite reduced to a mere narrow vestige about 1/8th the length of the opening, the metazonite reduced to a strip just wide enough to contain the coxal sockets of the 9th legpair, which are widely separated. Aperture not margined except at its lateral ends where the segment is produced into prominent subhemispherical lobes.

Gonopods freely moveable in the aperture, not attached to its edges, the coxae cylindrical and elongate, with a prominent apophysis just above insertion of the solenite, and with several long macrosetae just below it. Coxae connected by a slender but well sclerotized sternite, its apodemes largely fused with the coxae and remaining with them upon separation. Telopodite not definitely resolvable into distinct regions but basally enlarged and with long slender setae near insertion of the solenite, the mesial surface takes the form of a short ridge terminating in an acute basally directed spur, beset with short stiff bristles and bordered by a lateral row of long, slender macrosetae. Telopodite distally drawn out into a long acuminate flagelloid process describing a complete circle or nearly so, without any trace of accessory branches or processes. Prefemur of gonopod without indication of a prefemoral process.

Hybocestus plagiodon, new species

Figure 5

Type specimens—Male holotype and female paratypes, U. S. National Museum Myriapod Type No. 2593, from Tree Aguas, Guatemala, collected on March 30, 1906, by O. F. Cook.

Description—Superficially similar in most structural details and sexual characters to the type species, differing from *octonodus* in the following particulars:

Size considerably larger, the holotype 3.2 mm in width, a large female paratype 15 mm in length and 3.4 mm in width.

Body composed of head and 20 segments instead of only 19. Head considerably less setose on frons and clypeus, the genae with distinct flattened margins. Interantennal isthmus much broader than in *octonodus*, as broad as length of 2nd antennal article; lengths of the articles in descending order: 6-5-2-4-1-7, as opposed to 6-2-3-5-4-1-7.

Surface of collum finely granular instead of smooth. Segment 5 with 3 flattened tubercules on each side, those at the middorsal line in contact basally; the 3rd tubercule outward very small in relation to the paramedian series, halfway from it to the paranotal bases is a 4th, even smaller tubercule which is conspicuous chiefly because it carries a visible seta. Tubercules of segments 7 and 8, and 15 through 18 largest, those of segments 9 through 14 distinctly smaller, and in going caudad on the body, the tubercules tend increasingly to slope caudad (hence the specific name) rather than remaining perpendicular on all segments as in *octonodus.*

Interzonal groove broad and very shallow, provided with oblong pits only far down on sides; metazonites very abruptly elevated from posterior margin of the groove. Posterior edges of paranota with about 15-20 small dentate tubercules, as against 8 to 12 in the other species.

Telson, as seen in profile, sloping evenly to the edge instead of the distal half distinctly flared outward.

Male gonopods very similar to those of the type species, but considerably larger; the femoral ridge less pronounced and the corresponding area somewhat more strongly expanded outward.

Comparative morphology of the lateral cavities

The genus *Desmonus* was originally based in part on the presence of deep circular pits at the anterior base of the paranota, extending from the 3rd to the penultimate segment. In the subsequently described *Desmoniella* (Loomis, 1943) the cavities were found in the proper position but only on segments 4 to 10 inclusive. This discovery alone compelled the recognition of some mutability in the character, and the Mexican genus *Peridysodesmus,* which is similar to *Desmonus* in gonopod structure, apparently lacks the cavities altogether. With *Hybocestus* we gain some insight into the mode of formation of the structures. As already remarked in the preceding description, the anterior edge of the paranota is bowed cephalad in going toward the body and the anterior basal part of each paranotum is thus produced into a projecting subtriangular lobe for which the name *tragus* was suggested. In both species of this genus the tragus extends distinctly cephalad over the interzonal groove, which itself is accentuated at the paranotal base, and virtually meets the adjoining surface of the prozonite. It would require but little further modification to affect a complete junction and fusion of the two areas, thus leaving the interzonal groove bridged over to form a circular tunnel. This in fact is the condition in *Desmonus,* as can be seen from specimens boiled in KOH to clean off the dirt, although here the basal part of the paranota is turned in sufficiently to close off the ventral end of the tunnel.

Do these cavities contain the ozopores? This point has been in doubt since Cook's time, and cannot be resolved at this time with complete assurance. However, specimens of *Hybocestus* have been cleaned with strong caustic, then decalcified in acid, dehydrated through alcohol, and mounted in balsam, and such preparations have been studied under oil immersion without any trace of pores being detected. Doubtless the pores are absent in this genus, and inferentially so in *Desmonus,* although the study of serial sections will be desirable for confirmation.

On the other hand, it is well worth mentioning at this point that ozopores do occur in the genera *Sphaeriodesmus* and *Cyclodesmus,* both stated by Cook (1898) to be poreless. Perhaps the location of the pores, on the reduced and incurved surface of the metazonites, plus their small size, caused them to be overlooked by earlier workers. In the two genera mentioned, the ozopores are located just dorsad to and in front of the base of the paranota in front, normally concealed by the caudal margin of the preceding segments. Such a position for the pore is by no means unusual, however, as it is characteristic of most of the Oriental *Pterodesmidae* where it may even be on the ventral side of the paranotal base!

On the basis of this information, the family "Cyclodesmidae" (= *Cyclodesmus*) was credited as having pores in a key to families in the "Checklist of the Millipeds of North America" although the statement was pronounced false by a recent reviewer of that work who presumably relied upon old literature rather than personal examination of specimens.

The Status of the Families Desmonidae and Cyclodesmidae

Within recent years the number of species of polydesmoid millipeds related to *Desmonus earlei* has been greatly augmented by a variety of animals many of which depart in one way or another from the original characters attributed to the genus and to its family Desmonidae. Since most workers are still content to follow the old existing classifications in their haste to erect new species, it seems appropriate that this occasion be taken to review the status of the Desmonidae in the light of existing knowledge, even though some of the named genera and species are known only from very meagre descriptions.

The foundations of our knowledge of American onisciform polydesmoids were laid by O. F. Cook in 1898, at which time he recognized five families separated to a considerable extent by the relative sizes of the anterior segments and their paranota. Although Cook's taxonomic perspicuity was far better than average in the recognition of groupings and affinities within the Diplopoda, it must be recalled that in the five families alluded to, he was able to study specimens of but ten species, and some of the families were based exclusively on the characters of single species.

Cook himself remarked that his arrangement and key to families was an artificial one, ". . . the forms included not composing a natural group . . .," but it remained for Brolemann to suggest that the Sphaeriodesmidae, Cyclodesmidae, and Desmonidae were related to the Chelodesmidae, while the affinities of the Oniscodesmidae and Cyrtodesmidae lay instead with the polydesmid families. This system was followed by Pocock in the Biologia Centrali-Americana, but in the latest summary of the Polydesmida, the Count von Attems (1940) combines all onisciform polydesmoids in the single family Oniscodesmidae, admitting, however, two subfamilies on the lines suggested by Brolemann's dichotomy.

The Desmonidae was erected primarily on the basis of "the possession on each segment of a deep cavity located at the base of the carina in front." From the superficially similar genus *Cyclodesmus* (which formed the basis of a family Cyclodesmidae), *Desmonus* was further separated by having the surface of the segments granular-hispid, instead of smooth, even, and polished; and in that the paranota of the 4th segment are larger than those of the 5th instead of subequal as in *Cyclodesmus*. These two genera (and "families") were separated by Cook from the related Sphaeriodesmidae solely by relative sizes of the anterior segments and of the antennal articles.

So long as only one or a few species were known for each family, the diagnostic characters used by Cook remained useful and valid. With passing time, however, new forms have been described which virtually demolish the original distinctions, as shall be discussed at this point.

At the time *Desmonus* was described, Cook was puzzled by two enigmatic species which he knew only from the literature, but admitted nonetheless as the types of two genera: *Cylionus* and *Cyphodesmus*. *Cylionus*, which Cook proposed for *Sphaeriodesmus gracilis* of Humbert and Saussure, was placed in the Sphaeriodesmidae but with the admission that most of its characters indicated closer affinity with *Desmonus*. *Cyphodesmus* Peters, based on *Oniscodesmus mexicanus* Saussure, was regarded as related to *Desmonus* although being several times larger than *D. earlei*, and differing in various other ways.

In 1910, Filippo Silvestri very briefly diagnosed and figured two remarkable new genera from eastern Mexico, without allocating them to a particular family. Of them, *Taphrodesmus* was provided with lateral "pits" in exactly the position they occur in *Desmonus*, but differed from that genus in lacking transverse rows of tubercules and in having the 4th and 5th segments largest instead of the 3rd. Silvestri's second genus, *Peridysodesmus*, differed from *Desmonus* in lacking lateral pits and transverse rows of tubercules, and in having the 4th segment as large as the 3rd, but the gonopods are basically similar to those characteristic of *D. earlei*.

In 1943, H. F. Loomis erected still another genus, *Desmoniella*, in which the male gonopods are virtually identical with those of *D. earlei*, and in which the lateral pits are present although not on all of the body segments. *Desmoniella*, however, is completely smooth dorsally and the 2nd segment is essentially as large as the 3rd.

Finally, with the description of *Hybocestus*, we are provided with species which, if known only from females, might understandably be regarded as congeneric with *Desmonus earlei*, so great is the general concordance in body form and proportions. Yet the genus departs from *Desmonus* in sexual characters, as well as in the more primitive development of lateral cavities which indicates something of their evolution into the form which characterizes the North American genus.

I think the conclusion to which we are compelled by existing information must be that the characters originally stipulated for the family Desmonidae are at best generic in value, insmuch as they are shared in various combinations (pits, dorsal ornamentation, size of anterior segments, and form of gonopods) by members of seven apparently valid and obviously related genera.

What, then, is the status of the name Desmonidae? On the basis of Cook's original key (1899: 452), *Taphrodesmus* goes into his Sphaeriodesmidae and *Peridysodesmus* into the Cyclodesmidae, yet both are closely related to *Desmonus*. The basic structure of the gonopods, particularly retention of a distinct sternal remnant, is characteristic of all three of Cook's "families" here considered, as well as of many primitive genera in chelodesmoid families. *Desmonus* and *Sphaeriodesmus* even share, in addition, virtually the same configuration of the 1st legpair of males, with the femora dorsally arched and provided with a basal tubercule or spur on the ventral side.

Pocock (1909: 117) has already combined the families, remarking in his introduction to the Sphaeriodesmidae, "I include in this family the genera which Cook referred to the Sphaeriodesmidae, Desmonidae, and Cyclodesmidae, because the genera *Sphaeriodesmus* and *Cyclodesmus* appear to be linked to a certain extent by *Cylionus,* and because the essential feature upon which the Desmonidae were separated from the Cyclodesmidae is not known to occur in the one Central-American genus. Cyphodesmus, referred by Cook to the Desmonidae." Pocock tentatively retained Cyclodesmidae as a subfamilial designation, solely, however, on the basis of segmental size and shape, a character which we now know to be subject to much variation even in closely related forms.

Perhaps the single character which might afford a major dichotomy is the relative size and shape of the prozonites. In *Desmonus* and *Hybocestus,* at least, they are not strongly reduced and even ventrally are nearly as long as the metazonites. In *Sphaeriodesmus* and allied genera, the prozonites are quite small even on the dorsal side, and are virtually obliterated on the ventral side. What the relationship of the two subsegments may be in the numerous other genera concerned, I have no direct knowledge, and this matter must await future treatment. *A priori,* however, it does not seem likely that the character will prove to be much more stable than other details of body form. For the present, I can find no justification either in gonopod configuration or external characters for the continued recognition of the names Cyclodesmidae and Desmonidae on either the family or subfamily level, although some groups of genera in the Sphaeriodesmidae may share enough characters in comon to be thought of as desmonid or cyclodesmid.

In its new and more inclusive sense, the family Sphaeriodesmidae comprehends some 16 genera (some of uncertain validity) restricted to America north of Panama. The largest genera tend to inhabit discrete regions, viz., *Sphaeriodesmus* in the Central American highlands, *Desmonus* in southern United States, and *Haplocyclodesmus* in the Greater Antilles.

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Figure 1. *Hybocestus octonodus,* n. sp., lateral aspect of head and first 9 body segments, the distension owing to maceration of the specimen in caustic which has also caused the head to be far more exposed than under normal conditions. Figure 2. The same, an enlarged drawing of a midbody segment seen in a slightly oblique cephalolateral aspect, to show microsculpture of the cleaned surface, and relationships of the paranotal tragus to the interzonal groove. Figure 3. The same, gonopods in cephalic aspect, showing relationship of coxites to the sternite; setae omitted from left gonopod. Figure 4. The same, left gonopod in mesial aspect. Figure 5. *Hybocestus plagiodon,* mesial aspect of left gonopod of holotype. Figures 3, 4, and 5 drawn to the same scale.

Vol. 72, pp. 183-188 November 4, 1959

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

FOUR NEW MAMMALS FROM THE NORTHERN TERRITORY OF AUSTRALIA

By David H. Johnson
United States National Museum

The following new kinds of placental mammals and a new species of the marsupial *Antechinus* described previously in these Proceedings (vol. 67, pp. 77-80, 1954) were discovered in studying the collections made by the American-Australian Scientific Expedition to Arnhem Land of 1948, which was sponsored jointly by the Commonwealth of Australia, the National Geographic Society, and the Smithsonian Institution. A general report on the mammals will be included in the "Records" of the Expedition, which are being published in Australia by the Melbourne University Press.

Capitalized color terms are from Ridgway, "Color Standards and Color Nomenclature," 1912. All measurements are in millimeters.

Order CHIROPTERA

Family HIPPOSIDERIDAE

Hipposideros bicolor gilberti, new subspecies

Type specimen.—U. S. National Museum, No. 284170; male adult, skin and skull; collected November 1, 1948, by D. H. Johnson (field no. 5936).

Type locality.—Oenpelli, East Alligator River, Northern Territory, Australia (lat. 12° 21′ S., long. 133° 04′ E.).

Diagnosis.—A small race of *Hipposideros bicolor*, paler in color than previously described eastern races of that species, in size about equal to *cineraceus* of Burma and *anticola* of the Philippine Islands, smaller than *albanensis* of the Cape York Peninsula and *saevus* of the Key Islands.

Description.—Hair bicolored as is characteristic of the species, but terminal darkened part reduced to less than one third of total length; basal part between white and Pale Smoke Gray, terminal part near Drab, but general dorsal color effect much lightened by paler basal color which shows through from all angles; breast and belly colored like back but fur much shorter; throat whitish, terminal darkening of hairs imperceptible. Nose leaves comparatively simple, squarish in outline, lacking secondary leaflets or club-shaped median projections; transverse process divided into four approximately equal cells by three vertical septa. Ears broad, rounded at tips, and with simple outer margins. Skull narrow and pointed; mastoid breadth exceeding zygomatic breadth; upper incisors and canines simple; small upper premolar with its outer edge aligned with outer margin of toothrow.

Measurements of type specimen.—Head and body 45 mm., tail 24, hind foot with claw 8, ear from notch 21, forearm 37, condylobasal length of skull 13.7, length of skull from condyle to canine (as used by Andersen, Ann. & Mag. Nat. Hist., ser. 9, vol. 2, p. 380, 1918) 13.4, zygomatic breadth 8.0, mastoid breadth 8.4, intertemporal constriction 2.1, upper toothrow C-M^3 5.3.

Specimens examined.—A total of seven: the type and three others from Oenpelli (USNM nos. 284167-70), and three including a nursing young from Douglas River, about 100 miles south of Darwin (USNM nos. 237956, 237961, 237964).

Remarks.—The species *Hipposideros bicolor* is represented by numerous subspecies over a wide area in southeastern Asia and the various island groups east to New Guinea. The only race previously recorded from the Australian mainland is the dark-colored *albanensis* of the Cape York Peninsula.

The specimens from Douglas River were collected by Charles M. Hoy in 1920 and have for many years been misidentified as *Hipposideros stenotis,* the only member of the genus previously known from the Northern Territory of Australia. They were mentioned under that name by Tate (Bull. Amer. Mus. Nat. Hist., vol. 78, p. 389, 1941). The small size, bicolored fur, great mastoid breadth, and absence of protuberances on the nose leaves clearly distinguish them from that species and ally them with *Hipposideros bicolor.*

The new subspecies is named in honor of John Gilbert, the English naturalist who in 1840 initiated the study of the mammals of the present Northern Territory by making extensive collections at Port Essington.

Family VESPERTILIONIDAE

Nyctophilus arnhemensis, new species

Type specimen.—U. S. National Museum, No. 28424~~9~~0; male adult, skin and skull, collected August 12, 1948, by D. H. Johnson (field no. 5692).

Type locality.—Rocky Bay, south of Yirrkala, Cape Arnhem Peninsula, Northern Territory, Australia (lat. 12° 16′ S., long. 136° 47′ E.).

Diagnosis.—A small *Nyctophilus* resembling *N. microtis* and *N. geoffroyi* in size; differing from the latter species in having smaller ears, less well developed nose leaves, and broader skull; larger throughout and with much larger ears than *N. walkeri.*

Description.—Color above between Snuff Brown and Tawny-Olive, beneath near Cinnamon-Buff. Posterior element of nose leaves little developed, Type 1 in the classification of Thomas (Ann. & Mag. Nat. Hist., ser. 8, vol. 15, pp. 493-494, 1915); ears moderate in size, smaller than those of *N. geoffroyi* and larger than those of *N. walkeri.* Skull, as compared with that of *N. geoffroyi,* short and broad; rostrum short, broad, and flat; frontal region rising abruptly from rostrum; braincase high and broad. Toothrows widely spaced; upper incisor slender; upper canine with well developed cingulum which is elevated on lingual side of tooth to form a distinct cusplet; third upper molar larger and more complex than in *M. geoffroyi,* metacone and mesostyle well developed, and posterior margin of tooth indented between parastyle and mesostyle (terminology of cusps following Miller, U. S. Nat. Mus. Bull. 57, pp. 30-31, 1907).

Measurements of type specimen.—Head and body 51 mm., tail 43, hind foot with claw 9, ear from notch 21, forearm 37, condylobasal length of skull 14.0, zygomatic breadth 10.0, intertemporal constriction 3.5, mastoid breadth 8.3, upper toothrow C-M^3 5.5.

Specimens examined.—A total of five: the type and two others from Rocky Bay, Cape Arnhem Peninsula (USNM Nos. 284240-42), one from Brocks Creek, about 100 miles south of Darwin (No. 237960), and one from Port Langdon, Groote Eylandt (No. 284239).

Remarks.—In size *Nyctophilus arnhemensis* is intermediate between the two species previously described from the Arnhem Land area: *N. daedalus* Thomas with forearm length 41 to 43 mm., and *N. walkeri* Thomas with forearm 33.5 mm. Thus it falls within the general size range of *N. geoffroyi,* which is widely distributed over more southern parts of Australia, but which differs in essential characters as described above. The resemblance to *N. microtis* of New Guinea is suggestive, and, when comparison of specimens can be made, *arnhemensis* may prove to be a paler subspecies of that generally dark-colored bat.

The single specimen from Groote Eylandt stands out from the others in having a more robust skull and a more flattened rostrum, thus carrying the differences that distinguish *N. arnhemensis* from *N. geoffroyi* to an extreme. In other characters it does not appear to differ from the mainland specimens of *arnhemensis.*

Family MOLOSSIDAE

Tadarida loriae cobourgiana, new subspecies

Type specimen.—U. S. National Museum, No. 284243; female adult, skin and skull; collected September 25, 1948, by D. H. Johnson (field no. 5846).

Type locality.—Black Rock Point (on north shore of Van Diemen Gulf, 15 miles southeast of Cape Don lighthouse), Cobourg Peninsula, Northern Territory, Australia (lat. 11° 26′ S., long. 131° 56′ E.).

Diagnosis.—A small molossid bat of the group that includes *Tadarida loriae* Thomas of eastern New Guinea and *Tadarida norfolkensis* Gray of southeastern Australia. Distinguished from *T. l. loriae* by dark rather than white underparts. Allied to *loriae* and distinguished from *norfolkensis* by unflattened skull and large lower premolar teeth.

Description.—Color of fur on back between Snuff Brown and Sayal Brown; individual hairs whitish at base and intermixed with scattered white hairs; belly slightly paler than back, hairs paler at tips; throat approaching Pinkish Buff; small patch below ear nearly white. Color of skin on face, ears, wing and tail membranes, and feet brown; posterior border of wing membrane narrowly edged with white from third finger to tarsus. Bristly hairs on outer margins of first and fifth toes appearing whitish in contrast to dark-colored feet.

Skull (occipital region missing) slightly smaller than in *Tadarida loriae,* larger and less flattened than in *T. norfolkensis.* Dorsal profile nearly straight; sagittal crest barely perceptible in parietal region, rising abruptly at point of junction with lambdoidal crests to form a low supraoccipital protuberance. Crowns of upper canine and posterior premolar teeth almost in contact, their outer margins forming an angular recess occupied by anterior premolar; anterior lower premolar similar in shape to, and only slightly smaller than, posterior lower premolar; two pairs of lower incisors.

Measurements.—Type specimen (followed in parentheses by measurements of a female paratype of *T. loriae* from Papua, USNM No. 142550, in alcohol): Head and body 53 (53); tail 36 (28); hind foot with claw 8.5 (8); ear from notch 14 (13); forearm 34 (33); length of skull from anteriormost projections of premaxillaries to summit of supraoccipital protuberance 14.7 (14.9); length of palate in midline 5.9 (6.3); breadth across maxillary protuberances, above M^1, 6.4 (6.4); intertemporal breadth 3.8 (4.0); upper toothrow, C-M^3, 6.0 (6.2); lower toothrow, C-M_3, 6.4 (6.7).

Remarks.—*Tadarida loriae cobourgiana* is known only from the type specimen. The dark wings and underparts readily distinguish it from *T. l. loriae,* in which those parts are white. Cranial characters, especially the large and relatively unflattened skull and the large size of the anterior lower premolar, ally *cobourgiana* with *loriae* rather than with *norfolkensis.* The three specimens from Helenvale, Queensland, referred by Tate (Bull. Amer. Mus. Nat. Hist., vol. 98, p. 604; 1952) to *T. l. loriae* are appreciably darker in dorsal color than the type of *cobourgiana.* In color of the upper parts, but not in other characters, *cobourgiana* is intermediate between *loriae* and *norfolkensis.*

All the small Australasian bats of this group may eventually be shown to represent a single species, a possibility that has been anticipated by Laurie and Hill (List of Land Mammals of New Guinea . . . , p. 63, 1954) in their treatment of the Papuan form, but the material now available is divisible into distinct northern and southern types which have not been shown to intergrade.

Order RODENTIA

Family MURIDAE

Notomys carpentarius, new species

Type specimen.—U. S. National Museum, No. 284353; female adult, skin and skull; collected June 8, 1948, by D. H. Johnson (field no. 5525).

Type locality.—Umbakumba, Port Langdon, northeastern corner of Groote Eylandt, Northern Territory, Australia (lat. 13° 51′ S., long. 136° 45′ E.).

Diagnosis.—A medium-sized, pale-colored *Notomys* with opisthodont incisors and a well defined glandular throat patch; resembling *N. alexis* but with longer hind feet, longer tail, pure white rather than gray-based underparts, narrower skull, longer nasals, and larger molar teeth.

Description.—Color above Light Ochraceous-Buff, more or less darkened by blackish hair tips, approaching Clay Color in midback; underparts white, hairs white to base except toward flanks where they are gray-based; face paler than back; tail sparsely haired and weakly bicolored for most of its length, pencilled and more distinctly bicolored at tip; glandular area on throat well marked in both sexes, more extensive in males than in females. Skull with narrow braincase and broad frontal region; nasals long, extending well beyond incisors.

Measurements of type specimen.—Head and body 112 mm., tail 173, hind foot with claw 139, ear from notch 20; greatest length of skull 31.3, condylobasal length 27.6, anterior zygomatic breadth 16.1, posterior zygomatic breadth 15.1, interorbital breadth 5.5, breadth of braincase above auditory meati 12.3, depth of braincase 9.9, length of nasals 12.0, length of anterior palatine foramina 6.0, length of upper molar row 5.9.

Speciments examined.—A total of thirteen from the type locality (USNM Nos. 284350-62).

Remarks.—Hopping mice of the genus *Notomys* are desert animals characteristic of the arid interior of Australia. Their presence on the comparatively humid Groote Eylandt in the Gulf of Carpentaria was quite unsuspected until these specimens were collected. A suitable habitat for this sand-loving rodent is provided by extensive dunes and sandy flats that cover most of the northeastern part of the island.

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PROCEEDINGS
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PROCEEDINGS

The two meetings during 1960 were held in Room 43 of the United States National Museum.

1029th Meeting — 16 June 1960

EIGHTY-FIRST ANNUAL MEETING

President Owens in the chair; 26 members present.

The following officers and members of the council were elected: President, David H. Johnson; Vice Presidents, A. C. Smith, C. F. W. Muesebeck, Allen Duvall, Henry W. Setzer; Corresponding Secretary, John L. Paradiso; Recording Secretary, John L. Paradiso; Treasurer, John W. Armstrong; Council, C. O. Handley, Jr., J. P. E. Morrison, L. M. Russell, V. S. Schantz.

Formal Communication: Mr. Leonard M. Llewellyn, Patuxent Wildlife Research Center: The mammal fauna of the Patuxent Wildlife Research Center.

1030th Meeting — 20 October 1960

President Johnson in the chair; 21 members present.

Formal Communication: Dr. Joseph Curtis Moore, Research Associate, American Museum of Natural History: Stream piracy and the distribution of squirrels in the Indo-Chinese area.

Vol. 73, pp. xi–xvi 10 August 1960

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

SUGGESTIONS TO AUTHORS CONTRIBUTING TO THE PROCEEDINGS OF THE BIOLOGICAL SOCIETY OF WASHINGTON

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Typing and Style: Manuscript should be typed double spaced on one side of standard (8½ × 11 inches) or government (8 × 10½ inches) size paper, leaving margins of at least one inch all around. One carbon copy should be submitted with the original of each manuscript, and it is suggested that the author also retain a carbon copy.

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The scientific names of genera and lower categories, nothing else, should be underlined to indicate *italic* type.

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References in the text should be cited by author, with date and page in parentheses, as follows: Linnaeus (1758:306). For papers by one author in the same year, use letters following the date, as follows: Jones (1929b:422).

In matters of style the Proceedings of the Biological Society of Washington will follow as closely as possible the standards set forth in the Style Manual for Biological Journals, to be published during 1960 by the American Institute of Biological Sciences. Information regarding this manual may be obtained from the Editor. The Society also recommends the use of the following basic works in settling questions of style:

SPELLING: Webster's New International Dictionary of the English Language (Unabridged).

PUNCTUATION, ETC.: United States Government Printing Office Style Manual.

A Manual of Style. The University of Chicago Press.

WRITING: Fowler, H. W. A Dictionary of Modern English Usage. Oxford Univ. Press.

Strunk, William. The Elements of Style. Macmillan Company.

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"A new copepod, *Pseudanthessius latus* (Cyclopoida: Lichomolgidae) commensal with a marine flatworm."

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Vol. 73, pp. 1–4 10 August 1960

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SUBSPECIES OF FURNARIIDAE FROM VENEZUELA AND EXTENSIONS OF RANGES

By William H. Phelps and William H. Phelps, Jr.

We wish to thank the Curators of the American Museum of Natural History for access to their collections during this research. Specimens listed are in the Phelps Collection, Caracas, unless otherwise specified. Names of colors are capitalized when direct comparison has been made with Ridgway's "Color Standards and Color Nomenclature," 1912. Wing measurements are of the chord.

Hyloctistes subulatus lemae, new subspecies

Type: From Sierra de Lema, Gran Sabana, Bolívar, Venezuela; 1,000 meters. No. 64720-D, Phelps Collection, Caracas. Adult male, collected 12 February 1959, by Ramón Urbano. (Type on deposit at the American Museum of Natural History.)

Diagnosis: Nearest to *H. s. subulatus* (Spix) of southwestern Venezuela to Perú but differs from all subspecies by more olivaceous, less brownish breast and abdomen and by a darker back, also more olivaceous, less brownish; from *H. s. subulatus* it differs additionally by olivaceous instead of brownish sides, flanks and thighs, by more olivaceous, less brownish, striping of under parts and by more yellowish, less buffy chin.

Range: Known from the type locality in the upper Tropical Zone forest at kilometer 125 on the road from El Dorado on the Cuyuni River to the plateau of the Gran Sabana.

Description of Type: Top of head and neck dusky, the feathers with fine buffy olivaceous shaft streaks, giving a lined appearance; back Prout's Brown, feathers of mantle with very faint buffy shaft steaks; uropygium Sanford's Brown; lores dusky; ear-coverts dusky, faintly lined with buffy. Chin immaculate Pale Ochraceous-Buff X Light Ochraceous-Buff merging into the Warm Buff of lower throat and breast which are widely streaked with Dresden Brown, this merging into the Warm Buff of abdomen; sides and flanks Dresden Brown, under tail-coverts more rufous. Wings Antique Brown; inner webs of remiges Benzo Brown basally margined with Onion-skin Pink, more extensively internally; shafts of remiges dark brown above, yellowish white below; under wing-coverts and axillaries Apricot Buff. Upper surface of tail Mahogany Red, lower surface paler; shafts of tail feathers dark brown above, buffy below.

Bill (in life) "black, base greenish"; feet "greenish"; iris "brown." Wing, 81 mm; tail, 69; exposed culmen, 19.5; culmen from base, 23; tarsus, 20.

Remarks: Sexes alike. Size similar to *H. s. subulatus.* Range of measurements (including type): two adult males—wing, 79.2 mm; tail, 69; culmen from base, 22; two adult females—wing, 76; tail, 67.5; culmen from base, 22.7. Measurements of *H. s. subulatus* from Ecuador: five adult males—wing, 82; tail, 63; culmen from base, 23.2; five adult females—wing, 77.4; tail, 62.8; culmen from base, 22.8.

Specimens Examined

H. s. virgatus.—COSTA RICA—var. locs. 8.[1] PANAMÁ—9.[2]

H. s. assimilis.—PANAMÁ—2.[2] COLOMBIA—11.[2] ECUADOR[1]—Chimbo, 1 ♂; Paramba, 1 ♂; Río de Oro, 1 ♀; Cochyacu, 1 ♀; Cachabí, 1 ♂, 1 ♀; Lita, 1 ♂; Coca, Río Napo, 1 ♂.

H. s. subulatus.—COLOMBIA[1]—Florencia, 1 ♀; "Colombia," 1 ♂; Río Duda, Mt. Macarena, 1 ♂. ECUADOR—Vico, Río Curaray, 1 ♂[1]; Cucutú, Oriente, 1 ♀[1]; var. locs., 16.[2] PERU—3.[2] BRAZIL[1]—Calamá, Rio Madeira, 1 (?); Tatú, Rio Negro, 1 (?). VENEZUELA— Alto Río Asisa, Terr. Amazonas, 2 ♂; Kabadisocaña, Alto Río Ventuari, 1 ♂; Sarariña, Alto Caura, Bolívar, 1 ♀; Sabana Canaracuni, 1 (?); Caño Tonoro, Río Paragua, 1 (?); Salto María Espuma, 1 ♀; Caño Seco, Duida, 1 ♂[1]; Caño Desecho, 1 ♂.[1]

H. s. lemae.—VENEZUELA—Sierra de Lema, Gran Sabana, Bolívar, 2 ♂, 2 ♀.

Tyranniscus uropygialis (Lawrence)

Mecocerculus uropygialis Lawrence, Ann. Lyc. Nat. Hist. New York, 9, p. 266, 1870. ("Ecuador.")

2 (?), Páramo La Negra, Mérida; 3,100 meters. Collected 2 Nov. 1958.

These specimens extend the range of the species to Venezuela from southern Colombia (Cundinamarca, Cauca and Nariño); de Schauensee, 1950:864,[3] lists only subtropical localities in Colombia but Hellmayr, 1927:v–469,[4] lists 10,000 feet in Bolivia.

Phrygilus unicolor geospizopsis (Bonaparte)

Passericulus geospizopsis Bonaparte, Comp. Rend. Acad. Sci. Paris, 37, No. 25, p. 921, 1853. ("Bogotá.")

1 ♂, 1 ♀, Páramo de Tamá, Táchira; 3,275 meters. Collected 28 February 1941.

These specimens constitute an extension of range of the subspecies to Venezuela from the Páramo Zones of Colombia.

The wing lengths of these specimens are: ♂, 90 mm; ♀, 84 mm. The wing lengths of specimens in our collection of *P. u. nivarius* (Bangs) from localities between Páramo La Negra, Mérida and Páramo El Cendé, Trujillo, are: 26 ♂, 76.5 mm—83 (80.4). de Schauensee, 1951:1098, gives wing lengths of *geospizopsis* from Colombia as: 13 ♂, 88–100 (92.2).

Many of the subspecies from the Páramo de Tamá massif correspond to those of the Bogotá Region and not to those of the Mérida Region. There is no tropical interruption in the connecting Eastern Andes between Bogotá and the Páramo de Tamá while there is an upper tropical depression across the State of Táchira from San Cristobal to San Antonio separating the Tamá massif from the Cordillera de los Andes (Mérida Region).

[1] Specimens in American Museum of Natural History.

[2] *Idem.* For localities see Zimmer, Amer. Mus. Nov., No. 862, p. 10, 1936.

[3] Birds of the Republic of Colombia.

[4] Birds of the Americas, etc.

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STUDIES ON SPIROBOLOID MILLIPEDS. V. THE CORRECT IDENTITY OF THE GENUS RHINOCRICUS, BASED UPON A STUDY OF ITS TYPE SPECIES[1]

By Richard L. Hoffman
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The great assemblage of spiroboloid millipeds which has been going under the name *Rhinocricus* has become, in the sense of current usage, the largest genus in the order Spirobolida (if not in the entire class Diplopoda) despite the periodic removal of small groups of its species under new generic names. Most rhinocricids adhere closely to a basic configuration of the male genitalia, while differing considerably in details of external body form, so that there has been little agreement among students of the group concerning either generic or specific definitions. This difficult situation is complicated by the fact that the gonopods of the type species of *Rhinocricus* have never been described. From 1894 to the present time, the genus has been defined inferentially by the characters of species only *presumed* to be congeneric with the true type!

The name *Rhinocricus* was first published by Ferdinand Karsch in 1881 as a subgeneric name under *Spirobolus,* and included 17 species none of which was designated as the type of the subgenus. In 1894, R. I. Pocock elevated *Rhinocricus* to the rank of genus, and properly selected as its type the species which Karsch described as S. *(R.) parcus* from specimens collected by Krug in Puerto Rico. Unfortunately, Pocock chose a form of which he had seen no specimens, and which was inadequately described to begin with. However, since most of the West Indian species of large spiroboloids were strictly congeneric, insofar as Pocock's generic concept was concerned, he

[1] This study was carried out with the assistance of a grant from the National Science Foundation.

assumed that *parcus* would likewise prove to represent the same genus.

With the subsequent refinement of generic and specific limits by Pocock's successors, however, it became evident that most of the older diplopod genera (including *Rhinocricus*) desirably should be fragmented into numerous smaller and more homogeneous groups the definition thereof depending chiefly upon the structure of the male genitalia. Down to the present, about 30 generic names have been proposed for various groups of rhinocricids, including a considerable number for West Indian forms. These names, unfortunately, have without exception been thrust into the literature solely upon the naive and myopic assumption that Pocock's original surmise about the identity of *R. parcus* was correct. This is unseemly. If we discard old ideas about generic limits we must in consistency hold in suspicion the old inferences about identities as well. It is most curious that Pocock did not take the trouble to borrow Karsch's type specimens, a precaution apparently disregarded by all subsequent workers, insofar as I can determine. Count Attems found a much easier, if unorthodox, way around the difficulty: in 1914 he merely stated that *Rhinocricus beauforti* Attems (which at that time had not even been described!) was the type species of *Rhinocricus* in the strict sense.

It can be appreciated that as things still stand, the family Rhinocricidae has had all the nomenclatorial stability of a house of cards, and that eventually something would have to be done about the identity of the true type species of the typical genus. The matter was nearly solved in 1941 when H. F. Loomis reported the collection of *R. parcus* (the identification almost certainly correct) in Puerto Rico by Dr. P. J. Darlington. Unfortunately no males were taken; Loomis could only note details of body form and sculpture, but his account is the only published record of the species since the time of its description.

In face of the probability that the original types of *R. parcus* are now either lost or destroyed, the eventual resolution of the problem has seemed to depend upon the collection of topotypical specimens from Puerto Rico. Fortunately, however, this requirement was recently obviated, and dispatch of the *Rhinocricus* question greatly accelerated, by a series of events including the following: (1) following the death of Dr. O. F.

Cook in 1949 a considerable quantity of his myriapod collection was returned to the U. S. National Museum, (2) the efforts of curator Ralph E. Crabill have resulted in reconditioning and assembling for the first time all of the Museum's extensive holdings in myriapod groups, and (3) the present writer was enabled to devote abundant time and effort to the examination of said material. During this activity two very interesting items were found: a microscopic slide mount of one of the posterior gonopods of the male cotype of *R. parcus,* and a jar containing several collections of a rhinocricid from Puerto Rico which agrees in every detail with the aforesaid slide mount. As there can be no doubt that these specimens are strictly conspecific with the cotypes of *Rhinocricus parcus,* it is now possible to establish the characters of the genus.

Unfortunately, *Rhinocricus parcus* is clearly not congeneric with the great majority of American species which have traditionally been included in *Rhinocricus.* These species will have to be covered with another (or several more) generic name, but since there is now some dissention about the definition of genera in the Rhinocricidae, this matter may be deferred for future settlement. *Rhinocricus* in the current usage is undoubtedly heterogeneous, but I do not think that arbitrary groupings on the basis of scobinae and antennal sensory cones will provide a natural generic system. A certain number of groups of American rhinocricids have been set off as genera on the basis of well-marked characters of the gonopods; these include *Cubocricus, Nesobolus,* and *Neocricus,* for instance. Some others appear to be fairly well defined by non-sexual developments, such as the species of *Thyroproctus* and *Oxypyge.* Remaining is a great residue of species with basically similar gonopods, the posterior pair of which (the phallopods) terminate in a larger, hyaline, laminate blade, and a much smaller, more falciform branch from about the midlength of the telopodite. This configuration is the common denominator for a large number of species of most variable size, shape, and external structure which have generally been considered as "*Rhinocricus*" by virtually all workers. The presence or absence of scobinae, number of antennal sensory cones, and production of the epiproct into a caudal projection have all been used both singly and in combinations to define various "genera," but it is my conviction that such characters cut across genera based upon gonopod structure, and are at best of specific value. Obviously, most of the numerous American species described in *Rhinocricus* (as well as the several artificial satellite genera) will have to be carefully restudied, particularly with reference to the normally concealed internal parts of the gonopods, before a rational generic classification can be achieved. In recent years the present writer has suggested a redefinition of *Eurhinocricus* on the basis of gonopod structure instead of external characters, but even this does not result in a clearly distinct group of species.

At the present, however, there seems to be no question about the distinctness of the group of species having a simple, falciform phallopod, which was designated as *Cubocricus* in 1922 by R. V. Chamberlin, and to which *R. parcus* clearly is referable. The restriction of *Rhinocricus* to this ensemble throws open the problem of which of the numerous existing generic names are to be used for the redefined American genera. This matter will be simplified somewhat by the compilation of spiroboloid generic names (now in press) prepared by Dr. Keeton and me, but it may be mentioned in passing that the second oldest available name (discounting both *Oxypyge* and *Thyroproctus*) for consideration—*Anadenobolus* Silvestri—poses a serious difficulty. It was based upon *Spirobolus politus* Porat (1888) from Antigua, a species first referred to *Rhinocricus* by Pocock in 1894. Porat's types were females, and insofar as I know, topotypical males remain to be secured. Until this be done, *Anadenobolus* will remain an outstanding hazard to further nomenclatorial stability in the family.

Genus *Rhinocricus* Karsch

Rhinocricus Karsch, 1881, Zeitschr. Naturwiss., 54: 68 (as subgenus of *Spirobolus*).—Pocock, 1894, J. Linnean Soc. London (Zool.), 24: 485.

Cubocricus Chamberlin, 1922, Proc. U. S. Nat. Mus., 61(10): 5 (orthotype: *Rhinocricus suprenans* Chamberlin, 1918). NEW SYNONYMY.

Type species: Spirobolus (*Rhinocricus*) *parcus* Karsch, 1881, by subsequent designation of Pocock, 1894.

Diagnosis: Medium to large rhinocricids characterized by the form of the male gonopods: coleopods typical in form for the family but with deep cavities between coxae and sternite on the anterior side; phallopods with the telopodite slender, unbranched, and falciform. In the known species antennal sensory cones are numerous and ventral tarsal pads are present in males on at least the anterior legs.

Range: Cuba and Puerto Rico [Hispaniola?].

Species: Four are definitely known. In addition, Loomis (1936) considered *Julus haitiensis* Gervais to be congeneric with the Cuban species, although this allocation will have to be verified. The discovery of species of *Rhinocricus* in Hispaniola is anticipated.

Remarks: The remarkable similarity of the Antillean genus *Rhinocricus* to *Acladocricus* of the East Indian region cannot be overlooked. I have had no species of the latter genus for study, but literature descriptions indicate virtual concordance in gonopod structure with typical species of *Rhinocricus,* and if future comparison of specimens can reveal no differences, *Acladocricus* (Brolemann, 1913) will fall as a junior subjective synonym of *Rhinocricus.* The resulting generic discontinuity finds a parallel, among diplopods, at least in the archaic genus *Glomeridesmus,* and numerous families are now largely restricted in their distribution to the two Indies.

In addition to a redescription of *R. parcus,* I include here a roster of its congeners with literature references and some descriptive notes, which should for the present obviate the preparation of a key. As the gonopods are quite similar in all of the known species, specific characters must be drawn largely from details of body form.

Rhinocricus parcus Karsch
Figs. 1–4

Spirobolus (*Rhinocricus*) *parcus* Karsch, 1881, Zeitschr. Naturwiss., 54: 68.

Rhinocricus parcus Pocock, 1894, J. Linnean Soc. London (Zool.), 24: 485.—Loomis, 1941, Bull. Mus. Comp. Zool., 88: 38, fig. 11.

Type specimens: Cotypes, a male and female, collected by Krug in Puerto Rico, originally in the Berlin Museum (present condition unknown). One phallopod and the first legpair of the male in the U. S. Nat. Mus., Diplopod Type slides 1 and 2.

Diagnosis: A small member of the genus with large, deep scobinae on segments 8–12 and with prominent tarsal pads on all legs of the males.

Descriptive notes (adult male from Aguirre): A robust, stout-bodied spiroboloid, length ca. 85 mm, greatest diameter, 10.5 mm. Color largely faded from long preservation. Body with 43 segments.

Head small, moderately convex, smooth and polished; vertigial and clypeal sutures very short and indistinct, latter detectable nearly to level of antennal sockets. Labrum distinct, recessed below level of clypeus, with three distinct labral teeth all of equal length but the median somewhat the largest. Labral setae 10-10, stout, decurved; clypeal setal foveolae 2-2, the four pits set exactly equidistant from each other. Genae very slightly depressed below antennae, the ventral half of the edges round and immarginate but dorsal half set off by a fine marginal groove. Parietal sclerite distinct, with the shape of an elongate right triangle, its lateral

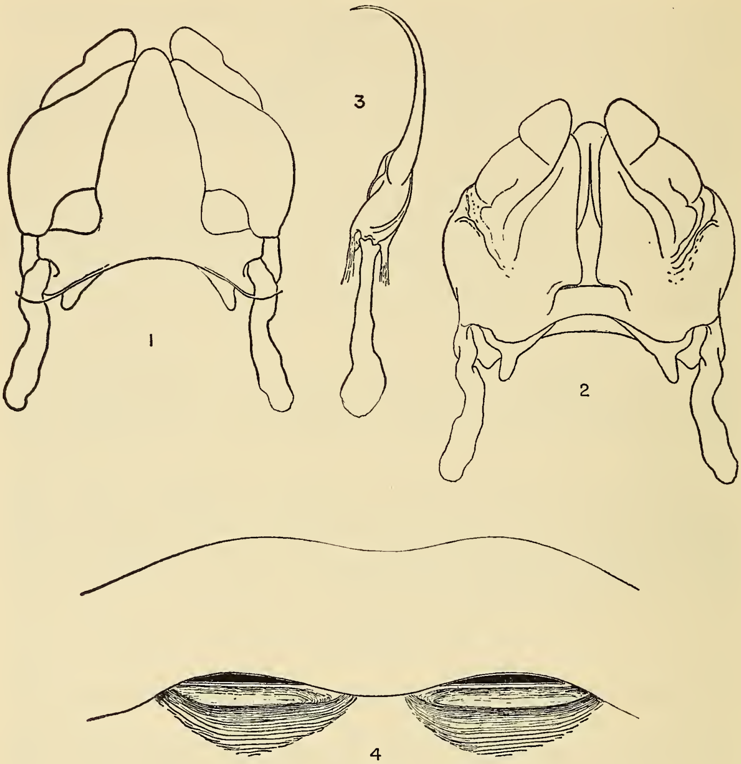

Fig. 1–4

edge set off by a broad elevated margin, the plate otherwise smooth and flat, continuing slope of the head. Ocellaria small and ovoid, about the size of an antennal socket, separated by a distance about 4 times an ocellarian diameter; each with 24 ocelli in 6 rows, those of the ventralmost row largest.

Antennae of moderate length, attaining base of 3rd segment when appressed caudally; antennal articles generally subequal in size except the 2nd, longest, and 6th, widest; the three basal articles glabrous, the four distal becoming increasingly setose; 7th article short, broad, and flattened, with about 20 sensory cones.

Collum broad, smooth, symmetrical, the anterior lateral marginal groove indistinct and short, not extending up as far as edge of the parietal sclerite. Pleurotergite of 2nd segment produced cephaloventrad below ends of collum, this portion with a few indistinct grooves.

Prozonites of most body segments with a few fine transverse striae on the anterior half; mesozonites and metazonites smooth, but the former with a distinct median suture across the dorsum between the lateral longitudinal sutures. Ozopores large and distinct, located in the mesozonites considerably below the level of the lateral sutures (as shown in Fig. 11 of the 1941 paper by Loomis), the peritreme smooth and polished, very slightly elevated.

Scobinae (Fig. 4) very large and transverse, occurring on segments 8–13, with the posterior edge of the preceding segments slightly concave in front of each scobina.

Pleurites and lower parts of mesozonites and metazonites with very fine striae, these turning dorsad and merging with the transverse striae of the prozonite. Pleurites about two-thirds as wide as long, flat except for the distinctly depressed caudal third. Sternites flat, with about 10–12 distinct transverse striae; stigmata smooth and polished, the stigmal opening longitudinally ellipsoid, each located in a circular depression confined entirely to the sternum.

Legs very short, not attaining level of sides of body when extended and thus invisible in dorsal aspect, the joints smooth and polished, ventral setae 1-1-1-1-1-2, pretarsus small, but slender and acute, with a large dorsal tarsal macroseta near its base. All tarsi with large and conspicuous ventral pads, also the ventral surface of the prefemora calloused and semimembranous. Legs in front of gonopods without any sort of modifications.

Body tapering gradually over the last 15 segments, the two or three segments in front of the anal ring somewhat smaller in proportion and slightly telescoped. Anal segment smooth, with a broad, bluntly triangular epiproct which does not cover more than basal half of the paraprocts. Latter large, only slightly convex, and with distinctly enlarged but not basally margined free edges. Hypoproct large, distinct, its free edge semicircular, extending laterally as far as ends of the femora of the last legpair.

Sympleurite of 7th segment narrow, simple, slightly elevated; with a trace of the median suture evident. Gonopods large, of the form shown in Figs. 1–3. Sternite of coleopods transverse and slightly arched, with a large triangular median projection as typical for the family, slightly surpassing apices of coxae but shorter than tips of telopodites. In anterior aspect, a deep, semicircular depression occurs on each side between sternite and base of coxae. Sternal apodeme of moderate length, slender, a little sinuous. Coxal apodeme short, bluntly acuminate, its base concealed by a small lobe of the coxal posterior edge. A distinct, darkly pigmented median piece separates the bases of the coxae. Telopodite of moderate size, vaguely articulated to the coxa, its distal reflexed lobe only slightly set off by a shallow groove. Phallopods completely separate, not completely concealed within the gonocoel of the coleopods, the apodeme slender at the base and abruptly enlarged and spatulate distally. Coxal portion of phallopod slender, flattened, showing some traces of torsion, merging evenly into the very slender, unbranched, falcate telopodite blade, the latter with the usual small basal enlargement of the seminal groove. In situ, the distal half of the telopodite projects beyond the apices of the coleopod.

Material examined: PUERTO RICO: Aguirre, 2♂♂, 2♀♀, June 1901;

Aibonito, 1 ♂, 28 June 1901; between Yauco and Guayanilla, 2♀♀, July 1901. All collections by O. F. Cook.

Variation: Meristic data were taken from the five mature specimens from Aguirre and Aibonito, 3♂♂ and 2♀♀. This small series shows considerable homogeneity and no evident sexual dimorphism. Length ranges from 70 to 90 mm (average 82 mm), diameter from 7.5 to 11.5 mm (10.1 mm); segments 43, 43, 43, 44, 45 (43.6); ocelli 24 to 30 (26.3) on each side; labral setae 16 to 22 (18.4). Scobinae occur on segments 8–12 in all except the described male, where they occur on segment 13 as well.

The cotypes measured 80 mm (♀) and 115 mm (♂) in length, both had 43 segments, and scobinae on segments 8–12. Loomis's female was 64 mm long, 9 mm in diameter, with 44 segments. Apparently the species is not a variable one.

Distribution: The specimens obtained by Dr. Cook originated from three localities on the southern half of Puerto Rico. The specimen taken by Darlington in June 1938 came from the Maricao Forest in the southwestern portion of the island, and it may be found that the species is restricted to the Cordillera Central and its southern foothills.

Rhinocricus duvernoyi Karsch

Spirobolus (*Rhinocricus*) *duvernoyi* Karsch, 1881, Zeitschr. Naturwiss., 54: 77.

Rhinocricus duvernoyi Pocock, 1894, J. Linnean Soc. London (Zool.), 24: 496—Chamberlin, 1918, Bull. Mus. Comp. Zool., 62: 193.

Cubocricus duvernoyi Chamberlin, 1922, Proc. U. S. Nat. Mus., 61(10): 5.

Type specimen: Female, originally in the Berlin Museum (present status unknown), collected by Otto in Cuba.

Remarks: The characters of this species are difficult to make out from the original description which provides little more than generic details. Scobinae are said to extend from the 8th to 20th segment, segment number is 50, and the length 135 mm. Chamberlin (1918) associated the name with specimens from three localities in Cuba, representing a species having 49 to 53 segments and all but the most caudal legs of the males with tarsal pads.

Chamberlin's material came from Santiago de las Vegas and Guanajay, Pinar del Rio Province, and Guantanamo, in Oriente. One is inclined to wonder if perhaps the last record might not be mislabeled or otherwise spurious.

Rhinocricus suprenans Chamberlin

Rhinocricus suprenans Chamberlin, 1918, Bull. Mus. Comp. Zool., 62: 193.

Cubocricus suprenans Chamberlin, 1922, Proc. U. S. Nat. Mus., 61(10): 5.—Loomis, 1938, Bull. Mus. Comp. Zool., 82: 450.

Type specimen: Male, Mus. Comp. Zool., collected at Baracoa, Oriente Prov., Cuba, by W. O. Crosby.

Remarks: This form was separated from *duvernoyi* chiefly on the basis of color differences and less distinct segmental sulci. A perhaps more tangible difference obtains in the tarsal pads of males, said to extend nearly to the last segments in *duvernoyi* but restricted to the anteriormost legs of *suprenans*. The difference in segment number (46–47 vs. 49–53) is not sufficiently documented by counts from series.

R. suprenans is apparently easily separated from *R. maximus* by the considerably greater segment number, 51–56, of the latter, as well as by details of the gonopods. The other differences cited by Loomis (size, color, form of the collum) are probably not reliable, however. A previously unnoticed distinction lies in leg size: the legs extend beyond the body in *suprenans* but are not visible from above in *maximus*.

Loomis reported numerous specimens of *suprenans* collected by P. J. Darlington in three localities in Oriente Province, Cuba, to which the form may be restricted.

I have examined topotypes of the species in the U. S. National Museum collections.

Rhinocricus maximus maximus (Loomis), new status and new combination

Cubocricus maximus Loomis, 1933, Bull. Mus. Comp. Zool., 75: 358, Figs. 5, 6; 1938, idem, 82: 450.

Type specimen: Male, Mus. Comp. Zool., collected at Central Jaronu, Camaguey Prov., Cuba, by L. D. Christianson, June 1931.

Remarks: The trinomial combination is adopted here to put the typical population of *maximus* on an equivalent standing with the "variety" *bartschi* of Loomis, probably a valid subspecies.

Loomis (1938) has discussed variation in a series of specimens taken in the Cubitas Forest, also in Camaguey Province. These two records suggest that perhaps the Cuban species of *Rhinocricus* are geographically vicarious, with *suprenans* occurring in the mountains of Oriente, *maximus maximus* in the central lowlands, *maximus bartschi* on the Isle of Pines, and *duvernoyi* in Pinar del Rio. Naturally, a large number of additional samples will have to be forthcoming before the status of these large millipeds can be worked out. In addition to the various characters cited (segment number, tarsal pads), an additional one may be mentioned for the attention of future workers: this is the shape and sculpture of the parietal sclerite which seems to be distinctive for each of the forms which I have examined (*parcus, suprenans,* and *m. bartschi*).

I have seen the long type series of *bartschi* collected on the Isle of Pines in April 1937 by Paul Bartsch, the form appearing to be only partially differentiated from the mainland population of *maximus*.

Rhinocricus maximus bartschi (Loomis), new combination

Cubocricus maximus bartschi Loomis, 1938, Bull. Mus. Comp. Zool., 82: 451.

Type specimen: Male, U. S. Nat. Mus. Myriapod Type No. 2364, collected in the Sierra de Casas, Isle of Pines, Cuba, by Paul Bartsch, 14 April 1937.

Loomis has discussed the characters and variation of this subspecies in the original description. The segment count is rather uniform, 50 to

53, but the length of adult specimens varies from 95 to 165 mm, a remarkable range!

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Explanation of Figures

Figs. 1–4. *Rhinocricus parcus* Karsch, specimen from Aguirre, Puerto Rico, all figures to same scale. 1. Anterior aspect of coleopods; 2. Posterior aspect of coleopods; 3. Posterior aspect of right phallopod; 4. Scobinae of 10th segment, the posterior edge of segment 9 pulled forward slightly.

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NOTES ON A SMALL COLLECTION OF LIPARID FISHES FROM THE YELLOW SEA

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Through the courtesy of Mr. Merrill Newman, I have had at my disposal several liparid fishes collected by him in May of 1953 on the west coast of Korea. The specimens herein reported were trawled at a depth of five to eight fathoms off Chodo Island, approximately 38° 30′ N. latitude, 124° 15′ E. longitude. The material has been deposited in the Natural History Museum of Stanford University.

The purposes of this paper are four: 1. Describe an apparently unknown form. 2. Give a second record of *Liparis choanus* and extend its known range to the eastern shores of the Yellow Sea. 3. Describe the only known male of *L. choanus*. 4. Confirm the observations of Abe (1950, 1955) that some species of *Liparis* lack posterior nostrils.

Counts on vertebrae, dorsal fin rays and anal fin rays have been taken from X-rays.

Liparis newmani new species

Holotype: S.U. 53270, 55.6 mm in standard length.

Diagnosis: A *Liparis* with two nostrils, the dorsal and anal connected to the caudal, the dorsal lacking a notch, the pectoral with a notch, the gill slit extending down in front of seven pectoral rays and with a greater number of pectoral rays than dorsal rays.

Counts and measurements: Measurements in millimeters first, followed by percent of standard length in parentheses. Greatest body depth 12.4 (21.4); width of body at level of anal fin origin 6.5 (8.9); greatest head width 14.5 (25.0); head length 16.6 (28.6); eye 2.8 (4.8); snout length 7.0 (12.1); disc length 6.5 (8.6); disc width 5.0 (9.0); interorbital 7.9 (14.2); gill slit 4.8 (7.2); posterior edge of disc to vent 6.4 (11.5); snout to posterior tip of pectoral fin 27.0 (48.6); dorsal 42; anal 35; pectoral 46, counted on the right fin; vertebrae 45, not including urostyle; branchiosetgals 6.

Description: A slender fish with the greatest body depth immediately behind the head, 4.5 in standard length. Body compressed, deeper than wide, even at the widest point behind the head. Viewed from above or below, body tadpole-shaped, broad anteriorly, strongly compressed behind the level of the anal fin origin. Skin smooth, lacking prickles.

Dorsal fin origin a short distance behind a vertical from the posterior edge of the opercle. Dorsal fin not notched. Dorsal and anal fins connected with the caudal fin to about the middle of the caudal fin length. Distance from vent to origin of anal fin 4.9 in head. Pectoral fin notched, fifteenth ray from the bottom at the apex of the notch. The disc is longer than it is broad. Caudal fin rounded.

The head is broader than it is deep in the opercular region. Viewed dorsally it curves to the broadly-rounded snout. Viewed laterally the tip of the snout is a blunt, almost vertical area. Eye relatively large, 5.9 in head, with a rounded pupil. Nostrils paired, the anterior tubular, the posterior a raised pore. The distance between the two nostrils is equal to the vertical diameter of the eye. The posterior nostril is in line with a vertical from the anterior margin of the eye.

Premaxillary with six to eight oblique rows of tricuspid teeth which are progressively larger towards the posterior margin of the bone. Dentary with about six oblique rows of tricuspid teeth arranged as in the upper jaw. Each pharyngeal carries a broad pad of pointed teeth which oppose smaller but similar pads in the floor of the mouth. The gill rakers are modified into small dentigerous knobs. Gill opening moderate, 3.5 in head, extending down to level of seventh pectoral ray.

Body and head reddish-brown, skin fairly transparent, with many small, brown chromatophores. Pigment cells unevenly distributed on dorsal and anal fins giving them a variegated appearance. Two narrow, irregular, brown bands across the basal half of the caudal. Ventral part of fish in front of anal fin a uniform reddish-brown, lacking spots. Pectorals with a few scattered chromatophores, more thickly distributed dorsally.

Relationships: This species is apparently most closely related to *L. agassizi* of northern Japan, to which it keys out in Burke's (1930: 56) key to the genus. It differs most strikingly from *L. agassizi,* and indeed from any other known *Liparis,* in its high pectoral ray count, 46 in *L. newmani* compared to 32 to 42 in *L. agassizi* (based on counts by the author on 22 specimens in the U. S. National Museum). Another difference is in the color: Burke (1930: 77) gives four types of coloration, none of which is similar to *L. newmani.* Finally, the skin of *L. newmani* is more transparent than the skin of any specimens of *L. agassizi* I have examined.

Liparis multiradiatus is similar in its high fin ray counts, unnotched dorsal, notched pectoral and attached dorsal and anal fins but has more dorsal rays than pectoral rays, a larger eye (7.0 percent of standard length), a larger gill slit (9.8 percent of standard length) and other differences (see Matsubara and Iwai, 1954: 437).

I have also considered the possibility that my specimen may represent a young example of *Liparis tanakae,* a species which has been recorded from Chefoo on the Yellow Sea (Wu and Wang, 1933). In writing of Japanese and Korean material, Burke (1930: 87) states: "Pectoral fin unnotched in the adult, possibly slightly notched in the young." The pectoral of *L. newmani* is definitely notched. Some differences from Wu and Wang's description of Yellow Sea *L. tanakae* are a longer head (3.4 in standard length for *newmani,* 3.7 to 4.3 for *tanakae*), shorter snout (4.2 in head for *newmani,* 2.3 to 2.9 for *tanakae*), and larger eye (5.9 in head for *newmani,* 7.0 to 9.5 for *tanakae*). Unfortunately, the smallest specimen which they report is 180 millimeters in total length, so that differences in proportions may not be significant. Other differences are in coloration, Wu and Wang state immature fishes are grey; and in pectoral ray counts, they state 40 to 42. In addition, their figure shows a specimen with a much blunter head than in *L. newmani.*

Liparis choanus Wu and Wang

Liparis choanus Wu and Wang, 1933, p. 83, Figs. 5 and 6 (orig. descr., two spec. Chefoo, two spec. Tsingtau).

Study material: A male, 90.2 mm in standard length; a female, 85.0 mm in standard length.

Counts and measurements: Measurements in percent of standard length, given for the male first followed by the female in parentheses. Greatest body depth 24.8 (21.1); width of body at level of anal fin origin 9.4 (8.5); greatest head width 24.3 (24.9); head length 24.4 (27.1); eye 4.2 (3.6); snout length 8.3 (8.2); disc length 8.6 (9.4); disc width 8.3 (9.4); interorbital 9.5 (9.4); gill slit 8.3 (7.8); posterior edge of disc to vent 6.1 (9.0); tip of snout to posterior tip of pectoral fin 39.6 (41.9); dorsal 37 (35); anal 31 (30); pectoral 37–35 (37–37); vertebrae 39 (40), not including urostyle; branchiostegals 6.

Sexual dimorphism: The most striking difference between the two sexes is the presence of typical, *Liparis,* thumb-tack prickles on the male. They are abundant over the sides of the body and on the vertical fins, sparse and small on the upper lobe of the pectoral fin, and absent on the body median to the pectorals and on the venter. The dorsal region of the fish from the interorbital area to the anterior part of the dorsal fin has only scattered prickles but bears a profusion of small fleshy protuberances which give the entire area a rugose appearance. The female has smooth skin.

The male has proportionally longer dorsal and anal fin rays than does the female.

The male has a proportionally shorter disc to anus distance than does the female.

Both sexes have a small papilla behind the vent; however, that of the male is slightly larger and has the tip directed posteriorly. The papilla of the female is surrounded by a number of irregular folds which are absent in the male.

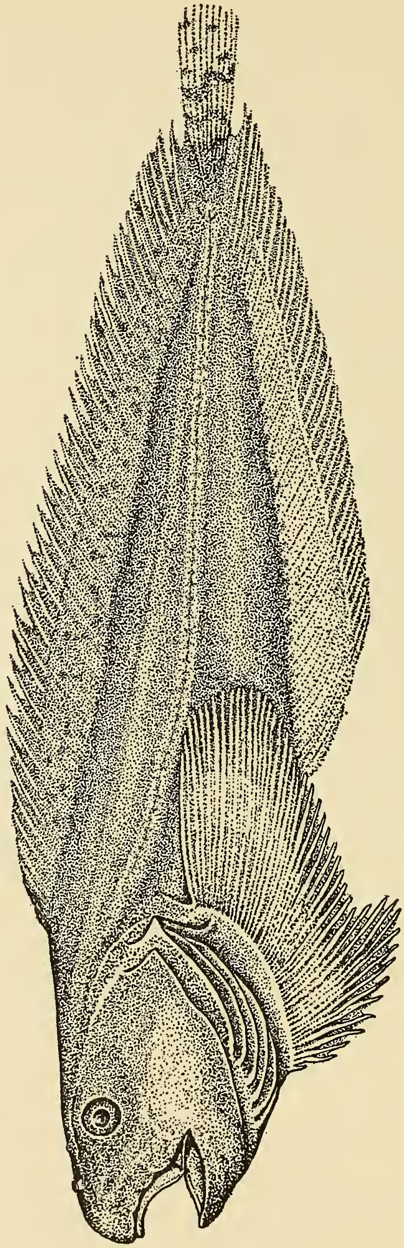

FIG. 1

The specimens at hand agree with the color pattern described for the type material and shown in the figure, with the exception that my material is reddish-brown rather than silvery. Wu and Wang (1933: 81) also describe *Liparis chefuensis*, a species which is reddish and has prickles but in most other respects seems similar to *L. choanus*. *L. chefuensis* was described from five specimens ranging from 120 to 155 mm total length, sex not given; *L. choanus* from four females, 92 to 110 mm total length. I refer my two specimens to *L. choanus* chiefly on the basis of greater similarities in proportions; however, it may well be that *L. choanus*, as described by Wu and Wang, is based on smaller females of *L. chefuensis*.

Nostrils: Many authors who have dealt with the genera of liparid fishes have utilized the presence of two pairs of nostrils to characterize the genus *Liparis*, although Burke (1930: 43) notes the posterior nostril is reduced in some species. More recently, Abe (1950, 1955) has described species which appear to be typical *Liparis* but lack posterior nostrils. A similar situation exists in *L. choanus*. The anterior nostril is present as a prominent, raised tube. The posterior nostril is present only as a very small, fleshy bump which has no opening. In their short diagnosis of the genus *Liparis*, Wu and Wang (1933: 80) state "Nostrils 2." However, in their descriptions of both *L. chefuensis* and *L. choanus* they mention only the tubular nostril.

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Explanation of Figure

Fig. 1. Holotype of *Liparis newmani*, 55.6 mm in standard length. Drawn by Mildred H. Carrington.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW WHITE-FOOTED MOUSE (*PEROMYSCUS LEUCOPUS*) FROM SOUTHEASTERN VIRGINIA

BY JOHN L. PARADISO
Bureau of Sport Fisheries and Wildlife

Two slightly differentiated subspecies of *Peromyscus leucopus* have been described from the mainland of the eastern United States. Osgood (North Amer. Fauna, 28:115, 1909) has pointed out that extreme examples of the more southern form, *Peromyscus leucopus leucopus,* are to be found in southern Louisiana, while the more northern race, *Peromyscus leucopus noveboracensis,* is best characterized in central New England. The type localities for both these forms are in intermediate areas: Mouth of the Ohio River in Kentucky for *P. l. leucopus,* and New York for *P. l. noveboracensis.* These subspecies are distinguished largely by coloration. Along the southern Virginia coast, and probably into North Carolina, a previously unrecognized subspecies occurs which differs markedly from all other mainland forms of the eastern United States in both size and coloration. It may be known as:

Peromyscus leucopus easti, new subspecies

Holotype: U. S. National Museum No. 302764; adult ♂, skin and skull; collected 10 April 1956, by Charles O. Handley, Jr., original No. 3052, in myrtle shrubbery in the flats back of the dunes on the barrier beach, 6.8 miles SE Pungo, Princess Anne County, Virginia.

This subspecies is named for Charles S. East, exhibits preparator at the U. S. National Museum, who collected white-footed mice at Virginia Beach in the summer of 1928.

Distribution: Taken in eastern Princess Anne County, Virginia, at Virginia Beach; 5 mi. S Virginia Beach; and 6.8 mi. SE Pungo. Probably occurs from the region of Cape Henry, Virginia, south along the barrier beach to Oregon Inlet, North Carolina, in favorable habitat.

Diagnosis: Similar to *Peromyscus leucopus leucopus* and *Peromyscus leucopus noveboracensis* but differs from both these forms as follows: Much smaller size, both externally and cranially; greater interorbital breadth; longer interparietal; bony palate relatively longer in proportion to greatest length of skull; basilar length relatively shorter; cheek teeth relatively larger; braincase shorter, higher and more rounded; wings of pterygoids less expanded laterally; zygomatic arch presenting a more rounded aspect when viewed dorsally; zygomatic arch shorter in proportion to greatest length of skull; entire skull more delicately built.

In all pelages the coloration of *Peromyscus l. easti* differs from that of *Peromyscus l. leucopus* in being much paler, and in having a brighter, reddish wash on the flanks. *Peromyscus l. easti* is similar to *P. l. noveboracensis,* but has a reddish rather than a yellowish wash on the flanks.

Measurements: Ten adults of *P. l. easti* from 6.8 mi. SE Pungo, and from Virginia Beach, Princess Anne County, Virginia, measure as follows (averages followed by extremes): Total length 152.4 mm (145–162); tail 68.6 (62–75); hind foot 19.0 (18–20); ear 17.6 (17–18); greatest length of skull 24.7 (23.9–25.6); basilar length 19.0 (18.3–19.6); zygomatic width 13.0 (12.6–13.3); interorbital constriction 4.1 (3.9–4.3); interparietal length 8.5 (7.2–9.4); length of nasals 9.6 (9.1–10.5); length of bony palate 4.0 (3.7–4.2); anterior palatine foramina 4.8 (4.7–5.0); diastema 6.6 (6.4–6.9); postpalatal length 8.9 (8.6–9.2); maxillary toothrow 3.5 (3.4–3.6); height of braincase 9.1 (8.8–9.4).

The two series which have been combined in the above measurements show no significant differences from each other.

Comparative measurements: The following measurements are given as an aid in comparing *Peromyscus leucopus leucopus* and *P. l. noveboracensis* with *P. l. easti.*

Seven adult specimens of *P. l. leucopus* from Houma, Louisiana, measure as follows: Total length 171.6 mm (162–180); tail 78.7 (74–83); hind foot 20.9 (20–22); greatest length of skull 26.3 (25.9–26.7); basilar length 19.8 (19.6–20.0); zygomatic width 13.5 (13.2–14.2); interorbital constriction 4.0 (3.8–4.1); interparietal length 8.4 (8.0–8.9); length of nasals 10.0 (9.5–10.4); length of bony palate 4.0 (3.9–4.2); anterior palatine foramina 5.1 (4.9–5.5); diastema 6.8 (6.5–6.9); postpalatal length 9.2 (8.9–9.6); length of maxillary toothrow 3.6 (3.4–3.9); height of braincase 8.9 (8.1–9.3).

Nine adult specimens of *P. l. noveboracensis* from Lake George, New York, measure as follows: Total length 175.0 mm (170–186); tail 80.9 (75–88); hind foot 20.7 (20–21); greatest length of skull 26.2 (25.6–26.9); basilar length 19.9 (19.3–21.7); zygomatic width 13.3 (12.8–13.7); interorbital constriction 3.9 (3.7–4.1); interparietal length 8.2 (7.4–8.9); nasals 9.9 (9.5–10.6); length of bony palate 4.0 (3.8–4.2); anterior palatine foramina 5.0 (4.8–5.3); diastema 7.1 (6.9–7.5); postpalatal length 9.3 (8.9–10.0); maxillary toothrow 3.5 (3.4–3.7); height of braincase 9.1 (8.8–9.6).

Remarks: Peromyscus leucopus leucopus occurs at nearby inland localities such as Dismal Swamp, Suffolk and Hampton, Virginia, and at Manteo and Currituck, North Carolina. Large series taken on Assateague Island, Accomack County, Virginia, and on the southern portion of the Delmarva

Peninsula, are also most like typical *leucopus*. Hence, *P. l. easti* has a small range. Within this range it is apparently confined to the marshes and sandy flats back of the beach dunes. Although its range is thus restricted, its very distinctive characters warrant its subspecific recognition.

Specimens examined: (All in collections at U. S. National Museum) 18, from Princess Anne Co., Virginia, as follows: Virginia Beach, 10; 5 mi. S Virginia Beach, 2; 6.8 mi. SE Pungo, 6.

Comparative material: (All in collections at U. S. National Museum) KENTUCKY—Eubank, 29. LOUISIANA—Houma, 17; LaFayette, 2; Mer Rouge, 4; Morgan City, 8; Tallulah, 5. NEW HAMPSHIRE—Ossipee, 32. NEW YORK—Hastings, 2; Lake George, 29; Locust Grove, 9; Newburgh, 2; Owego, 5; Sing Sing, 2. NORTH CAROLINA—Asheville, 2; Catalooche Ranch, 2; Chapanoke, 2; Currituck, 4; Highlands, 1; Manteo, 2; Old Richmond, 1; Pisgah National Forest, 13; Raleigh, 36. VIRGINIA—Amelia, 10; Assateague Island, 29; Belle Haven, 1; Chincoteague Island, 12; Dismal Swamp, 48; near Hampton, 9; Kinsale, 15; Old Point Comfort, 3; near Wattsville, 35.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

SPEOSTRIARIA, NEW GENUS (DIPLOPODA: CHORDEUMIDA: CHORDEUMIDEA: STRIARIIDAE)

By Nell B. Causey
Fayetteville, Arkansas

Samwel Cave, Shasta County, California, is the only known locality of the striariid milliped that is the type of the genus described here. An unusual series of both Pleistocene and Recent specimens of it has been collected by the Cave Research Associates. The original description of *shastae* was based on female and larval specimens, and the species was tentatively included in the genus *Striaria*. The males that have been collected recently show that the species is unusual not only in the large body size, but also in the extent of the sexual dimorphism.

The female holotype and male allotype are in the American Museum of Natural History. Topotypes of both sexes are in the collections of the California Academy of Sciences, San Francisco, and of the author.

I am grateful to the Cave Research Associates for the opportunity of studying the millipeds collected by them in California caves.

Genus **Speostriaria**, new genus

Diagnosis: Distinguished from *Striaria* by the simpler branching of the anterior gonopods and by the greater amount of sexual dimorphism, especially as seen in the collum.

Type species: Striaria shastae Causey, 1958.

Species: One.

Description: Crests equally spaced, low, becoming lower and the sixth one absent from posterior segments. Granules smaller and sparser on posterior segments. Females and larvae of both sexes with the collum (Fig. 2) small but hoodlike, with a bulge behind the anterior margin, and with paranota; second segment with paranota; legs and antennae longer and thinner than in epigean genera. Secondary sexual characters of the male include the following: labral spines, short mandibular spines, longer antennae and legs, longer collum without the median bulge and paranota, second segment without paranota, lower crests on the anterior segments, posterior subsegments of segments 2 through 5 or 6 longer, and legpairs 1 through 7 and 10 and posterior gonopods as in *Striaria.* Sternum of segment 7 bandlike. Anterior gonopods contiguous along the middle line; each gonopod consists of a short coxa, which bears a lateral coxite, and of a telopodite composed of an anterior branch, a posterior branch, and three flagella.

Speostriaria shastae (Causey)
Figs. 1–5

Striaria shastae Causey, 1958, Proc. Biol. Soc. Washington, 71: 182.

Description of male allotype: Length 25 mm, width 2.2 mm. Labral spines directed ventrad and slightly mesiad, their length about one fifth the width of the ventral margin of the labrum. Eyes composed of brown ocelli in 3 irregular series, 6 on one side and 7 on the other. Antennae slender, their length nearly twice the greatest body width, and the relative lengths of segments 1 through 7 as follows: 5:18:40:24:40:16:5. Head and first three segments as shown in Fig. 1. Segments 2, 3, and 4 each with pleural lobes, those of segments 2 and 3 broader and shorter than those of segment 4. Caudal margins of tergites 4, 5, and 6 rise to a slight peak in the midline; the crests of those segments are oblique.

Coxae of the first legpair enlarged and contiguous, their ventral surfaces covered with long setae. Coxae of the second legpair also enlarged and contiguous; the gonopores, which open from the coxae, with a thin membrane around the margin and an adjacent tuft of long setae; second segments produced into a stout, anteriorly directed lobe with a tuft of long setae at the apex; third segments enlarged distad as in the third legpair. Coxae of third legpair enlarged and contiguous as in species of *Striaria;* the coxae are elongated, narrowed at the apex, curved forward, and the telopodite is attached at about the middle of the lateral surface. Legpairs 4 through 7 have the coxae enlarged, rectangular, and almost contiguous; segments 3 and 4 are broadened and flattened slightly. Legpair 10 has the opening of the coxal gland near the base. The posterior legs are slender and longer, the longest ones about one and one half times the greatest body width, and the relative lengths of segments 1 through 7 as follows: 9:2:17:38:6:6:41. The setae on the legs are sparser and relatively shorter than in species of *Striaria.* Somatic characters not described here are as described for the female.

In situ the anterior gonopods project ventro-caudad and the telopodites of the posterior gonopods are laterad to them. From a lateral view, the three large divisions of the anterior gonopod can be seen: the anterior and posterior branches of the telopodite and, between them, the shorter, soft, lobelike coxite. The heavily chitinized anterior branch ends in three unequal divisions, of which all can be seen from an anterior view (Fig. 3). The posterior branch ends in two large divisions, of which only one can be seen from the posterior view (Fig. 4). From a mesial view (Fig. 5),

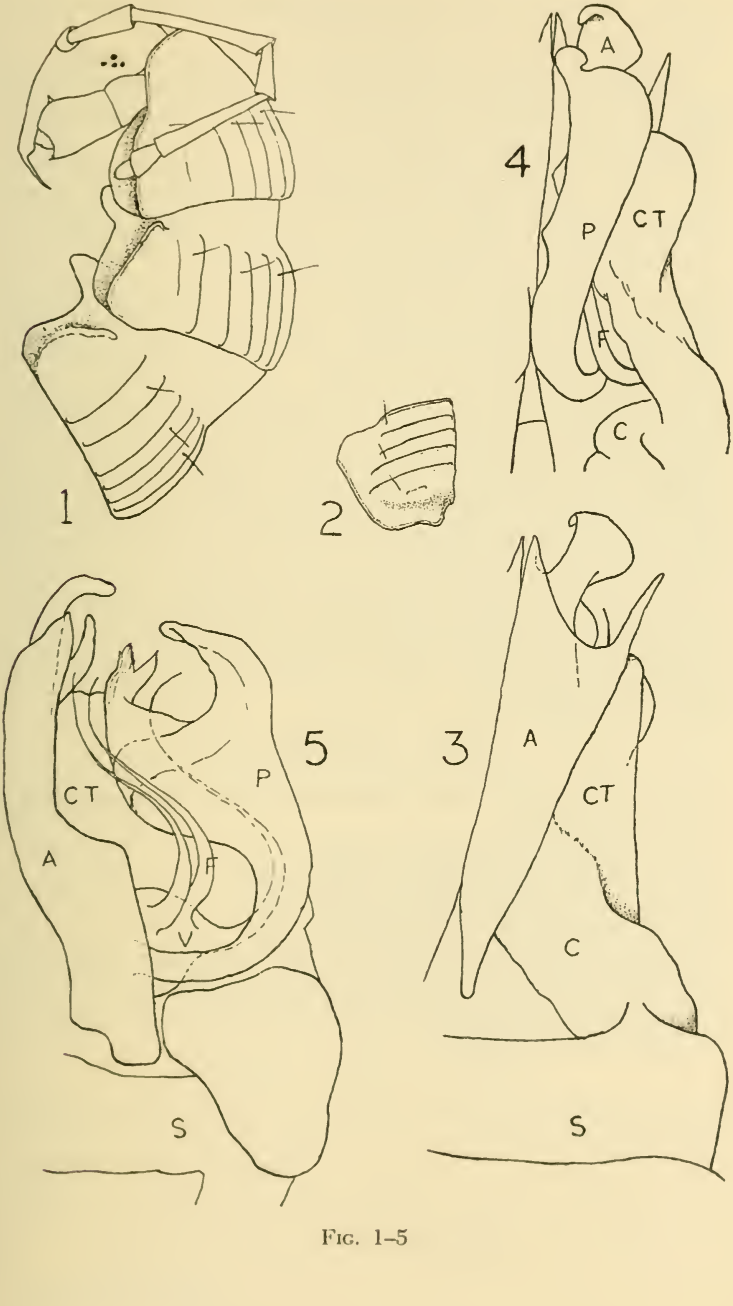

FIG. 1–5

the entire posterior branch and the three flagella, which arise from a vesicle at the base of the telopodite, are visible.

The posterior gonopods are very much as in species of *Striaria*. The sternum and coxae are transparent, flattened, and thin, and the flat but thicker and ventrally setose telopodites are almost perpendicular to them. The joints between the three parts are distinct.

Remarks: Except for the brown ocelli, living specimens are nearly white. The number of ocelli in 15 adult specimens ranges from 8 in 3 series to 4 in 2 series. This is as many ocelli as most epigean striariids have. The segmental setae are longer than in epigean species, but the sensory setae on the legs are not. The elongation of the legs and antennae may have been induced by cave life, for in all epigean species of the family they are relatively shorter and thicker. I have never seen *Striaria eldora* Chamberlin, 1953, which is known only from caves in Eldora and Calaveras counties, California, but probably it is a troglophile. The description refers to its antennae as being of "moderate length, clavately thickened distad"; there is no statement as to the length of the legs. Possibly the large body size of *Speostriaria shastae* is a cave-induced modification. A slight increase in body size is very common among cave forms of the family Conotylidae. *Collections:* Three males, 12 females, and several larvae have now been collected from Samwel Cave, most of them by Richard E. Graham. All collections were made either in June or in January, and mature specimens were taken in each of those months. They occur from the twilight zone to the lowest level of the cave under pieces of broken stone and organic matter. A recently found fossil (No. 1571, Cave Research Associates) was in a Pleistocene stratum with an antilocaprid, *Euceratherium* sp.

Explanation of Figures

Fig. 1.—*Speostriaria shastae,* head and first three segments (without the legs) of the male.

Fig. 2.—Collum of the female, left side.

Fig. 3.—Right anterior gonopod, anterior view.

Fig. 4.—Left anterior gonopod, posterior view.

Fig. 5.—Left anterior gonopod, mesial view.

A, anterior branch of telopodite. C, coxa. CT, coxite. F, flagellum. P, posterior branch of telopodite. S, sternum. V, vesicle.

Figs. 1 and 2 are drawn to the same scale. Figs. 3, 4, and 5 are drawn to a larger, but equal, scale.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW CARDINAL FISH OF THE GENUS *ARCHAMIA* FROM NORTHERN AUSTRALIA

By Ernest A. Lachner and William Ralph Taylor
U. S. National Museum

The study of the apogonid fishes collected by the Arnhem Land Expedition of 1948 revealed a species of *Archamia* Gill believed new to science. The expedition to Arnhem Land, Northern Territory, Australia, was conducted under the auspices of the Commonwealth of Australia, the National Geographic Society and the Smithsonian Institution. About 15,000 specimens representing many families of fishes were collected under the direction of Robert Rush Miller, Museum of Zoology, University of Michigan. A faunal report of these collections is in progress by William Ralph Taylor.

The morphological divergence among the species of *Archamia* was reviewed by Lachner (1951). A previously recognized polymorphic species, *Archamia lineolata* (Cuvier), was demonstrated to represent four distinct species. The new species is related to the *A. lineolata* complex. All members of the genus are marine and are found in the Indian and west-central Pacific Oceans.

The generic allocation of the new species is substantiated by the presence of the following characters: body slab-sided, comparatively deep; dentition complete, with small villiform teeth in a narrow band on the jaws and in single rows on the palatines and vomer; spinous dorsal with six spines; base of anal fin long, the number of rays ranging from II,16 to II,18.

Archamia melasma new species

Archamia lineolata Paradice and Whitley, Mem. Queensland Mus., 9(1): 84, 1927 (species listed, Pellew Islands; material re-examined under Australian Mus. No. IA.1499).

Holotype: Australian Museum register No. IB.4473, a female specimen

60 mm in standard length taken on a coral reef with rotenone poison at Yirrkalla, near Cape Arnhem, Arnhem Land, Northern Territory, Australia, on 11 August 1948 by Robert Rush Miller and Bill Harney, in water at a depth of about four feet.

Paratypes: USNM No. 173794, totaling 6 specimens, taken with the holotype and bearing the same data, one specimen a male 55 mm in standard length and 5 female specimens ranging from 55.5 mm to 59 mm in standard length; Australian Museum No. IA.1499, one specimen, 56.5 mm in standard length, taken in the Pellew Islands, Gulf of Carpentaria by W. E. J. Paradice in June, 1923.

Additional specimens examined: Australian Mus. No. IA.2334, 2 specimens, 56.5 and 60.5 mm in standard length, taken at North Barnard Island, Great Barrier Reef, Queensland by W. E. J. Paradice, 1924.

Diagnosis: Archamia melasma is most closely related to *A. biguttata* of the *lineolata* complex. It differs from *biguttata* in having the dark humeral spot descend downward over the operculum and in the absence of the large, intensely black, basi-caudal spot characteristic of *biguttata.* These closely related species of *Archamia* are compared in Table 1.

Description: This description is based on all of the specimens listed above. The methods of recording the counts and measurements are given by Lachner (1951:581). Counts of several meristic characters are given first for the holotype, followed by counts taken from the remaining specimens. Where the data for the holotype are identical with that of all the other specimens, but one number is given.

Dorsal fin rays VI-I,9(10 specimens); anal fin rays II,17, II,16(2), II,17(5), II,18(2); pectoral fin rays, counting the left and right sides, 14–14, 14–14(5), 13–14(1), 14–13(1), 14–15(1); pelvic fin rays I,5 (10); branched caudal fin rays 8,7(10); scale rows along the lateral line about 24 in holotype, 22(1), 23(3), 24(2), 25(1); scale rows above lateral line 2 in the holotype, 2(6); scale rows below lateral line about 7 in holotype, 7(7), 8(2); gill rakers including all rudiments 21, 21(1), 22(3), 23(5). There were either 1 or 2 rudiments and 4 well-developed rakers on the upper arch, one developed raker at the angle of the arch, and 15 or 16 developed rakers and an occasional rudiment on the lower arch.

The vertebral count, including the fused urostylar vertebrae as one, was 24 in all specimens.

Measurements expressed in thousandths of the standard length are given for the holotype and two paratypes in Table 2.

Body compressed and deep; mouth terminal; eyes large (Table 2); posterior margin of preopercle serrated, particularly the lower margin; anterior margin of preopercle smooth; angle of jaw nearly reaches vertical drawn through middle of eye; first spine of spiny dorsal fin small; second spine equal to or slightly smaller than third; third spine of spiny dorsal fin about one and one-fourth times greater than diameter of eye; anal spines comparatively stout, the first spine short, only one-fifth length of second spine; second anal spine slightly longer than diameter of eye;

TABLE 1.—Comparison of closely related species of *Archamia*

SPECIES	ANAL FIN RAYS	BASI-CAUDAL SPOT	HUMERAL SPOT	DUSKY SPOT ON BODY JUST POSTERIOR TO OPERCULUM AND BELOW LATERAL LINE
A. *lineolata* (Cuvier)	II,13 to II,15 (49 specimens)	Usually well-developed, blackish and about equal to size of pupil	Absent	Absent
A. *fucata* (Cantor)	II,15 to II,18 (58 specimens)	Diffuse, dusky and large, notably larger than pupil	Absent	Absent
A. *dispilus* Lachner	II,16 to II,18 (13 specimens)	Diffuse, faint, somewhat larger than pupil	Absent	Diffuse, dusky spot present, deeper than wide
A. *biguttata* Lachner	II,16 to II,17 (22 specimens)	Intense black, nearly circular, slightly larger than pupil	Intensely black, circular to squarish, at junction of gill opening and body	Absent
A. *melasma*, n. sp.	II,16 to II,18 (10 specimens)	Absent	Blackish, vertically elongate, extending downward on opercular flap from junction of gill opening and body	Absent

TABLE 2.—Measurements of *Archamia melasma*, expressed in thousandths of the standard length.

CHARACTER	HOLOTYPE IB.4473	PARATYPES USNM 173794	
	♀	♀	♂
Standard length, mm	60	56	55
Body depth at origin of spinous dorsal fin	428	446	424
Body width at mid-body just behind opercular flap	138	148	131
Head length	397	407	398
Head depth at occiput	400	368	355
Length of caudal peduncle	175	179	178
Least depth of caudal peduncle	153	155	144
Length of longest pectoral ray	323	325	304
Length of second spine of spinous dorsal fin	—	180	129
Diameter of eye	137	137	142
Length of upper jaw	183	193	193
Length of snout	87	93	80
Least width of bony interorbital	98	104	102
Tip of snout to origin of spinous dorsal fin	438	445	431
Tip of snout to origin of anal fin	602	589	575
Tip of snout to insertion of pectoral fin	358	368	373
Tip of snout to insertion of pelvic fin	383	377	384

scales ctenoid with about 7 to 18 radii in the anterior field; lateral line complete and located rather high on body (see Fig.); gill rakers on first arch long, slender and simple, longest raker about one-half diameter of eye; contour of outer margin of soft dorsal fin slightly rounded; outer margin of anal fin slightly falcate; caudal fin emarginate or weakly forked; pelvic fins extend posteriorly slightly beyond origin of anal fin; inner rays of pelvic fin weakly united to body by thin membrane.

Teeth on both jaws, the vomer and palatines; those on lower jaw are short, conical and in several irregular rows anteriorly, tapering to 1 or 2 rows posteriorly; teeth on upper jaw short and pointed and in several irregular rows anteriorly and in a wider, villiform band posteriorly; the palatines and vomer have a single row of small, pointed teeth.

Color in Alcohol: The characteristic markings in both sexes are: The conspicuous, black humeral spot or bar that descends downward over the posterior margin of the opercle, and the wide, blackish, oblique bar below the eye (see Fig.). The humeral spot is intensely developed in all specimens. As the pigmentation descends over the margin of the opercle it becomes less intense. The two specimens from North Barnard Island, Great Barrier Reef, Queensland, have the weakest markings on the opercular margin.

The body coloration, otherwise, is pale and the fins transparent. The

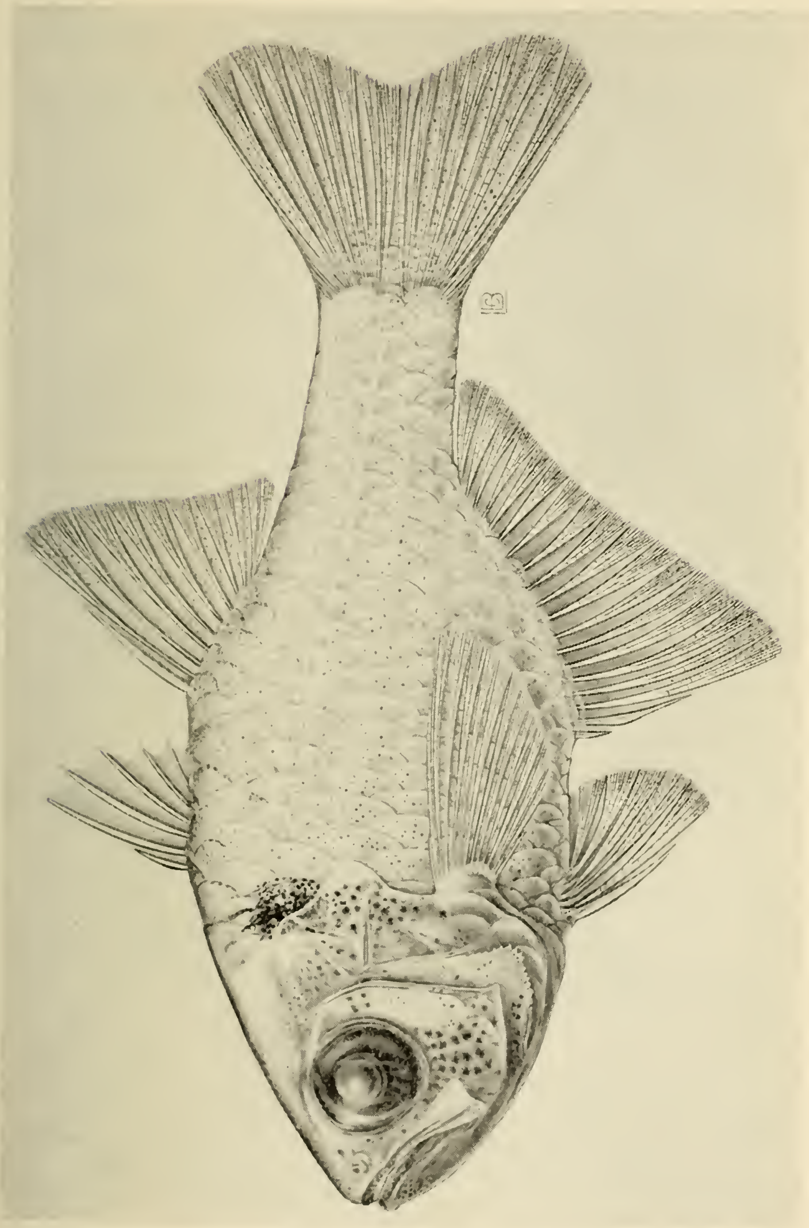

Fig. 1

top of the head, chin and snout have some scattered, brownish pigmentation and a few tiny melanophores are located near the base of the caudal fin in some specimens.

Color in life: The following notes describing the living coloration of this species were recorded in the field by Robert Rush Miller; a colored sketch accompanied the field notes: body silvery white with about 23 very narrow downward and forward curving vertical lines of deep red-orange; a black scapular bar; a yellow-orange band from snout to eye passing through eye; all fins pale pink; dark brown bar extending obliquely backward from below eye to edge of preopercle.

Geographic distribution: We do not expect this species to range extensively in the Indo-Pacific fauna. It may represent another endemic, characteristic of the Australian faunal area. Our rich collections, particularly the extensive material collected by the Albatross Philippine Expeditions from the Philippine and East Indies Islands and from many other Pacific areas, did not contain this species. The senior writer also examined the large collections housed in several European museums during 1956 while on a John Simon Guggenheim Fellowship, and did not find this form. Among the noteworthy collections examined were those at the Rijksmuseum van Natuurlijke Historie, Leiden, and the Zoological Museum, Amsterdam, Netherlands.

Remarks: This species was named *melasma* in reference to the black humeral spot.

We express our appreciation to J. W. Evans, Director, and Gilbert P. Whitley, Curator of Fishes, The Australian Museum, Sydney, Australia, for the loan of critical material and for providing information of Australian fishes; and to Mrs. C. B. Lutz, staff artist, U. S. National Museum, for her meticulous drawing.

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Explanation of Figure

A female paratype of *Archamia melasma*, 56 mm in standard length, taken over a coral reef at Yirrkalla, near Cape Arnhem, Arnhem Land, Northern Territory, Australia on 11 August 1948 by Robert Rush Miller and Bill Harney. Drawing by Mrs. C. B. Lutz, staff artist, U. S. National Museum.

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PROCEEDINGS
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A NEW SUBSPECIES OF POCKET GOPHER (*THOMOMYS UMBRINUS*) FROM SINALOA, MEXICO, WITH COMMENTS ON *T. U. SINALOAE* AND *T. U. EVEXUS*

BY E. RAYMOND HALL AND CHARLES A. LONG

Although only one species of pocket gopher is thought to occur in Sinaloa, the geographic distribution of the species is incompletely known and it is, therefore, not surprising to find an unnamed subspecies, which may be named and described as follows:

Thomomys umbrinus varus, new subspecies

Type: Male, adult, skin and skull; No. 75271, K.U.; 1 mi. S El Dorado, Sinaloa, México; 14 November 1957; obtained by William L. Cutter, original No. 1452.

Range: Known only from the type locality.

Diagnosis: Size large (see measurements); Ochraeeous-Tawny (Capitalized eolor terms after Ridgway, "Color Standards and Color Nomenclature," Washington, D. C., 1912) but darkened with blaekish below ears and in mid-dorsal area from nose to rump; tympanie bullae rugose and only slightly inflated; sagittal crest (11.7 mm long) prominent; maxillary arms of zygomata inelined posteriorly; nasals V-shaped posteriorly, flaring anteriorly but otherwise straight-sided; interpterygoid spaee V-shaped.

Comparisons: Indistinguishable in color from topotypes (for example 75264 Univ. Michigan) of *Thomomys umbrinus camoae* but larger in all measurements taken exeept interorbital breadth, whieh is the same, and lesser extension, posterior to nasals, of premaxillae. In eomparison with the darker *Thomomys umbrinus sinaloae*, next north along the Paeific Coast, there is an equal or even greater disparity in size. From both *camoae* and *sinaloae*, the skull of the male of *varus* further differs as follows: tympanic bullae smaller; maxillary arm of zygoma inclined posterolaterally (less nearly at a right angle with longitudinal axis of skull); squamosal root of zygoma inclined anterolaterally (less nearly at a right angle). Differences from *Thomomys umbrinus parviceps* of higher terrain to the eastward, *Thomomys umbrinus musculus* to the southward, and *Thomomys umbrinus atrovarius* of the coastal area, also to the southward, are even greater. By weight eaeh of those three subspeeies appears to be hardly half so large as *varus*, is Plumbeous to black instead of Ochraceous-Tawny, and has a skull that relative to the over-all length is wider across the braincase and has zygomatic arches that are widest posteriorly instead of anteriorly. Because of the larger degree of difference between *varus* and the three, small, dark subspecies (*parviceps, musculus,* and *atrovarius*) it is difficult to imagine intergradation between *varus* and any one of them. The uninflated tympanic bullae of *varus*, nevertheless, are seen also in *musculus* and *atrovarius*.

Measurements of the holotype (in millimeters): Total length 281; length of tail 101; length of hind foot 37; basilar length 41.9; length of nasals 18.0; zygomatic breadth 31.0; mastoidal breadth 23.3; breadth of rostrum 10.0; interorbital constriction 6.7; alveolar length of maxillary tooth-row 9.6; extension of premaxillae posterior to nasals 2.0; length of rostrum (middle of anterior border of nasals to lateral junction of maxilla with hamular process of lacrimal) 20.1.

Specimen examined: One, the holotype.

Thomomys umbrinus sinaloae Merriam

Three females (67609–67611 K.U.) from along the Río Fuerte, 1 mi. N, ½ mi. E San Miguel, Sinaloa, are larger, darker, and differ in other respects from *Thomomys umbrinus simulus*, the subspecies to the eastward, and more closely resemble *Thomomys umbrinus sinaloae* to the southward and *Thomomys umbrinus camoae* to the northward. Comparisons with the adult females of *camoae* from Guaymas, Sonora, and with three adult female topotypes of *sinaloae* reveal intermediacy in the ratio of the width of the nasals to the width of rostrum. The specimens closely resemble *camoae* in total length (230 mm, in *camoae* 228, and in *sinaloae* 214) and in relative shortness of tail that is 47 per cent of the length of the head and body (46 per cent in *camoae* and 51 per cent in *sinaloae*). The specimens more closely resemble *sinaloae* in broad rostrum (8.2, in *sinaloae* 8.4, and in *camoae* 7.6), long rostrum (15.7, in *sinaloae* 15.9, and in *camoae* 15.0), and coloration (darker than *camoae*). The specimens (67609–67611 K.U.) extend the known geographic range of *T. u. sinaloae* 110 miles northward along the coast from Altata, Sinaloa, the type locality of *T. u. sinaloae*. Previously the subspecies *T. u. sinaloae* was recorded only from the type locality.

Thomomys umbrinus evexus Nelson and Goldman

This subspecies until now has been known from only the holotype from Mount San Gabriel, 7,000–9,000 feet, state of Durango. Two males and two females (66132–66135 K.U.) from Villa Ocampo, 4,575 feet elevation, Durango, only 10 miles southeast of the mentioned type locality, agree with the holotype as originally described and differ from *T. u. sheldoni* (6 specimens from 7 mi. SW Las Adjuntas, and 6 specimens from 10 mi. SW El Salto, both localities in the state of Durango) the geographic range of which bounds that of *evexus* on the north, west and south. The black-tipped hairs of the russet-colored upper parts and the brownish proximal portion of the white-tipped tail of *evexus* are well shown in our specimens from Villa Ocampo.

Acknowledgments: Grants from the Watkins Fund of the Kansas University Endowment Association furthered the field work that yielded the specimens on which the above report was based, and a grant from the National Science Foundation furthered the study, in the Museum, of the specimens. We are grateful to W. H. Burt and E. T. Hooper of the Museum of Zoology of the University of Michigan, and S. P. Young, R. H. Manville, and Viola S. Shantz of the Biological Surveys Collections of the U. S. Fish and Wildlife Service for lending certain specimens essential for comparison.

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PROCEEDINGS
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TWO NEW SPECIES OF *CRASPEDORRHYNCHUS* (MALLOPHAGA) FROM NORTH AMERICA

By K. C. Emerson
Stillwater, Oklahoma

Species of the Ischnoceran genus *Craspedorrhynchus* Keler, 1938, are found in North America on avian hosts of the family Accipitridae (Hawks, Eagles and Kites). To date, no species have been recorded from hosts of the other families of Falconiformes. Species of this genus are of the short, round-bodied, robust type with a large head, and are found on the neck and head of the host. The premarginal carnia and the ventral carnia of the forehead are prolonged to a point well beyond the anterior margin of the dorsal anterior plate. This character and the distinctive male genitalia separate the genus from related genera found on other hosts.

The known North American species form a rather homogeneous taxon. Differences in the male genitalia do not appear to be great. The characters which appear to offer the best means of separation are: size, shape of the dorsal anterior plate of the forehead, chaetotaxy, and the sternal plate of the genital region. In some species, the chaetotaxy of abdominal segments II-VII (the first apparent segment is II) is not the same in both sexes. Individual differences of chaetotaxy within each species are slight. The sternal plate of the genital region of the male is more variable in shape than is the dorsal anterior plate of the forehead.

Two new species are herewith described and illustrated from material in the collection of the U. S. National Museum. In addition, keys are provided to the species known to occur in North America.

Craspedorrhynchus subhaematopus, new species

Holotype male: Dorsal anterior plate of forehead as shown in Fig. 8.

Terminal abdominal segments as shown in Fig. 6. Male genitalia as shown in Fig. 7. Distinctive chaetotaxy as given in the key to the males.

Allotype female: Dorsal anterior plate of forehead as in the male. General shape as in the male, but larger and more robust. Distinctive chaetotaxy as given in the key to females. Terminal abdominal segments as shown in Fig. 5.

Measurements: Holotype male and allotype female measurements in millimeters, are respectively: length of head 0.76, 0.86; breadth of head 0.73, 0.79; breadth of prothorax 0.45, 0.49; breadth of pterothorax 0.60, 0.69; breadth of abdomen 0.92, 1.12; total length 1.98, 2.27.

Type host: Accipiter cooperii (Bonaparte), Cooper's Hawk.

Type material: Holotype male and allotype female, U. S. National Museum Catalog No. 64,938, collected at Laurel, Maryland, on 20 April 1938 by E. B. Marshall. Two paratypes collected in Leon County, Florida, on 2 December 1925 by H. L. Stoddard. Ten paratypes collected at Tillamook, Oregon, on 1 January 1931 by Alexander Walker.

Discussion: This species is closest to *C. haematopus* (Scopoli, 1763). In addition to the differences given in the keys, the two species can be separated by the differences illustrated in Figs. 1–8.

Craspedorrhynchus americanus, new species

Holotype male: Dorsal anterior plate of forehead as shown in Fig. 13. Genital sternal plate as shown in Fig. 9. Genitalia as shown in Fig. 17. Distinctive chaetotaxy as given in the key to the males.

Allotype female: Dorsal anterior plate of forehead as in the male. General shape as in the male, but larger and more robust. Distinctive chaetotaxy as given in the key to the females. Shape of genital sternal plate as in *C. haematopus* (Scopoli, 1763).

Measurements: Holotype male and allotype female measurements, in millimeters, are respectively: Length of head 0.87, 0.93; breadth of head 0.79, 0.85; breadth of prothorax 0.47, 0.51; breadth of pterothorax 0.66, 0.71; breadth of abdomen 1.08, 1.31; total length 2.12, 2.60.

Type host: Buteo jamaicensis (Gmelin), Red-tailed Hawk.

Type material: Holotype male, allotype female, U. S. National Museum catalog No. 64,939, and sixteen paratypes collected at Rosedale, Mississippi, on 3 March 1952 by M. G. Vaiden. Five paratypes collected at Cedar Grove, Wisconsin, on 12 May 1956 by D. Berger. One paratype collected at Tooele, Utah, on 13 August 1951. One paratype collected in Pennsylvania, in November, 1931 by M. Wood. Five paratypes collected at Winchester, New Hampshire, on 25 September 1933 by L. R. Nelson. Two paratypes collected at West Point, New York, 30 October 1926 by W. Robinson. Two paratypes collected at Stag Lake, New Jersey, in 1926.

Discussion: This species is close to *C. buteonis* (Packard, 1870), *C. dilatatus* (Rudow, 1869), and *C. hirsutus* Carriker, 1956; the other species found on the host genus *Buteo*. In addition to differences given in the

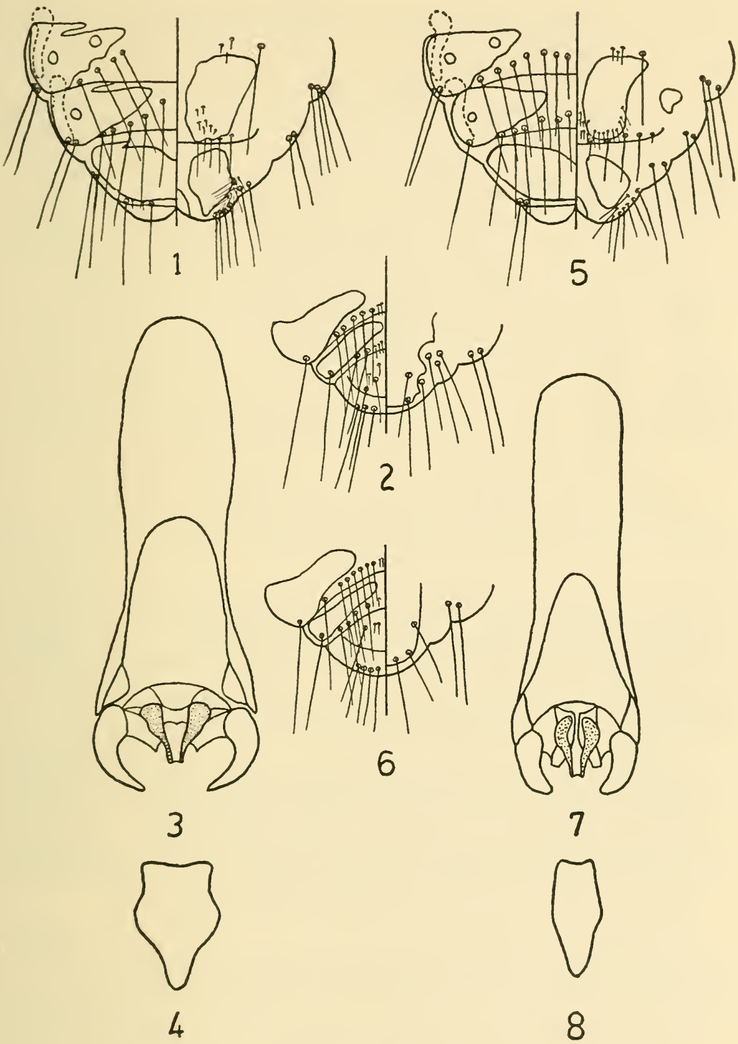

Fig. 1–8

keys, these closely related species can be separated by the differences illustrated in Figs. 9–16.

Key to females of North American species of *Craspedorrhynchus*

1. Posterior margin of pterothorax with 20 long setae .... *haematopus*
   Posterior margin of pterothorax with 14 long setae 2

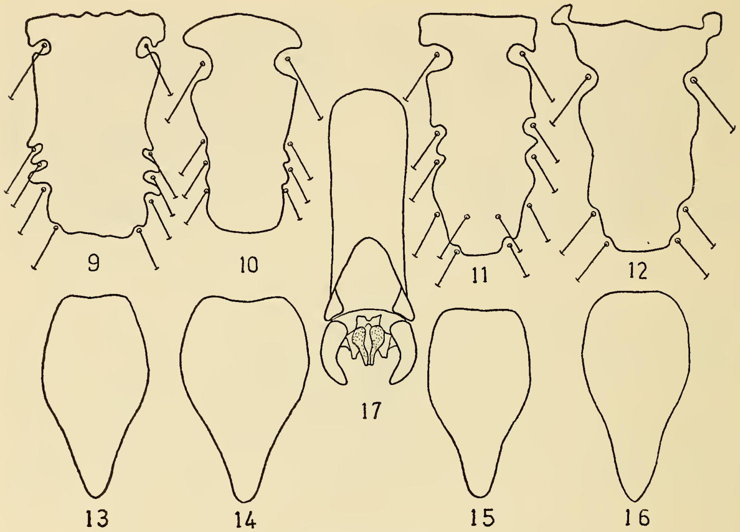

Fig. 9–16

Posterior margin of pterothorax with 12 long setae 3
Posterior margin of pterothorax with 10 long setae .... *hirsutus*

2. Pleural plates of abdominal segment VII each with 10 long setae .... *obscurus*
   Pleural plates of abdominal segment VII each with 6 long setae .... *subhaematopus*
3. Posterior margin of vulva with 14 medium-length setae .... *halieti*
   Posterior margin of vulva with 12 medium-length setae .... *aquilinus*
   Posterior margin of vulva with 10 medium-length setae 4
4. Posterior margin of tergite VIII with 14 long setae .... *americanus*
   Posterior margin of tergite VIII with 12 long setae 5
5. Posterior central margin of abdominal sternite III with 14 long setae .... *dilatatus*
   Posterior central margin of abdominal sternite III with 20 long setae .... *buteonis*

Key to males of North American species of *Craspedorrhynchus*

1. Posterior margin of pterothorax with 16 or more long setae .... *haematopus*
   Posterior margin of pterothorax with 14 or fewer long setae 2
2. Abdominal sternite VI with a sparse row of setae 3
   Abdominal sternite VI with numerous scattered setae .... *obscurus*
3. Abdominal tergite II with more than 14 long setae 4
   Abdominal tergite II with fewer than 14 long setae 5
4. Abdominal tergite VIII with 8 long setae .... *americanus*

Abdominal tergite VIII with 10 long setae .... *halieti*
5. Thoracic sternal plate between coxae II and III with two long setae 6
Thoracic sternal plate between coxae II and III with four long setae 7
6. Pleural plates of abdominal segment IV each with at least 7 long setae .... *subhaematopus*
Pleural plates of abdominal segment IV each with no more than 4 long setae .... *aquilinus*
7. Genital sternal plate with 3 long setae on each side in lateral indentations .... *hirsutus*
Genital sternal plate with 4 long setae on each side in lateral indentations .... *dilatatus*
Genital sternal plate with 5 long setae on each side in lateral indentations 8
8. Genital sternal plate with median setae .... *buteonis*
Genital sternal plate without median setae .... *americanus*

Host list for North American species of *Craspedorrhynchus*

C. americanus n. sp.—*Buteo jamaicensis* (Gmelin), Red-tailed Hawk.
C. aquilinus (Denny, 1842)—*Aquila chrysaëtos* (Linnaeus), Golden Eagle.
C. buteonis (Packard, 1870)—*Buteo lineatus* (Gmelin), Red-shouldered Hawk.
C. dilatatus (Rudow, 1869)—*Buteo lagopus* (Pontoppidan), Rough-legged Hawk.
C. haematopus (Scopoli, 1763)—*Accipiter gentilis* (Linnaeus), Goshawk.
C. halieti (Osborn, 1896)—*Haliaeetus leucocephalus* (Linnaeus), Bald Eagle.
C. hirsutus Carriker, 1956—*Buteo regalis* (Gray), Ferruginous Hawk.
C. obscurus (Giebel, 1874)—*Rostrhamus sociabilis* (Vieillot), Everglade Kite.
C. subhaematopus n. sp.—*Accipiter cooperii* (Bonaparte), Cooper's Hawk.

Explanation of Figures

Figs. 1–4 are of *C. haematopus* (Scopoli, 1763). 1, dorsal-ventral view of terminal abdominal segments, female; 2, dorsal-ventral view of terminal abdominal segments, male; 3, male genitalia; 4, dorsal anterior plate of forehead, male.

Figs. 5–8 are of *C. subhaematopus* n. sp. 5, dorsal-ventral view of terminal abdominal segments, female; 6, dorsal-ventral view of terminal abdominal segments, male; 7, male genitalia; 8, dorsal anterior plate of forehead, male.

Figs. 1, 2, 4, 5, 6, and 8 are drawn to the same scale.

Figs. 9–12 are genital sternal plate of *Craspedorrhynchus* sp., male. 9, *C. americanus* n. sp.; 10, *C. dilatatus* (Rudow, 1869); 11, *C. buteonis* (Packard, 1870); 12, *C. hirsutus* Carriker, 1956.

Figs. 13–16 are dorsal anterior plate of forehead of *Craspedorrhynchus* sp., male. 13, *C. americanus* n. sp.; 14, *C. dilatatus* (Rudow, 1869); 15, *C. buteonis* (Packard, 1870); 16, *C. hirsutus* Carriker, 1956.

Fig. 17 is of *Craspedorrhynchus americanus* n. sp., male genitalia.

Figs. 3, 7, and 9–17 are drawn to the same scale.

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PROCEEDINGS

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THE LARGE TOADS OF CUBA

By Albert Schwartz

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The genus *Bufo* is represented in Cuba by five forms. The largest of the Cuban toads is *Bufo peltacephalus* Tschudi, which has an islandwide distribution. Under two National Science Foundation grants, collections of this large species have been made on the Isla de Pinos as well as in all the provinces of Cuba, and adequate material has now accumulated to make possible an assessment of the variation in the characteristics of the various populations involved. Over the years, my companions have aided me greatly in collecting these large amphibians, but I wish to mention especially the aid afforded me by Ronald F. Klinikowski, Peter F. Pepe, Barton L. Smith and James R. Talada in taking specimens of the new form from the northern coast of Oriente. The illustrations of dorsal views are the work of David C. Leber and the drawings of the heads are by Peter F. Pepe; both merit my gratitude for their work. I have borrowed material from the U. S. National Museum (USNM), the Museum of Comparative Zoology (MCZ) and the Illinois Natural History Survey (INHS). I wish to thank Doris M. Cochran, Ernest E. Williams and Philip W. Smith for their hearty cooperation in the current study.

Bufo peltacephalus was described by Tschudi (1838: 52) as *Bufo peltocephalus*, a toad whose coloration was brownish red with a pattern of hieroglyphs. Such a thumbnail description leaves much to be desired as far as allocating this name to one of the two populations of the large Cuban toad. Although it was considered likely that the original material came from the vicinity of the La Habana, use of the term "hieroglyphs" to describe the diffuse and blotched pattern of the Habana population is not tenable. Strictly speaking, I would not call the

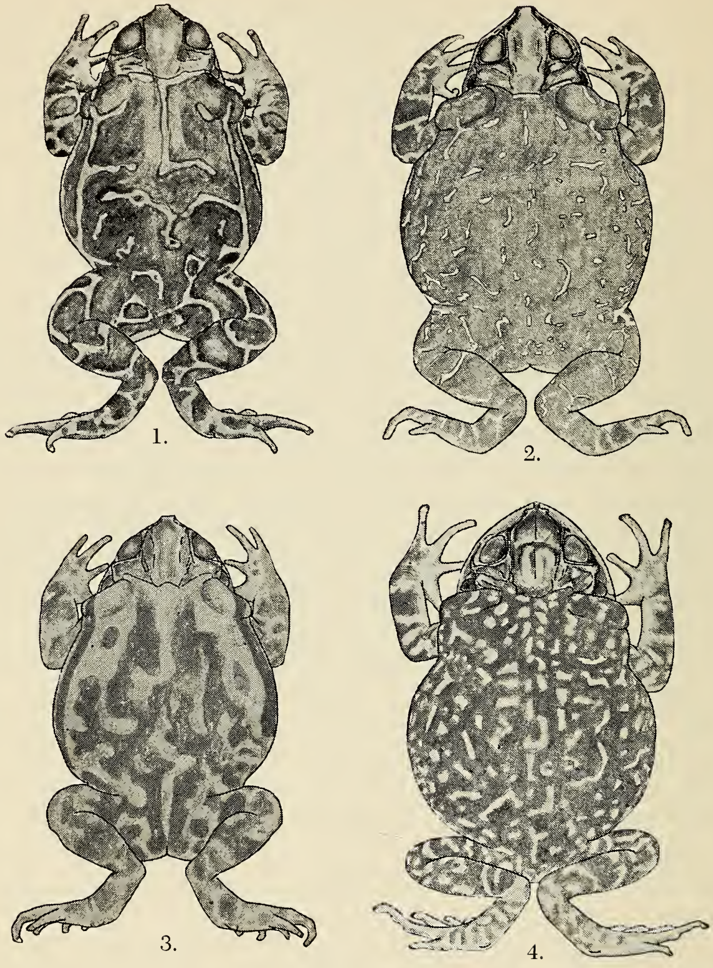

Fig. 1–4

markings of the central Cuban toads hieroglyphs, but at least this population shows definite markings on a reddish-brown dorsum (see Figs. 1 and 2). I feel that it is more appropriate to restrict the name *B. p. peltacephalus* to these distinctly marked toads which occur from Las Villas Province eastward throughout Oriente; with the description of a new subspecies of this amphibian, restriction of the type locality may well be

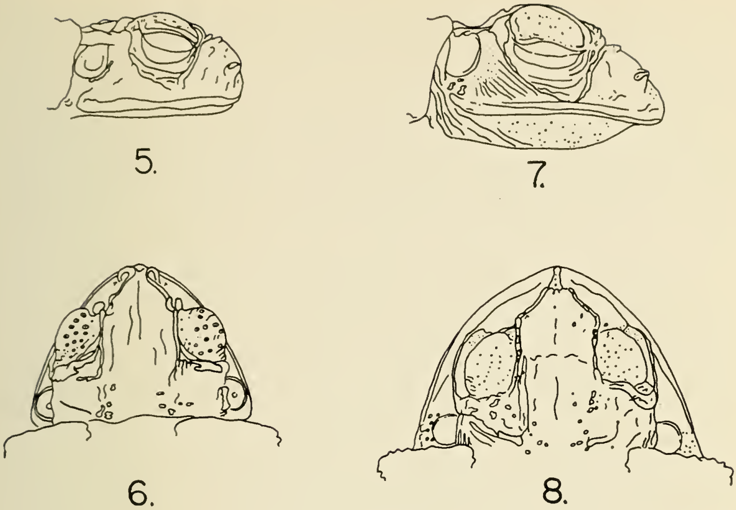

Fig. 5–8

in order. Considering the fact that it is probable that Tschudi's material came from the region of some seaport, and La Habana being disqualified for reasons specified above, I hereby propose to restrict the type locality of *Bufo peltacephalus peltacephalus* Tschudi to the vicinity of Santiago de Cuba, Oriente Province, Cuba.

The large toads of western Cuba are thus without a name, and for these western populations I hereby propose the name:

Bufo peltacephalus fustiger new subspecies

Type: American Museum of Natural History (AMNH) 59847, from San Vicente, Pinar del Río Province, Cuba, taken 21 December 1956, by John R. Feick. Original No. 1205.

Paratypes (all from Pinar del Río Province, Cuba): AMNH 63383, 3.5 km NE Guane, 26 August 1958, G. R. Zug; AMNH 63384, Cueva de Santo Tomás, 10 km N Cabezas, 1 September 1958, A. Schwartz; AMNH 61196-97, San Vicente, 29 August 1957, J. R. Feick; USNM 27330-32, El Guamá, 18–25 March 1900, William Palmer and J. H. Riley; USNM 27634, San Diego de los Baños, 17 April 1900, William Palmer and J. H. Riley.

Distribution: Known from the Península de Guanahacabibes (Vallecito de San Juan) throughout Pinar del Río, Habana and Matanzas provinces at least to the vicinity of the city of Matanzas.

Diagnosis: A subspecies of *Bufo peltacephalus* characterized by a diffuse dorsal pattern of yellows, tans and browns, usually appearing as vermiculations or confluent ill-defined blotches, large size (males up to 148 mm, females up to 164 mm in snout–vent length) and a long and broad head.

Description of type: An adult male, with the following measurements (in millimeters): snout–vent length, 126.6; length of head from snout to posterior border of tympanum, 40.3; greatest width of head, 52.8; longitudinal diameter of eye, 15.2; naris to eye, 11.1; femur, 46.3; tibia, 44.2; fourth toe, 45.8; interorbital distance, 20.4; "length" of parotoid gland, 24.3.

The coloration of the type is a combination of dark chocolate-brown markings laterally which become slightly more reddish centrally, and irregular areas of tan, these areas not being sharply set off from the dark pattern. The entire dorsum gives the appearance of dark and light vermiculations, arranged asymmetrically (see Fig. 3). There is a rather distinct, brown, longitudinal band, beginning just posterior to the tympanum and extending along the side to the region of the groin, where it becomes fragmented into a series of distinct brown spots. The fore- and hindlimbs are banded; the antebrachium, thigh, crus and pes each appear to have two bands. None of these limb markings is especially definite or prominent. The dorsal surface of the head is uniformly brown. The ventral surface is dull gray on the throat and chest, with the chin and lip areas cream. The belly becomes increasingly pale posteriorly after the gray chest, but remains somewhat clouded with gray to the region of the groin. The anterior and posterior faces of the thighs are mottled with brown blotches on a lighter tan background, the blotches on the anterior face of the thigh being smaller than those on the posterior.

The head is like that of *Bufo p. peltacephalus* in that the cranial crests are low, and not projecting, and there is an anteorbital notch at the junction of the supraorbital and canthal cranial crests (see Figs. 5 and 6). The upper lip does not project into a flange-like shelf, and the cranial crests and surface of head itself are smooth and lack any keratinized tubercles or spines. Although the dorsum is tuberculate, the warts on the anterior third being the largest, there are no keratinized spines either dorsally or ventrally, and the tubercles are low and rounded.

The toes are rather short and webbed, 4-3-5-2-1 in order of decreasing length. The web between toes 3 and 4 is the largest, and allows three phalanges of digit 4 and two of digit 3 to remain free, although it extends as a marginal lateral flange to the tips of these digits. The basal phalanx of digit 4 lacks web but shows the dermal flange for about half its length. The fingers are moderate in length and slender, unwebbed, 3-4-1-2 in order of decreasing length. The tympanum is large and conspicuous, eccentrically oval in shape, and separated from the posterior corner of the eye by a distance one-half its longitudinal diameter. The interorbital space is smooth, with three tubercles posteriorly. Microscopically, the interorbital space is raised into fine rugae, rather than tubercles.

Variation: Six adult males have the following measurements: Snout–

vent length 129.5 (115.6–147.8); head length 42.2 (39.0–47.7); head width 55.2 (50.5–62.3); longitudinal diameter of eye 14.9 (14.1–15.4); naris to eye 11.7 (9.5–12.7); femur 45.0 (41.1–50.5); tibia 44.8 (43.2–46.0); fourth toe 45.2 (41.6–48.3); interorbital distance 21.0 (18.8–23.5); "length" of parotoid 24.1 (23.0–26.1). Nine adult females measure: Snout–vent length 139.8 (125.5–163.8); head length 45.5 (41.5–50.4); head width 59.8 (55.6–64.2); longitudinal diameter of eye 15.5 (13.7–17.5); naris to eye 12.2 (10.6–13.0); femur 48.9 (38.8–56.0); tibia 48.6 (41.7–52.3); fourth toe 46.7 (41.8–50.6); interorbital distance 22.3 (19.7–24.2); "length" of parotoid 25.9 (22.8–28.8). Females average larger in all measurements taken than males.

Comparison of the 14 adult specimens with the type shows some variation. Although the dorsal pattern is always diffusely vermiculate, it is often more narrowly so than the pattern of the type; thus, the dorsum may show a very diffuse pattern of tan to yellow, diffuse, worm-like markings on a darker tan to chocolate-brown background. In no specimen is the dorsal pattern clearly defined as it is in *B. p. peltacephalus* (see Figs. 1 and 2). Structurally, the series resembles the type in most ways; the dorsal and ventral tubercles may or may not be spinose. If the latter condition pertains, the spines are poorly developed and not striking. The anterior tubercles are always larger and more prominent than the posterior ones. The interorbital area is always smooth with fine rugae, with a few scattered bony tubercles posteriorly. Because of the broad head, this member often appears to be unusually large, even for such a big toad. All specimens show the prominent anteorbital notch.

Comparisons: B. p. fustiger differs from the nominate form in that *peltacephalus* has a dorsal pattern of distinct yellow vermiculations on a chocolate to reddish-brown background (see Figs. 1 and 2). The diffuse pattern of *fustiger* contrasts with the definite pattern of *peltacephalus.* The western subspecies appears to reach a larger size than *peltacephalus,* males of which race are known to reach a size of 128 and females 139 mm. The difference in head width is reflected in the ratio of head width to snout–vent length; this ratio (× 100) in male *fustiger* is 42.7 (40.6–44.4) and in male *peltacephalus* 40.5 (38.3–45.5), in female *fustiger* 42.9 (38.1–45.5) and in female *peltacephalus* 39.7 (37.2–40.8).

Remarks: I have seen no specimens intermediate between the two subspecies of *B. peltacephalus;* the easternmost specimen of *fustiger* is from Matanzas, Matanzas Province, and the westernmost *peltacephalus* is from Soledad, Las Villas Province; thus a distance of some 170 kilometers separates the known ranges of these two forms. Intergrades are to be expected in western Las Villas and eastern Matanzas provinces.

With the naming of an additional race of *B. peltacephalus* from Cuba, I am undecided about the status of the Isla de Pinos toads. I have examined 16 adult toads from four Isla de Pinos localities, including both north and south coasts. Chromatically, these anurans are closest to *B. p. peltacephalus,* but occasional specimens resemble the western *B. p. fustiger.* In size, they are intermediate between the two Cuban races; males reach a maximum size of 142 and females 149 mm. In contrast to *fustiger*, these toads are more narrow headed and are thus closer to *peltacephalus*. In addition, they appear to be more warty dorsally than either of the Cuban races. Although I feel that the relationship of the Isla de Pinos fauna is with that of western Cuba, it appears that these toads are an exceptional case, and I prefer to call them *Bufo p. peltacephalus*, thus showing their affinities with the central and eastern Cuban subspecies. The differences mentioned above should be noted, however.

Bufo p. fustiger occupies the same niche in western Cuba that *B. p. peltacephalus* does elsewhere on the island. These toads occur, at times abundantly, in hardwood forest, cultivated fields, along stream banks, and in almost any mesic situation. They are not uncommon along the ocean in certain areas. Males vocalize from flooded ditches and slowly running streams, usually after heavy rains in summer, and are very shy, ceasing to call when disturbed.

The measurement "length" of parotoid gland requires comment. Since the parotoids are lateral in position and are curved both dorsally and ventrally, it is difficult to secure an accurate measurement of length. Actually, this measurement is almost one of thickness of the amphibian in the neck region, and thus can be used only with extreme reservation as far as differentiating various forms of the *B. peltacephalus* group is concerned.

Specimens examined (other than type and paratypes): *B. p. fustiger*, Pinar del Río Province—Vallecito de San Juan, 11 km W Cayuco, 1 (AMNH 63382); La Mulata, 2 (USNM 51864–65); Guanajay, 1 (USNM 27333); 3 km NE Guanajay, 1 (AMNH 59843); Matanzas Province—6 mi. E Canasí, 1 (AMNH 63379); Matanzas, 1 (USNM 57892). Also numerous juveniles and subadults from Pinar del Río and Habana provinces.

Bufo p. peltacephalus, Las Villas Province—Soledad, nr. Cienfuegos, 5 (AMNH 6020, 61185–88); Camagüey Province—3 mi. S Playa Santa Lucía, 2 (AMNH 63473); 2 km SE Banao, 1 (AMNH 61194); Oriente Province—Banes 2 (USNM 138901, 138903); El Cobre, 1 (AMNH 494); Santiago de Cuba, 3 (AMNH 495, USNM 57893–94); 0.7 mi SW El Cristo, 1 (AMNH 63474); 5 mi S Dos Caminos, 5 (AMNH 63475); Guantánamo, 1 (USNM 81807); 12 mi E Guantánamo, 1 (AMNH 63481); Taco Bay 1 (AMNH 63482); Pilón, 1 (AMNH 32209); Isla de Pinos—just W Nueva Gerona, east base Sierra de las Casas, 7 (AMNH 63380); Bibijagua, 1 (AMNH 61199); Paso de Piedras, *ca.* 20 km SSW Santa Fé, 5 (AMNH 61200, 61203–06); Jacksonville, 3 (AMNH 63381). Also additional juveniles and subadults from Las Villas, Camagüey, and Oriente provinces, as well as the Isla de Pinos.

In the summer of 1959, Messrs. Klinikowski and Smith, and myself collected a small series of distinctly patterned toads on El Yunque de Baracoa. In addition to their characteristic design, these toads were structurally distinct from *B. peltacephalus*, although obviously closely related to it. The two forms appear to be generally sympatric, although ecologically separated. That this ecological isolation is not complete is shown by two specimens which I regard as hybrids between the two. The new species and *B. peltacephalus* I regard as another example of the rapidly increasing number of recognized sibling species in the West Indies, and for this form I propose the name, in honor of James R. Talada for his enthusiastic assistance in many ways in the field, as

Bufo taladai, new species

Type: AMNH 63485, from 2 mi S Taco Bay (Bahía de Taco), Oriente Province, Cuba, taken 23 December 1959, by Albert Schwartz. Original number 8598.

Paratypes (all from Oriente Province, Cuba): AMNH 63484, Taco Bay, 22 December 1959, P. F. Pepe; AMNH 63486–87, same date as type; AMNH 63490–93, 3 mi S Taco Bay, 25 December 1959, P. F. Pepe and Albert Schwartz; AMNH 63476–79, west slope, El Yunque de Baracoa, 7 August 1959, R. F. Klinikowski, A. Schwartz, B. L. Smith.

Distribution: Known from the north coast of Oriente (vicinity of Baracoa) west to northern Camagüey (vicinity of Banao).

Diagnosis: A moderately large species of *Bufo* (largest male 138, largest female 147), related to *Bufo peltacephalus* but differing from that species in having a dorsal pattern of dark brown with light yellow ocellate spots; lacking an anteorbital notch at the junction of the supraorbital and canthal cranial crests, all cranial crests beaded with minute keratinized granules; a distinctly flanged upper jaw; and more spinose than *B. peltacephalus*, especially on the anterior dorsal surface, parotoid glands, dorsal surface of the arms, and throat and chest.

Description of the type: An adult female, with the following measurements: Snout–vent length 141.8; length of head from snout to posterior border of tympanum 49.0; greatest width of head 59.3; longitudinal diameter of eye 17.2; naris to eye 12.6; femur 48.4; tibia 47.2; fourth toe 49.8; interorbital distance 23.1; "length" of parotoid gland 23.1.

The coloration of the type is uniformly chocolate-brown dorsally, mottled with a profusion of light yellow, generally rounded, spots, which are somewhat dusky (tan) along the midline of the back (see Fig. 4). The femoral markings are like those of the dorsum, and the concealed surfaces of the thighs are brown with a pattern of yellow spots and vermiculations. There are apparently three brown crural crossbars, and the dorsal surface of the pes is mottled brown and yellow. The toes, as well as the fingers, are tan to cream colored. The forelimbs are likewise mottled brown and yellow, with three poorly delineated antebrachial crossbars. The entire head is brown without chromatic features. The ventral surface is dirty cream on the belly to a very pale tan on the chest and throat. The palmar and plantar tubercles are prominent but not keratinized.

Structurally, the type is characterized by the high and prominent cranial crests (see Figs. 7 and 8) and the absence of an anteorbital notch between the supraorbital and canthal crests. Immediately anterior to the eye, the junction of these two crests is somewhat raised, and then the canthal crest descends rather abruptly to the naris. The parietal area of the head is irregularly rugose, and the region between the tympanum and the upper labial margin, as well as the loreal area, shows irregular small keratinized tubercles. The upper jaw projects laterally and anteriorly into a sort of shelf or flange, along the surfaces and edge of which are studded a series of tiny but conspicuous horny tubercles, which occur as well along the margin of the mouth itself. The postorbital, supraorbital, preorbital, canthal, and rostral crests likewise are beaded with these small horny tubercles, and the profile of the head is distinctly sharp-nosed rather than with the blunt appearance of *peltacephalus* (see Fig. 5). The upper eyelids are also spinose.

On the body, the dorsal tubercles are distinctly horny, the keratinizations larger and more conspicuous anteriorly than posteriorly, and giving the appearance of a tuberculate and spinose cape over the back between the parotoids. All warts on the fore- and hindlimbs have horny spines. The throat and chest are spinose, the black spines prominent against the pale tan to gray ground color. Posterior to the chest, the spines become smaller and less conspicuous, and they disappear completely about half way across the belly.

The toes are relatively long and webbed, 4-3-5-2-1 in order of decreasing length. The web between toes 3 and 4 is the largest, and allows three phalanges of digit 4 and two of digit 3 to remain free, although it extends as a marginal lateral flange almost to the tips of these digits. The fingers are long and slender, 3-4-2-1 in order of decreasing length, unwebbed. The tympanum is large and conspicuous, irregularly oval in shape, and separated from the posterior corner of the eye by a distance one and one-half times its longitudinal diameter. The interorbital area is smooth throughout most of its length, but there are a few irregular rugosities posteriorly; microscopic examination of the interorbital fossa shows that it is paved with tiny tubercles, giving it a shagreened appearance.

Variation: Seven adult males have the following measurements: snout–vent length 117.8 (99.8–138.4); head length 38.6 (31.0–45.2); head width 45.1 (30.0–53.6); diameter of eye 13.9 (10.8–15.7); naris to eye 10.5 (7.3–12.6); femur 41.2 (36.0–51.5); interorbital distance 18.5 (14.4–22.0); "length" parotoid 20.9 (18.2–24.7). Seven adult females, including the type, have the following measurements: snout–vent length 138.4 (118.5–146.9); head length 45.0 (37.8–49.0); head width 55.5 (47.8–59.3); diameter of eye 15.5 (13.3–17.2); naris to eye 12.0 (10.7–12.8); femur 47.4 (36.9–54.7); tibia 46.4 (38.4–48.3); fourth toe 47.0 (40.5–50.0); interorbital distance 22.5 (18.5–24.4); "length" parotoid 24.7 (20.4–29.1). Inspection of these data shows that females average larger in all measurements taken. Mature males may have a heavily cornified area on the entire dorsal surface of the thumb, but some of the larger males lack this keratinized pad.

Comparison with the type of the 13 specimens regarded as mature shows that they agree very well with it in coloration and pattern. The dorsal color is always some shade of brown, usually dark, with the back profusely covered with pale yellow to cream spots. The precise configuration and arrangement of these spots varies; some individuals (AMNH 63493) are almost irregularly vermiculate, whereas others (AMNH 63476) have relatively few small discrete spots, and much more dark ground color than pale on the dorsum. In some the parotoids are distinctly yellowish in preservative, but this is not usual. The crural bands are at times almost completely obliterated by random and diffuse pale mottling and spotting.

All the adult specimens are like the type insofar as wartiness, absence of the anteorbital notch, pointed snout and flanged upper jaw are concerned. One individual (AMNH 63480) is unique in that the supraorbital crest almost overhangs the eye anteriorly. The ventral spines may be more or less prominent than on the type; if more, they extend over the entire belly, and if less, they involve the throat and chest only.

There are eight juvenile and subadult specimens ranging in snout–vent length from 23.7 to 97.6 mm. The largest of these resembles the adults in pattern; the next largest (96.0 in snout–vent) is considerably lighter dorsally, and the dorsum is more or less diffusely vermiculate. The remaining six toads, of which the largest is 59.6 mm, show the juvenile pattern of a dark brown interocular triangle, its apex pointed posteriorly, and two pairs of dark brown dorsal blotches, the posterior pair somewhat less clearly defined than the anterior. The ground color of these small toads was dull tan in life, and none showed the vivid emerald green or rich reddish-tan of young *B. peltacephalus*.

All juveniles lack the anteorbital notch; the larger three toads in addition have the beaded cranial crests and heavily spinose back and face of the adults. It is apparent that the characteristics of *taladai* are not the manifestations of age or senility.

Comparisons: B. taladai hardly needs comparison with the three species of smaller toads (*B. longinasus, B. gundlachi* and *B. cataulaciceps*) of Cuba, nor with the somewhat larger *B. empusus*. The new species exceeds the former three greatly in size, and is distinctly larger than *empusus*, which species reaches a maximum body length of 74 mm (Ruibal, 1959: 14).

From *B. peltacephalus*, *taladai* differs in lacking the anteorbital notch, and in having a pattern of light spots on an otherwise dark dorsum. The new species is far more spinose than *peltacephalus*, and the head appears to be more pointed (*i.e.*, longer and narrower). Attempts at proving such a difference in head shape statistically show no significant difference, but at least male *taladai* have the average head width/snout–vent length ratio lower (39.1) than do male *peltacephalus* (40.1 Isla de Pinos, 42.7 western Cuba, 40.5 eastern Cuba). Female *taladai* have this ratio similar to *B. p. fustiger*. In size, *taladai* reaches a smaller size than Isla de Pinos and western Cuba *peltacephalus*, but is larger than the eastern race. I am unable to differentiate the two species involved on the basis of any measurements or proportions.

Comparison of juvenile *peltacephalus* and *taladai* shows that even the smallest *peltacephalus* have a clearly defined anteorbital notch, whereas the smallest *taladai* lack it. The cranial crests of the small *peltacephalus* are irregularly edged, whereas those of *taladai* are smoother. The patterns of both are comparable, although I have had the impression that the interocular triangle is narrower and more restricted in *peltacephalus* and larger and wider in *taladai.* Juvenile *peltacephalus* only 48.5 mm in snout–vent length are already losing the juvenile pattern and have the first indication of the adult pattern, whereas a juvenile *taladai* 59.6 mm in snout–vent length still retains the juvenile pattern. There may thus be a difference between the two forms concerning size at which the juveniles begin to change to the adult pattern.

Remarks: Two specimens deserve special comment; these are AMNH 63488 from the type locality, and USNM 138902, from Banes, Oriente. This latter specimen has been reported upon by Lynn (1957: 57). It is one of three specimens from Banes collected by Major Chapman Grant; the remaining two toads are typical of *p. peltacephalus.* Lynn commented that the one toad was not typical of *B. peltacephalus* in that it lacked the anteorbital notch; the dorsal pattern likewise appears to be rather diffuse and is neither like the ocellate *taladai* pattern nor the distinctly vermiculate *peltacephalus* pattern. It resembles the latter species in lacking beaded cranial crests, and being smoother dorsally and ventrally, without spinose tubercles. The toad from Taco Bay likewise lacks anteorbital notches, is not spinose dorsally, but has a spiny throat and chest, and was almost uniformly olive green in life with vague mottling and blotching in gray and brown dorsally. Both specimens have a rather intermediately flanged upper jaw.

I prefer to call these two bufonids hybrids between *taladai* and *peltacephalus.* Structurally, they are almost ideally intermediate between the two species. Although *taladai* is presently not known from the Banes area, it is to be expected there since it occurs farther to the west in Camagüey. Both *peltacephalus* and *taladai* are known from Taco Bay, and the possibility of hybridization is not untenable. It might be argued that these two specimens represent intergrades—rather than hybrids—between the two toads, and that *taladai* should be regarded as a race of *peltacephalus.* The random nature of the distribution of these two peculiar individuals, and the fact that both forms maintain their distinctness despite geographical, if not ecological, sympatry elsewhere convinces me that the relationship is a specific one.

All specimens of *B. taladai* were taken in cut-over rain forest. The El Yunque series was obtained on a road on the side of this mountain as the toads hopped about on the road and in adjacent banana and cacao groves; the series from Taco Bay was taken in similar situations. The single Taco Bay *peltacephalus,* on the other hand, was taken in coastal scrub growth near the shore of the ocean, and was not associated with rain forest.

Specimens examined other than paratypes: Camagüey, 2 km SE Banao, 2 (AMNH 61193, 61195); Oriente, Moa, 1 (INHS 9269); Mayarí, 1 (MCZ 3725); Taco Bay, 1 (AMNH 63482); 3 mi S Taco Bay, 3 (AMNH 63489, 63494–95); Baracoa, 1 (MCZ 22090).

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Explanation of Figures

Fig. 1.—*Bufo p. peltacephalus,* AMNH 63475, adult male, snout–vent length 123.9 mm, from 5 mi S Dos Caminos, Oriente Province, Cuba.

Fig. 2.—*Bufo p. peltacephalus,* AMNH 63481, adult female, snout–vent length 133.6 mm, from 12 mi E Guantánamo, Oriente Province, Cuba.

Fig. 3.—*Bufo p. fustiger,* new subspecies, AMNH 59847, type, adult male, snout–vent length 126.6 mm, from San Vicente, Pinar de Río Province, Cuba.

Fig. 4.—*Bufo taladai,* new species, AMNH 63485, type, adult female, snout–vent length 141.8 mm, from 2 mi S Taco Bay, Oriente Province, Cuba.

Fig. 5.—*Bufo p. peltacephalus,* lateral view of head, AMNH 63473, from 3 mi S Playa Santa Lucía, Camagüey Province, Cuba; note absence of flange-like upper lip.

Fig. 6.—*Bufo p. peltacephalus,* dorsal view of head, same individual as Fig. 5; note prominent anteorbital notch.

Fig. 7.—*Bufo taladai,* lateral view of head, same individual as Fig. 4; note flange-like upper lip.

Fig. 8.—*Bufo taladai,* dorsal view of head, same individual as Fig. 4; note absence of anteorbital notch.

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PROCEEDINGS
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NEW SUBSPECIES OF PHILIPPINE BIRDS

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In connection with my current studies of the birds of central Luzon, I have reviewed the geographic variation of certain species in the Philippine archipelago as a whole. This has resulted in the discovery of several new subspecies, of which three are described here. For one of these, a race of the sunbird *Aethopyga shelleyi,* an old name is available. Specimens have been borrowed through the courtesy of the authorities of the American Museum of Natural History (AMNH), Chicago Natural History Museum (CNHM), U. S. National Museum (USNM), and Yale Peabody Museum (YPM). Luzon specimens of *Saxicola caprata* in Carnegie Museum (CM) were collected in connection with a project of the Graduate School of Public Health, University of Pittsburgh, under the sponsorship of the Commission on Viral Infections, Armed Forces Epidemiological Board, and supported in part by the Office of the Surgeon General, U. S. Department of the Army.

Pitta sordida palawanensis, new subspecies

Type: Adult ♂, CM No. 100677, collected at Puerto Princesa, Palawan, Philippine Islands, by R. C. McGregor *et al.*, 10 August 1925.

Characters: Nearest *P. s. sordida* of the Philippine archipelago proper, but blue of rump and wing coverts of a richer, deeper cobalt color (deeper than in any other race of this widely distributed species); in *sordida* these areas are paler and greener, more of a turquoise color. The outer edges of the inner secondaries are bluer, less green, in *palawanensis,* although this can be matched in some specimens of *sordida.* The green of the dorsum of *palawanensis* can be seen, in series, to be lighter than that of *sordida.* This difference is not apparent on the underparts, which are subject to much individual variation in the amount of bluish wash over the green.

The odd plumage variation in which the green dorsal and ventral feathers are marked with black streaks is more common in *sordida* than in *palawanensis.* These markings, not known to be correlated with age or sex, are present in 10 out of 25 (40%) of *sordida* examined, and in 3 out of 24 (12.5%) of *palawanensis.*

In addition to color differences described above, Palawan specimens have, on the average, longer bills than those of *sordida.*

Remarks: Three type specimens have been examined during this study; those of *Pitta atricapilla rothschildi* Parrot, *P. leucoptera* Elliot, and *P. persola* Brodkorb. The type of *rothschildi,* from Marinduque, is strikingly different from any other specimen of *Pitta sordida* examined in having a strong blue wash on the underparts. Other characters ascribed to it by Parrot are not apparent. A female from Marinduque, however, collected within three days of the type of *rothschildi,* is inseparable from a series of *sordida,* and I agree with Hartert (1922: 379) that *rothschildi* represents an extreme variant of *P. s. sordida.* The type of *leucoptera* is a very young juvenile without data. The blue feathers of the rump do not match those of Palawan birds in shade, so *leucoptera* need not be considered as a possible name for the Palawan race.

The type of *Pitta persola* Brodkorb, 1934, is in the Museum of Zoology of the University of Michigan, where I examined it on 16 April 1957. It is a specimen in very poor condition. The underparts are badly faded, and the abdomen may well have been as brilliantly red as in any *sordida* when fresh. There is no sign of any black in mid-abdomen, "*persola*" in this respect resembling CM No. 100845, an immature specimen of *sordida palawanensis.* There are, however, no other indications of immaturity about the type of *persola,* in spite of the conjectures of Hachisuka (1935: 423). The bill of this specimen, although broken, can be seen to be smaller than that of normal *P. s. sordida,* and thus much smaller than that of *P. s. palawanensis.* The nostril of *persola* was described as being "narrow and almost linear, instead of broad and oblique" as in the single specimen of "*sordida*" (= *palawanensis*) examined by Brodkorb. Actually the nostril is not unlike that of certain specimens of *sordida;* there is much variation in apparent shape of the nostrils depending on the way the operculum has dried, and on whether a thread was passed through the nostrils by the preparator (a deplorable but virtually universal practice). The supposed darker bill and feet of *persola* can be matched in series of *sordida.* The two characters in which *persola* departs completely from *P. s. sordida* and *P. s. palawanensis* are the green rather than black tail, and the complete absence of white on the primaries. As noted by Hachisuka (*loc. cit.*), these are characteristics of a southern group of subspecies of *Pitta sordida* from the Celebes, New Guinea, etc. This fact, together with the "make" of the skin itself, suggests that the type of *Pitta persola* was probably a native trade skin purchased by Steere in the market in Puerto Princesa. I cannot agree with Meise (1938: 158) in considering *persola* to be an aberrant specimen of the Palawan population of *Pitta sordida;* the name *persola* will probably find its way into the synonymy of one of the southern races of *Pitta sordida,* but it is certainly not applicable to the population here called *Pitta sordida palawanensis.*

Measurements (in millimeters): Bill from anterior edge of nostril:

P. s. sordida; 12.4, 13.1, 13.5, 13.5, 13.7, 13.8, 13.9, 14.1, 14.3, 14.4, 14.8, 14.8, 14.9, 14.9, 15.0, 15.1, 15.3. *P. s. palawanensis*; 14.5, 14.7, 15.2, 15.3, 15.3, 15.3, 15.7, 15.7, 16.3, 16.4, 16.4, 16.5, 16.6, 17.2, 17.6. Sexes are alike in size. There is no significant difference in wing length between *palawanensis* and *sordida* in general. Within *sordida,* two birds from Negros and one from Samar are rather short-winged (95, 101, and 97 mm as compared with 101–107 mm for Luzon birds), and the Samar specimen has the smallest bill of any Philippine example measured (12.4 mm). It is doubtful, however, whether any further subdivision of *sordida* is either practical or desirable.

Specimens examined (adults only): *P. s. palawanensis*: PALAWAN—23; BALABAC—1. *P. s. sordida*: LUZON—8; MARINDUQUE—2 (including type of *rothschildi*); MINDORO—1; NEGROS—2; CEBU—1; SIQUIJOR—1; SAMAR—1; MINDANAO—1; BASILAN—4; JOLO—3; TAWI-TAWI—1. Also types of *Pitta leucoptera* and *P. persola,* and specimens in AMNH of all recognized races of *P. sordida.*

Saxicola caprata randi, new subspecies

Type: Female, AMNH No. 459839, collected at Bondo, Siaton, Negros, Philippine Islands, by D. S. Rabor, 30 January 1954 (collector's No. 5931).

Characters: Females differ from *S. c. caprata* of Luzon as follows: much blacker above; throat paler, more grayish or whitish rather than cinnamon-buff; underparts with heavy black shaft-streaks, accentuated in worn plumage; thighs distinctly spotted rather than faintly spotted or immaculate; under tail coverts averaging paler buff, contrasting more with color of lower abdomen; a partly-concealed white patch, formed by the inner webs of the smaller tertials and adjacent coverts, is present on some (not all) individuals, varying in degree of development (this mark absent in *caprata*). Females agree with those of *S. c. anderseni* Salomonsen from Mindanao in coldness of color tone and frequent presence of white wing-patch, but *anderseni* is a pale race with little or no shaft-streaking on the underparts. Males of the three Philippine races are not surely separable, although there is a tendency for *caprata* to have solidly black axillars, those of *randi* and *anderseni* usually being tipped with white.

Remarks: Specimens of *randi* have been examined from Negros, Bohol, and Siquijor. One female from Panay and one from Mindoro are too pale to be *randi* and too gray to be *caprata,* most nearly resembling the geographically distant *anderseni.* Additional specimens may show the existence of another race from the islands south of Luzon and north of Negros and Bohol. A single male from Ticao is unidentifiable.

This subspecies is named for Dr. A. L. Rand of the Chicago Natural History Museum, in recognition of his many contributions to our knowledge of the birds of the central Philippines.

Specimens examined: S. c. caprata: LUZON—20. *S. c. randi*: NEGROS—5; BOHOL—14; SIQUIJOR—1. *S. c. anderseni*: MINDANAO—6. *S. c.* subsp.: MINDORO—2; PANAY—1; TICAO—1.

Aethopyga shelleyi minuta Bourns and Worcester

The subspecies *flavipectus* of the highly polytypic sunbird *Aethopyga shelleyi* is assigned by Delacour and Mayr (1946: 232) to the islands of Luzon, Mindoro, and Polillo. The subspecies *rubrinota,* described from the small island of Lubang (northwest of Mindoro), is considered by these authors to be "doubtfully separable." Gilliard (1950: 500) erroneously cites the type locality of *flavipectus* as Mindoro; Ogilvie-Grant based this name on Whitehead's specimens "from the mountains of Northern Luzon." I have been able to locate only four specimens from northern Luzon; all are in the AMNH, and all, unfortunately, are males. Comparison of these specimens with others from central and southern Luzon and Mindoro, and with *rubrinota* from Lubang (lacking in the AMNH collection and thus not seen by Delacour and Mayr) indicates not only that *rubrinota* is a valid race, but that *flavipectus* is confined to northern Luzon. A third race inhabits Luzon south of the range of *flavipectus;* these birds are inseparable from those of Mindoro, so the name *Aethopyga minuta* Bourns and Worcester (1894: 18), based on a lost unique type from Mindoro, may be revived for this additional race.

Males of true *flavipectus* from northern Luzon are similar to *rubrinota* of Lubang in being pale yellow below; however, the yellow is slightly deeper in *flavipectus,* and is palest and greenest on the throat, deepening posteriorly. In *rubrinota* the yellow is nearly uniform. The relative depth of the yellow of the rump agrees with that of the breast. The iridescence of the forehead is definitely more purplish, less green in *rubrinota.* This is also true, although difficult to see, of the posterior half of the iridescent moustachial stripe. This difference in iridescence does *not* hold true for the upper tail coverts, which are identical in color in the two races. The red of the back and sides of face and neck is slightly duller in *rubrinota.*

True *flavipectus* differs from *minuta* in being decidedly paler yellow below and on the rump, and in having the green of the crown darker and duller. Only one of the 9 adult males of *minuta* seen has a bill as slender as those of the 4 *flavipectus.* Width at the base of the bill, in millimeters, is as follows:

flavipectus: 3.1, 3.2, 3.3, 3.3
minuta (Luzon): 3.7, 3.7, 3.8, 3.8
minuta (Mindoro): 3.2, 3.7, 3.8, 3.9, 3.9.

Ripley and Rabor (1958: 73) found a difference in the red of the back between their three Mindoro males and a single male from Tayabas, Luzon. When additional specimens are examined, this difference is shown to be due to individual variation.

As mentioned previously, no females of true *flavipectus* from northern Luzon were available. Females of *rubrinota* agree with males with respect to general paleness of their yellows. Females of *minuta* appear to be highly variable, and the material at hand does not show conclusively whether or not this may be correlated with age. None of the specimens is marked "immature" or "adult" on the label, but I suspect that the paler, grayer (less greenish below) females such as CNHM No. 98896 (Lamao, Bataan, Luzon) may be immature individuals.

The geographic variation of *Aethopyga shelleyi* in the northern Philippines parallels in some respects that of *Parus elegans* (Parkes, 1958). In both species there is a pale, greenish-yellow race in the mountains of northern Luzon, while the richly yellow birds of southern Luzon and Mindoro are inseparable. Ripley and Rabor (1958: 67–69) did not recognize the northern Luzon *Parus elegans montigenus*, but they had adequate material only from Mindoro. Their series of 17 adult males from Mindoro, 4 from northern Luzon, and 2 from southern Luzon, were all included within the series of 18, 37, and 19, respectively, assembled for my revision of this species. The larger series does not support the conclusions of Ripley and Rabor.

Specimens examined: A. s. rubrinota: Lubang—4 ♂, 3 ♀. *A. s. flavipectus*: Luzon—Sablan, Benguet, 2 ♂; "North Luzon," 2 ♂. *A. s. minuta*: Luzon—Bataan Prov., 3 ♂, 1 ♀; Laguna Prov., 4 ♀; Tayabas (= Quezon) Prov., 1 ♂, 1 ♀. Mindoro—Mt. Halcon range, 4 ♂, 1 ♀; Rio Baco, 1 ♂, 1 ♀; Alcate, Victoria, 1 ♂, 1 ♀. Ripley and Rabor (1958: 14) list *Aethopyga shelleyi* among the species typical of "lowlands and rolling country" that also extend their range into "foothills and moderate mountain elevations (1,500–3,500 feet altitude)." But USNM No. 202457 was taken at 4,500 feet on a "spur of main ridge of Mt. Halcon," and AMNH Nos. 686595–6 at 5,000 feet on Mt. Dulangan.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A REMARKABLE NEW SPECIES OF NEOTROPICAL *AGALLIOPSIS* AND THE PREVIOUSLY UNKNOWN MALE OF *AGALLIOPSIS INSCRIPTA* OMAN (HOMOPTERA: CICADELLIDAE: AGALLIINAE)

By James P. Kramer
Entomology Res. Div., Agricultural Res. Serv., U. S. Dept. Agriculture

The genus *Agalliopsis,* at least as presently conceived, is found in both the Nearctic and Neotropical Regions. Oman reviewed the North American species in 1933 (U.S.D.A. Tech. Bull., 372: 8–24); the Central American species in 1934 (Ann. Ent. Soc. America, 27(3): 445–453); and the South American species in 1938 (Ann. Carnegie Mus., 25: 354–362).

For the most part, leafhoppers of the genus *Agalliopsis* are not known for either their bright coloration or large size. Most of them are rather drab insects whose coloration involves various shades of brown, yellow or black. Few are more than 5 mm, while the great majority are 4 mm or less in length.

It was, therefore, surprising to find a strikingly colored undescribed species of comparatively gigantic size among the undetermined neotropical leafhoppers in the collection of the U. S. National Museum. Both W. E. China of the British Museum and R. Linnavuori of Turku, Tyttölyseo, Finland, were consulted regarding this species and they are also of the opinion that it is undescribed. In addition to the description of the new species, the male of *Agalliopsis inscripta* Oman is reported for the first time.

Agalliopsis rex, new species

Length: Male 8.25 to 8.75 mm. Not very close to any described member of the genus, but with the posterior margin of crown sinuately curved laterally and produced behind eyes although not strongly so. Comparatively long, slender species. Genae longitudinally wrinkled. Posterior

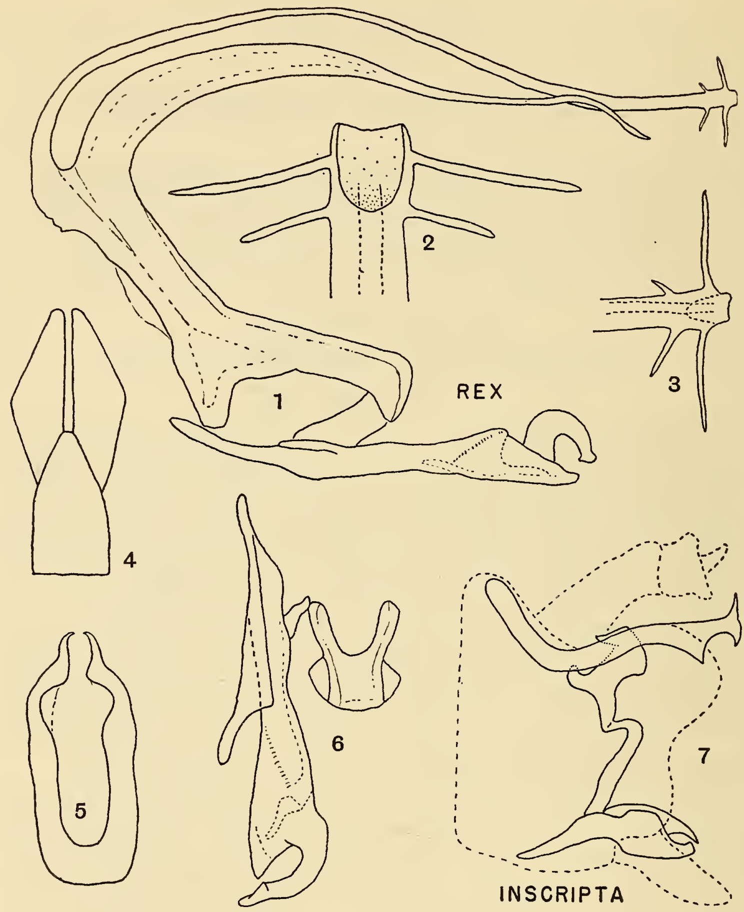

Fig. 1–7

margin of pronotum straight. Tegmina greatly exceeding abdomen in length and without second cross-vein between sectors.

Coloration: Head black, eyes brownish, ocelli and antennae reddish. Genae reddish in some specimens. Pronotum, scutellum, thoracic venter and legs black. Genital capsule black, rest of abdomen scarlet to red. Tegmina varying from scarlet to rusty red with apices black to dark fumose. Whitish bloom on some specimens, most noticeable on black areas of head and thorax.

Male genitalia: Pygofer simple, without processes or notches. Both valve and plates elongate (Fig. 4). Tenth segment terminating with a pair of hooklike processes (Fig. 5). Aedeagus exceedingly long, flattened, slender, almost ribbon-like, with rather stout ventral accessory process (Fig. 1). Two pairs of slender processes at tip of aedeagus, and gonopore ventral, at apex (Fig. 2). Style in ventral view with mesal lobe or inner fork long and curved laterad; the connective short, Y-shaped and articulated with aedeagus (Fig. 6).

Holotype: Male, Ecuador, 3,000 ft. USNM No. 64866. Seven paratype males as follows: 1—same data as type; 1—Colombia; 1—Tuyo-c, Ecuador; 4—Zunái, Ecuador. Female unknown. Paratypes will be deposited in the British Museum and in the Linnavuori collection.

A. rex may be separated from all other members of *Agalliopsis* by its strongly contrasting scarlet to rusty-red and black color pattern, its large size and distinctive male genitalia.

Agalliopsis inscripta Oman

1934. *Agalliopsis inscripta* Oman, Ann. Ent. Soc. America, 27(3): 450.

The original description of this species was based upon three female specimens. The male specimen on hand fits this description exactly. Comparison with the only paratype in the USNM confirms the identity of the male.

Habitus, including size and color, as in female.

Male genitalia: Pygofer indented on both dorsal and caudal margins. Male plates not fused basally. Valve poorly defined. Tenth segment with sharp, broad, ventral, preapical expansion terminating nearly truncately, with sharp dorsal and ventral points of moderate length. Aedeagus short, moderately stout and irregular in outline. Styles rather short, with forks of about equal length. (Fig. 7.)

Single male in USNM collection with data: Antonio-Such., Guatemala, 26 January 1955, J. Castro. The holotype female was collected at Cerro Zunil, Guatemala, and is in the British Museum.

Explanation of Figures

Figs. 1–6.—*Agalliopsis rex* (holotype). 1. Lateral view of aedeagus (somewhat twisted), connective and style. 2. Ventral aspect of aedeagal apex. 3. Dorso-lateral aspect of aedeagal apex. 4. Ventral view of valve and male plates. 5. Tenth segment in dorsal view. 6. Ventral aspect of connective and style.

Fig. 7.—*Agalliopsis inscripta*, lateral view of entire genital capsule with all component parts. [Drawings made at various magnifications.]

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

VARIATION IN THE CUBAN LIZARD *LEIOCEPHALUS RAVICEPS* COPE

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Of the five species of the genus *Leiocephalus* inhabiting Cuba, the least known is *Leiocephalus raviceps* Cope. Described by Cope in 1862 on the basis of specimens collected by the botanist Charles Wright in "eastern Cuba," *L. raviceps* was unknown to Gundlach except from the original description (Gundlach, 1875:354; 1880:34). Barbour (1914:301) followed Boulenger in regarding *L. raviceps* as a synonym of *L. vittatus* (= *L. cubensis*), but later he and Ramsden (1919:173) followed Stejneger (1917:53) in affirming the distinctness of the species, although they were not certain that it was Cuban. These two authors assumed that Wright's types came most probably from the Sierra de Yateras (probably owing to Gundlach's (1880) comment), but Ramsden was unable to find the lizard in that immediate area. This is not surprising, when it is known that *L. raviceps* is an inhabitant of the most xeric areas in Cuba, and is not known to occur in mesic areas or forest.

Cochran (1934:39) apparently was the first to report *L. raviceps* from a definite locality in Cuba; she cited specimens from four localities in the vicinity of Guantánamo Bay in Oriente, and erroneously (see Schwartz, 1959:110–11) from the Doce Leguas keys off Camagüey Province. Alayo (1951:109; 1955:16) reported the species from La Socapa, on the west side of the Bahía de Santiago, and from Laguna de Baconao on the coast road between Santiago de Cuba and Guantánamo. Thus, *L. raviceps* is now known from the region of the Bahía de Santiago east to the Bahía de Guantánamo; the only record of the species to the west of the Bahía de Santiago is Alayo's specimen from La Socapa, whereas the only record from east of the Bahía de Guantánamo is that of Cochran from Boquerón.

During the summer of 1959, specimens of *L. raviceps* were collected at various localities on the south Oriente coast by myself, Ronald F. Klinikowski, and Barton L. Smith. During the Christmas holiday season of 1959, a new series was taken in the Sierra de Purial by myself and James R. Talada. All these collections were made under a National Science Foundation research grant. For the first time, ample series of specimens from various localities are available. It is not surprising that two subspecies are readily distinguishable in the material from Oriente. In addition to these fresh specimens, I have had the opportunity to examine the cotypes of *L. raviceps* in the U. S. National Museum, as well as a small series collected by Thomas M. Uzzell, Jr., and Richard Etheridge at the U. S. Naval Base on the east side of Guantánamo Bay, and a single specimen from Baracoa. I wish to thank Doris M. Cochran, Norman E. Hartweg, and Miguel L. Jaume García for permission to examine specimens respectively in the U. S. National Museum (USNM), Museum of Zoology, University of Michigan (UMMZ), and the Museo y Biblioteca de Zoología de la Habana (MBZH). Knowing my interest in the species, Messrs. Uzzell and Etheridge kindly allowed me to examine their very pertinent material. The illustrations are the work of Ronald F. Klinikowski; his work on my behalf is sponsored by a National Science Undergraduate Research Participation grant.

In addition to the specimens from Oriente, we collected a series of *L. raviceps* on the northern coast of Matanzas Province near Varadero. These specimens are the first extra-Oriente lizards of this species, and they too represent a distinct new form; a distance of some 690 kilometers separates this population from the nearest known Oriente population of *L. raviceps*.

In order to establish which of the three populations of *L. raviceps* best agrees with Cope's concept of the species, I have examined the seven cotypes of the species (USNM 4162). This series consists of two adult males and five adult females, all in fair condition considering their preservation for almost a century. Cope's (*op. cit.*:183) description of coloration and pattern are a composite of the series; he stated, "Above yellowish brown, with many short, narrow, black longitudinal lines, which are something arranged as a double series of dorsal spots." In general, the males have the dorsal short lines (dashes), whereas the females have a double series of dorsal spots. This characterization of the cotypes, along with Cope's comment "Top of head light yellowish brown," is sufficient to restrict it to the population of *L. raviceps* which occurs east of the Bahía de Guantánamo, *i.e.*, between Guantánamo and Cajobabo, and in the Sierra de Purial. The remainder of Cope's description is consonant with the allocation of the cotypes with this population, and examination of the series of cotypes confirms this arrangement. Comparison of the types with fresh material from this region, and with specimens of the new dark race from farther west along the Oriente coast, shows that this area is occupied by the nominate form.

Only Gundlach (1880:34) has attempted to restrict the type locality of *L. raviceps* Cope; this Cuban herpetologist restricted it to "the mountains near Guantánamo, Oriente." This general locality was not unlikely, since it is known that Wright collected in this area. Repeated search for *raviceps* in the mesic Sierra de Yateras by herpetologists yielded no specimens. However, the species does occur in the very different and xeric Sierra de la Vela to the southeast of Guantánamo on the east of the Bahía de Guantánamo. Thus if Gundlach's type locality restriction of "the mountains near Guantánamo" is understood to refer to the Sierra de la Vela or other of the dry coastal ranges, this locality may be regarded as correct.

I have seen no specimens from Guantánamo itself; I suspect that *raviceps* occurs to the south of that city, on the west side of the Bahía, in the xeric and *Opuntia*-studded plains which occur close to the city itself. We collected one specimen near Caimanera. To the southeast of Guantánamo, between the city and the U. S. Naval Base, no *raviceps* were collected, and in general this area now, at least, appears unsuitable. However, as one approaches the Naval Base, the typical xeric features of the flora and landscape appear, and the species should occur there, as it does in the Sierra de la Vela.

The population of *L. raviceps* between the Bahía de Santiago and the Bahía de Guantánamo differs in coloration, pattern, and certain features of scutellation from that to the east; for this western population I propose the name, in honor of Thomas

M. Uzzell, Jr., who collected the first fresh specimens of *L. raviceps* which I had seen, as:

Leiocephalus raviceps uzzelli, new subspecies

Type: American Museum of Natural History (AMNH) 79321, from 18.2 kilometers east of Siboney, Oriente Province, Cuba, taken 25 July 1959; one of a series obtained by Ronald F. Klinikowski, Albert Schwartz, and Barton L. Smith. Original number 7867. See Fig. 1.

Paratypes: AMNH 79310–20, 79322–35, same data as type.

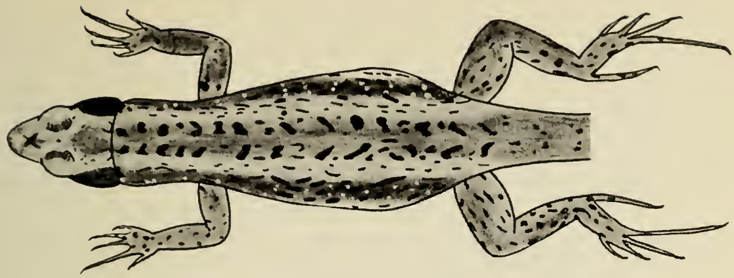
Specimens examined and not designated as paratypes: AMNH 79336–40, 26.6 km E Siboney; AMNH 79341–45, Laguna de Baconao, 21.8 mi E Siboney; AMNH 79346, 2 mi N Caimanera.

Distribution: The southern Oriente coast from the Bahía de Santiago to the Bahía de Guantánamo.

Diagnosis: A subspecies of *L. raviceps* characterized by dark tan coloration with sharply differentiated darker brown lateral fields, relatively prominent dark brown to black dorsal dashes or paired blotches, usually well defined postorbital blotch and more often incomplete than complete supraorbital semicircles.

Description of type: An adult male, with the following measurements (in millimeters): snout–vent length 65; tail 96, complete; snout to anterior border of tympanic opening 13.7; head width 11.4; supraocular scales 7/7; loreals 3; temporals 9; enlarged auricular scales 4/4; median head scales 4; prefrontal row complete 3 scales; frontoparietal row complete 5 scales; parietals in contact; semicircles incomplete; dorsal crest scales occiput to vent 65; dorsal crest scales occiput to axilla 27; scales around half body at midbody 33; fourth toe subdigital tricarinate scales 25/26.

Coloration: The dorsal coloration in life is yellowish tan. There is a darker brown lateral field, which in life contained scattered yellow and red scales, extending from the eye to the groin. The dorsal surface of the head is likewise yellowish tan with some of the scales, especially the inner margins of the semicircles, outlined by black. The dorsum between the lateral fields shows a median zone which is set off laterally by a longitudinal paler zone. Ventral to the lateral field there is a longitudinal pale whitish band which extends from above the tympanic opening to the groin; this line is outlined below by a faintly gray longitudinal band, which merges gradually into the pale gray venter. The dorsal crest scales are not set off by their coloration from the remainder of the median dorsal tan band. The median zone includes a series of about 13 more or less triangular dark brown blotches, their apices pointed posteromedially; the anterior blotches are darker and more rectangular than the posterior ones. There are a few short, dark longitudinal dashes between the blotches. The next adjacent longitudinal zones, which have a paler ground color, are marked with scattered longitudinal dashes, involving two to three scales. The lateral fields are marked with diagonal dark dashes, which are prominent on the sides and somewhat fainter on the neck; these dashes continue more ventrally between the limbs to midway between the limb in-



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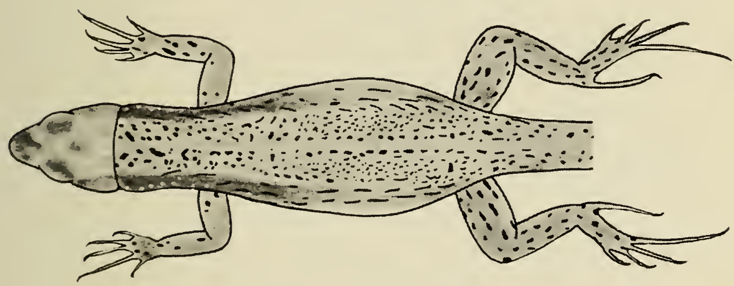

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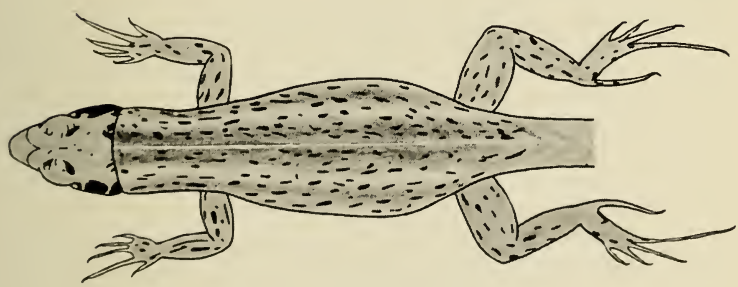


3.

Fig. 1–3

sertions. Scattered light scales in and below the lateral fields were yellow in life; these light scales continue onto the abdomen as a series of transverse rows of white dots against the pale gray of the abdomen. The dorsal surfaces of the limbs are tan; the hindlimbs have a combination of short brown dashes and scattered cream colored scales on their dorsal surfaces, and these markings continue onto the dorsal surface of the foot. The postorbital blotch is represented by a slightly gray area on the cheek, with a few brownish scales intermingled with the gray. The upper labials are suffused with tan; the lower labials have deeper tan pigment along the infralabial sutures, giving the lower lip a somewhat mottled appearance. Three white bands radiate ventrally from the eye, the posterior two separated by a vertical black bar which extends ventrally from the middle of the eye. The entire ventral surface is pale gray, and the throat is immaculate. The underside of the hindlimbs and the posterior third of the abdomen have scattered brown dots; these dots extend as well onto the basal portion and sides of the tail. In addition, cream colored scales occur on the underside of the hindlimbs and tail. Thus these members are pale gray with scattered brown spots, and more abundant cream colored spots.

Variation: In snout–vent length, 21 adult male *L. r. uzzelli* average 63.2 mm (55–71); 9 adult females average 48.1 (45–53). Dorsal crest scales (combined data for both sexes) in occiput–vent length average 63.4 (56–69), and dorsal crest scales in occiput-axilla average 26.0 (23–31). One half scales at midbody average 32.4 (29–36), loreals 3.3 (2–5); temporals, 11.0 (8–13), subdigital fourth toe tricarinate scales 24.3 (22–28). The parietals are always in contact, and the supraorbital semicircles are more often incomplete (53%) than not. The supraoculars are most often 7/7 (68%), with 6/6 occurring as the next most frequent (13%) category. Variation in this character includes in addition counts of 5/5 (3%), 5/6 (6%), 6/7 (6%), and 7/8 (3%). If all counts which include at least 7 supraoculars (at least unilaterally) are combined, 77% of the population is differentiated from the 23% which have counts ranging from 5/5 to 6/6.

Since there is a certain amount of sexual dimorphism in pattern, the two sexes will be discussed separately. Males can be distinguished from females in that the former have two pairs of enlarged postanal scales. All males are relatively darkly pigmented in life, with a conspicuous lateral field as compared with the paler *r. raviceps*. Some males demonstrate a yellowish suffusion of the head scales in life, but in general this has disappeared in preservative; the more common condition in *uzzelli* is the unicolored tan head scales. The dorsal pattern is like that described for the type in most cases—a series of paired dark rectangular or triangular blotches in the median tan zone. Some specimens lack these blotches and have them supplanted by a uniform series of longitudinal dashes or even dark dots; any combination of these patterns may occur on the same individual. The lateral fields are always dark and prominent with bold black diagonal dashes. The postorbital blotch varies in intensity, but the type is unusual in the faint pigmentation of the postorbital area; usually the cheek is covered by a heavy black blotch, or there is at least some black pigment in this area, and the "blotch" may appear as a hollow or open-ended rectangle, brown to tan centrally; the blotch is, even at its most reduced, usually better defined and more prominent than it is in *r. ravi-*

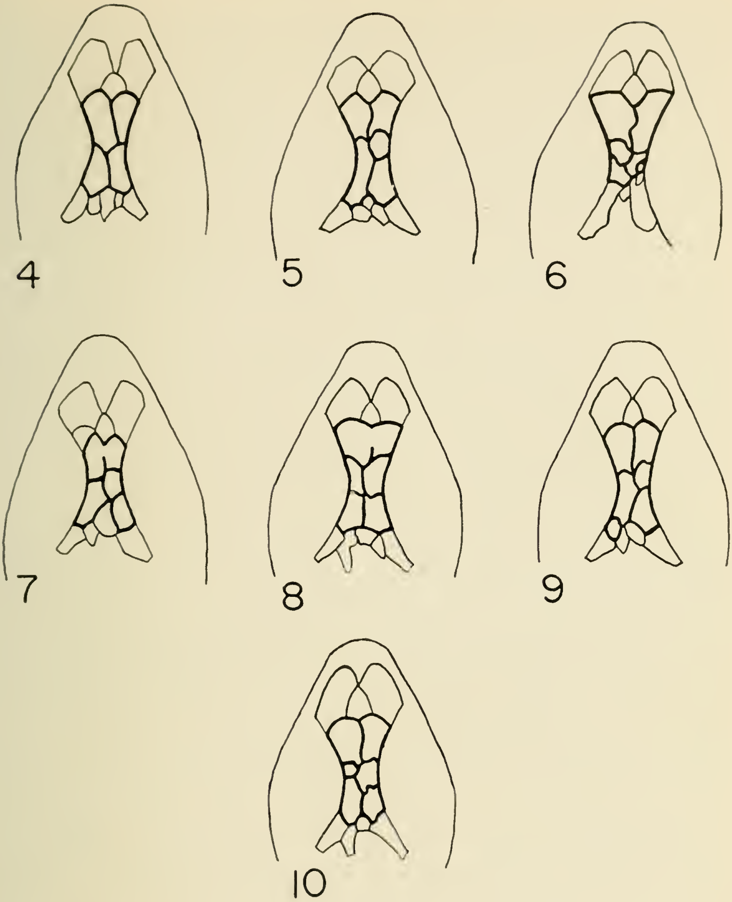


Fig. 4–10

ceps. Unregenerated tails have a pattern of about 17 dorsal chevrons, their apices pointed posteriorly; the ground color of the tail is faintly pinkish in life, and this serves to distinguish these lizards in the field. The throat usually is immaculate, varying in color from white to very pale lavender to gray, with occasional clear cream colored scales scattered on its margins. Some males show a few gray lines or dots on the throat; this gray pigmentation occurs in juveniles more regularly than adults, but it appears not to be strictly ontogenetic in nature. The undersides of the hindlimbs, posterior abdomen, and basal portion of the tail are dotted with dark brown as are these members in the type.

The females present the same dark appearance as the males, but are more distinctly lined longitudinally (*cf.* Schwartz, *op. cit.,* sexual dimorphism in *L. cubensis* and *L. stictigaster*). The female pattern is an intensification of that described for the males—the paired dorsal blotches (only one female shows any additional dorsal pigmentation in the form of dark dashes in the median zone). The sides have the diagonal dark dashes which may be somewhat inconspicuous due to the dark coloration of the lateral fields. The hindlimbs have dorsal dark dashes, but these may be obscure. The postorbital blotch is usually demonstrated by a slightly darker brown area on the cheek. The females, in contrast to the males, almost always have dark gray dots, often aligned into longitudinal rows, on the throat, and usually lack any dark dots on the underside of the hindlimbs, although the belly usually has brown dots on its posterior third. Both sexes have the pale facial markings described for the type, but they are more clearly expressed in the females than the males. Usually there are but two, rather than three, light subocular areas, the anteriormost being obscured by the deposition of tan pigment, and the posterior two being separated by a definite vertical black bar. The juvenile males resemble the females in pattern and pigmentation very closely.

All specimens but six have four median head scales (see Fig. 4); five specimens have five median head scales (see Fig. 5) and one has six (see Fig. 6). This condition of five and six, rather than four, scales is caused either by the unequal transverse division of one of a pair of scutes or by the unequal division of both members of a pair.

Comparisons: L. r. uzzelli differs from its relative, *L. r. raviceps,* to the east in both coloration and scalation, as follows: Although both races are tan dorsally, *uzzelli* is by far the darker of the two; *raviceps* has a distinctly faded or "washed out" appearance (see Fig. 2), whereas *uzzelli* is darker. Male *uzzelli* have the lateral fields very dark, and the dorsum is marked either with dark brown or black dashes, often organized into two series of paired black or brown blotches on either side of the dorsal midline. This feature seems to be a retention into the adult of the juvenile (and female) blotched pattern. Even if the dorsal pattern is composed of dashes, there are at least two pairs of blotches in the nuchal area, and thus at times the subspecies *uzzelli* may superficially resemble *L. m. macropus.* The postorbital blotch is usually demonstrated, in contrast to the condition in *raviceps,* and when best expressed, is black and outlined anteriorly by a light line extending ventrally from the eye onto the posterior supralabials, and extends posteriorly to the tympanic opening. Ventrally, males of the two subspecies are much alike, except that *uzzelli* males often have a few gray lines or dots on the throat, and the undersurface of the hindlimbs, basal portion of the tail and posterior abdomen are much more heavily and profusely marked with dark brown dots. In contrast to the dull face and labial markings of *raviceps, uzzelli* has distinct facial markings of dark brown or black consisting of three lines (one just below the canthus rostralis, another from the anterior corner of the eye, and the third from the posterior half of the eye) which encloses three light areas and extend onto the supralabials. The infralabials are regularly mottled white and dark brown to tan. Female *uzzelli* resemble female *raviceps* except that the latter females are much paler and appear faded, and lack the female *uzzelli* face pattern of a single vertical black line through the center of the eye. The gray throat markings of female *uzzelli* are more pronounced and darker than those of *raviceps*, and one female demonstrates brown dots on the underside of the hindlimbs.

As noted above, the two races differ in general coloration, *raviceps* being more distinctly yellowish-tan than *uzzelli*. The yellowish suffusion on the head of *raviceps* is not shown so distinctly in *uzzelli*, although occasional specimens do show it. *L. r. uzzelli* shows yellow or red dots (lateral scales) on the sides and in the area of the shoulder, and apparently lacks the green lateral scales of *raviceps*.

Males of the two subspecies do not differ in snout–vent length; 23 adult male *raviceps* average 66.5 mm (61–71). Eleven adult females average 54.5 (52–57); it is possible that the females of *uzzelli* are consistently smaller than those of *raviceps*, but there are too few *uzzelli* females available to be certain. At present the females of the two races can almost be separated by size alone (largest female *uzzelli* 53 mm, smallest female *raviceps* 52 mm). Means and extremes of scale characters of *raviceps* are: dorsal crest scales in occiput–vent length 64.2 (55–74); dorsal crest scales in occiput–axilla length 27.5 (22–32); one half scales at midbody 32.3 (27–36); loreals 3.6 (2–5); temporals 11.6 (9–15). None of these counts are significantly different from those of *uzzelli*. However, tricarinate subdigital fourth toe scales 25.5 (21–30) in *raviceps*; inspection of Fig. 11 indicates that this count is significantly higher than that of *uzzelli*. Both races usually have four median head scales; only one *r. raviceps* examined had five median head scales. Both races usually have 7/7 supraoculars; 71% of *r. raviceps* have 7 or 8 supraoculars at least unilaterally. Parietal contact occurs in 95% of the *r. raviceps*; the semicircles are complete in 81% of the lizards. This is in contrast to *uzzelli*, in which 47% of the specimens have complete semicircles; the difference is significant.

Remarks: The south Oriente coast lies in the rain shadow of the Sierra Maestran system; specifically, between the Bahía de Santiago and the Bahía de Guantánamo, the range involved (which is considered as part of the Sierra Maestra by Marrero, 1951: 584) is the Cordillera de la Gran Piedra. North and east of the Guantánamo Basin are the Sierra del Guaso, the Sierra de Maquey and the Sierra de la Vela. The extensive Sierra de Purial (Las Cuchillas) limits the very narrow coastal area from east of Guantánamo to Cabo Maisí. Marrero (*op. cit.*: 658) described the coast from Guantánamo to Cabo Maisí in the following accurate terms: "The southern coast of Oriente, from Guantánamo eastward, is in reality a desert, with infrequent rains during the entire year and a xerophytic vegetation, in which cacti predominate, interrupted only by the gallery vegetation at the base of palms, together with the rare rivers which descend to the ocean." Later, Marrero (p. 659) mentioned the botanist Victorin's appellation for part of this region as the "inferno of Maisí"; such descriptions are verbally adequate to describe the intense heat, sandy and rocky soils, and xerophytic plants which characterize this coastal strip. The coast from Santiago to Guantánamo, while nonetheless hot and xeric, is less so than the Guantánamo area, and supports occasional stands of deciduous trees, mangroves, and palms, along with some low herbaceous cover. *L. raviceps* is widespread between Guantánamo and Cabo Maisí, but appears to be less so and more restricted to the niche of sandy soil and *Opuntia* between Santiago and Guantánamo. However, in this latter region, it has been found sparingly in other habitats, which are invariably dry. For example, at Laguna de Baconao, we took both *r. uzzelli* and *m. macropus* in close proximity to one another, at the edge of the mangrove border of the lake. However, *macropus* occurred within the shady forest on mud and moist ground, whereas *uzzelli* shunned this cooler habitat in preference to the dry and extremely hot hillsides.

Although the single specimen of *L. raviceps* from Baracoa (MBZH 136) is the only individual from the north coast of Oriente, and is separated from the south coast *r. raviceps* population by the Sierra de Purial, this lizard does not differ in any way from the southern coastal specimens of *r. raviceps*. It has the herringbone dorsal pattern which occurs in south coast *r. raviceps* and not in *uzzelli*. Although we collected *Leiocephalus* in the Baracoa area, no *raviceps* were taken. The series of lizards from the Sierra de Purial (AMNH 83791–806, from 4.6 mi N Cajobabo) shows that in extreme eastern Cuba the distribution of this lizard may not be completely coastal. Under proper conditions it may invade non-coastal montane areas, provided that the soil and moisture conditions are suitable. At this Cajobabo locality, the lizards were taken along the Cajobabo–Baracoa road in a dry and sunny road cut, as they ran about on the broken shale fragments where there was little or no plant cover. Such relatively isolated populations between the south coast and Baracoa may well maintain genetic continuity between the populations of the two coasts. On the other hand, *r. raviceps* may continue to Baracoa via a more or less continuous population from the south coast around Cabo Maisí and thence to Baracoa.

The absence of *L. raviceps* west of the Bahía de Santiago is puzzling; as noted previously, the only record for the species in this area is at La Socapa, which is on the west side of the bay itself. The common *Leiocephalus* on the coast south of the Sierra Maestra is *L. macropus*; there are no obvious differences in the vegetation or substrate of this coastal strip as compared to that of the Santiago–Guantánamo strip except the absence of the sand-*Opuntia* niche. It is possible that *raviceps* and *macropus* are competitors, and that the former has been unable to become established to the west of Santiago; another possibility is that the western coast is too moist for this species and the apparent absence of sandy soils and *Opuntia* is a limiting factor.

The completely unexpected occurrence of *L. raviceps* in Matanzas Province is indeed surprising. The series of 22 lizards from two localities near Varadero is very different in several features from *L. raviceps* in

Oriente, and accordingly, in honor of Ronald F. Klinikowski, the discoverer of this western population, I propose the name:

Leiocephalus raviceps klinikowskii, new subspecies

Type: AMNH 83326, adult male, from 4.5 kilometers southwest of Varadero, Mantanzas Province, Cuba, taken 8 September 1959, one of a series collected by Ronald F. Klinikowski, Albert Schwartz, and Barton L. Smith. Original No. 8528. See Fig. 3.

Paratypes: AMNH 83327–46, same data as type; AMNH 83347, 5.5 kilometers southwest of Varadero, Mantanzas, 8 September 1959, R. F. Klinikowski.

Distribution: Known only from the coast southwest of Varadero in Matanzas Province, Cuba.

Diagnosis: A subspecies of *L. raviceps* characterized by very pale yellowish tan dorsal coloration, lateral fields very inconspicuous and hardly differentiated from ground color, dorsum with prominent black dorsal dashes, poorly defined postorbital spot, usually 5 or 6 median head scales and 6/6 supraoculars, and high number of dorsal crest scales and scales around midbody.

Description of type: An adult male, with the following measurements in mm and counts: snout–vent length 69; tail 74, distal one third regenerated; snout to anterior border of tympanic opening 14.4; head width 11.8; supraocular scales 6/6; loreals 5; temporals 16; enlarged auricular scales 4/4; median head scales 6; prefrontal row complete 3 scales; frontoparietal row complete 5 scales; parietals in contact; semicircles complete; dorsal crest scales occiput to vent 62; dorsal crest scales occiput to axilla 27; scales around one half body at midbody 35; fourth toe subdigital tricarinate scales 24/26.

Coloration: The dorsal coloration in life is pale yellowish-tan, almost sand colored, with the dorsal crest scales immaculate pale yellow. There is little evidence of longitudinal zonation and the lateral fields are not appreciably darker than the dorsum itself, nor are they separated from the ventral gray coloration by an additional band of tan; the effect laterally is a gradual blending of the dorsal yellowish-tan coloration into the gray of the abdomen. The dorsal surface of the head is yellowish-tan with black pigment stippled over the head scutes, especially the prefrontals, posterior supraoculars, and the parietals and interparietal. The entire dorsum and lateral field area is marked with short black longitudinally aligned dashes (see Fig. 3), which become obscure on the neck and form two very faint pairs of nuchal blotches which are barely discernible. Cream colored isolated scales on the sides extend onto the abdomen in a series of five parallel rows, with additional cream scales on the abdomen anterior to the hindlimbs. Some of the tan scales in the lateral field area were orange basally in life. The forelimbs are mottled tan dorsally and the fingers are immaculate pale tan, giving the lizard a distinctly pale fingered appearance. The hindlimbs show short black longitudinal dashes on all sections, but they are arranged as spots on the foot itself; there are additional light scales on the dorsal surface of the hindlimbs. The postorbital blotch is represented by a vertical black bar behind the eye, and a darker irregular blotch posterior to this bar; the cheek itself is tan. Three gray lines radiate from the eye, one below the canthus rostralis, another from the anterior corner of the eye, and a third from the center of the eye; these extend to the supralabials, and are continued on the infralabial sutures. The entire ventral surface is gray, with a darker gray suffused area across the chin, another on the throat, and a few scattered cream scales on the throat. The undersurface of the hindlimbs is almost white, again with a few light tan dots scattered over the shank; darker dots occur on the posterior abdomen and on the underside of the tail. The unregenerated portion of the tail shows about six dull gray chevrons with the apices directed posteriorly; the ground color of the tail is dull reddish-tan in life.

Variation: In snout–vent length, four adult male *L. r. klinikowskii* average 58.5 mm (53–69); eight adult females average 51.9 mm (46–59). Dorsal crest scales (combined data for both sexes) in occiput–vent length average 66.2 (61–71), and dorsal crest scales in occiput–axilla length average 27.0 (24–29). One half scales at midbody average 35.3 (32–39), loreals 4.2 (4–5), temporals 13.9 (11–16), subdigital fourth toe tricarinate scales 25.9 (21–27). The parietals are more often (86%) in contact than not, and the supraorbital semicircles are always complete.

Of the three paratypic males, one resembles the type in dorsal pattern; the remaining two individuals have the dorsal zonation somewhat more apparent, and still retain some remnants of the juvenile male paired blotch pattern. All have pale yellowish-tan dorsa, very pale fingers, immaculate yellow dorsal crest scales, chevrons (about 18) on the complete tails, rather diffuse gray postorbital blotches, black stippling on the head scutes, and dark facial and labial markings. The three paratypic males lack brown dots on the undersurface of the hindlimbs, but show them on the underside of the base of the tail. One has a completely immaculate throat, and the remaining two have a gray suffusion and scattered diffuse gray dots. The eight adult females are much as the females of *raviceps* and *uzzelli* except that they are much paler; all but one show the paired female blotches and dashes in the lateral fields. The single exception is unusually gray and has dashes in the lateral field area and very pale gray dashes dorsally. All females have black on the head scutes, postorbital blotches absent or if present diffuse and gray, and a contrasting face pattern of gray or black lines. The inter-infralabial sutures are distinctly black, and the throat always has some indication of gray dots or dashes. The underside of the hindlimbs is usually immaculate white, but a few individuals have indications of very light tan dots. The dark brown belly dots are present and rather extensive.

There are 10 juvenile female paratypes ranging in snout–vent lengths from 26 to 44 mm. These show the same pattern as the adult females and differ only in the more definite dark gray chin and throat markings.

Nineteen of the 22 specimens of *klinikowskii* have five or six median head scales; variation in this feature is shown in Figs. 4 to 10. Only two individuals have four median head scales (Figs. 4 and 7). Fig. 7 shows that, although there are only four head scales in this case, anterior continuation of the incipient median suture would convert this pattern to five median scales. The other lizard with four median head scales differs in no wise from four-head-scaled individuals of *raviceps* and *uzzelli* (Fig. 4). Thus almost 100% of *klinikowskii* have either 5 or 6 median head scales, at least incipiently.

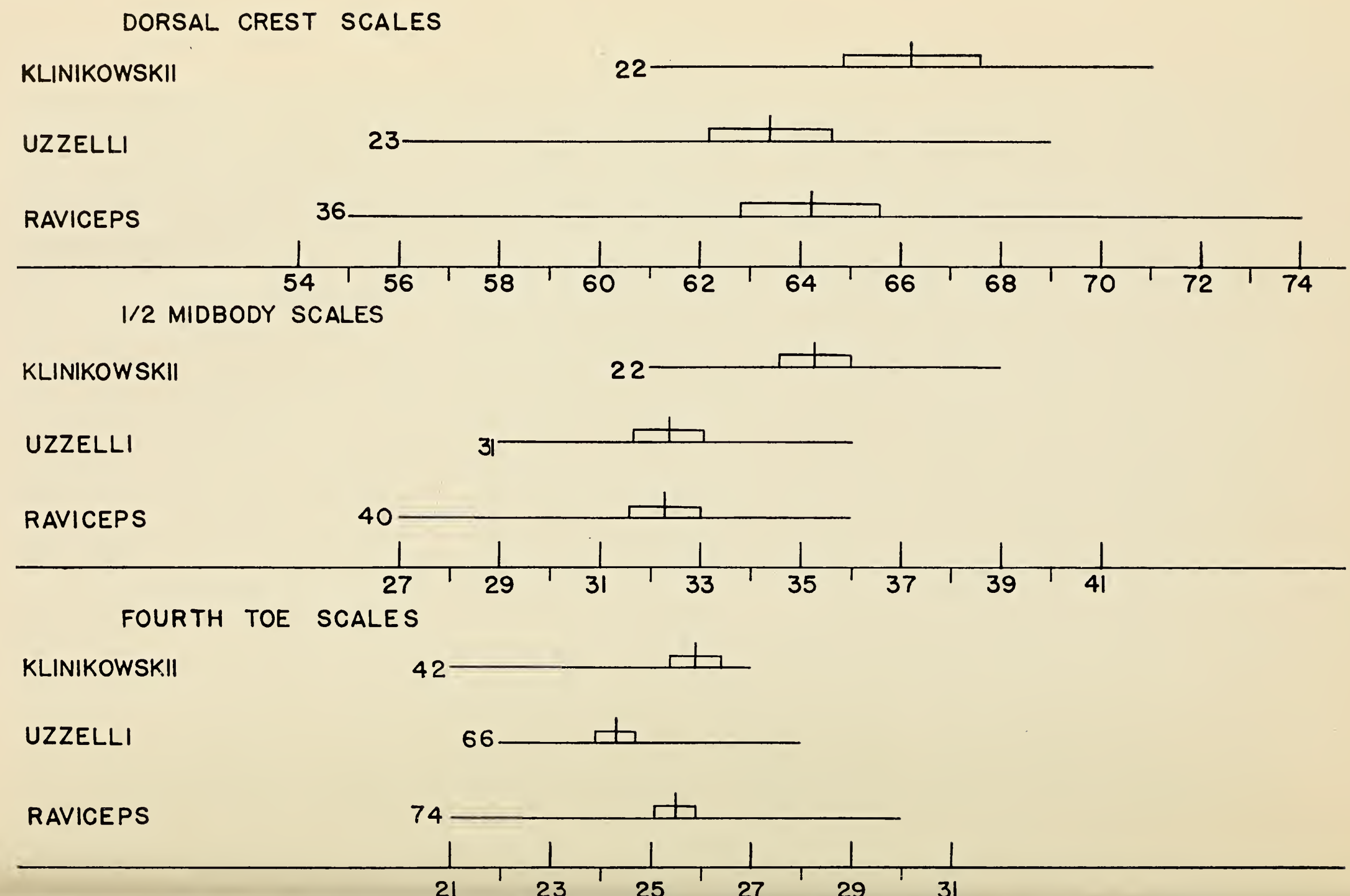
Variation in number of supraoculars is great; 6/6 occurs in the most individuals (12 lizards, 55%), and 6/7 in six lizards (27%). Only two (9%) *klinikowskii* have 7/7 supraoculars, in contrast to 68% in *uzzelli* and 44% in *raviceps*. Other counts in *klinikowskii* are 6/8 and 7/8 (one individual each). Counts of more than 6/6 arise in the following three ways: (1) a supraocular, usually the sixth, is divided longitudinally so that two scales occupy the area of one scale; (2) the sixth is replaced by two scales transversely, thus giving the usual 7 supraoculars of *raviceps* and *uzzelli*; (3) a small supraocular is added anteriorly from fusion or enlargement of one of the semicircle scales. The occurrence of six supraoculars at least unilaterally is shown in all but one specimen (which has 7/8) of *klinikowskii*.

Comparisons: *L. r. klinikowskii* differs from both *raviceps* and *uzzelli* in its very pale coloration, light to no ventral spotting on the hindlimbs, usually very inconspicuous lateral fields, relatively faint postorbital blotch, pale fingers, and immaculate yellow dorsal crest scales. In scalation, the Matanzas race differs in usually 6/6 supraoculars, although a relatively high percentage (32%) of *raviceps* has this number of supraocular scales.

From *uzzelli*, *klinikowskii* differs in having the semicircles always complete, whereas the former has the semicircles more often incomplete. Inspection of Fig. 11 shows that *klinikowskii* differs significantly from *uzzelli* in number of dorsal crest scales in occiput–vent length, from *raviceps* and *uzzelli* in number of one half midbody scales, and from *uzzelli* in number of fourth toe scales.

In size, *klinikowskii* males average smaller than males of both the other races; this is probably an artifact of the small size of the sample of male *klinikowskii*. Female *klinikowskii* reach a larger size than females of the other races, although the average of the series is intermediate between that of *raviceps* and *uzzelli*. It is especially interesting that, despite the apparent great hiatus between the known range of *klinikowskii* and *uzzelli*, the scale differences between these two races are not more striking.

Remarks: The habitat of *L. r. klinikowskii* is apparently the sandy beaches of Punta de Hicacos. It is probable that the race has a wider distribution than presently known; since much of the beach area of the Varadero area is now converted to recreational use, collecting must be carried on at less populated areas. The type locality is a stretch of open beach, with almost no herbaceous cover except *Ipomea* and scattered tufts of grass, separated from the Matanzas–Varadero highway (Via Blanca) by a stand of introduced *Casuarina*. The single lizard from 5.5 kilometers


DORSAL CREST SCALES
KLINIKOWSKII
22
UZZELLI
23
RAVICEPS
36
54
56
58
60
62
64
66
68
70
72
74
1/2 MIDBODY SCALES
KLINIKOWSKII
22
UZZELLI
31
RAVICEPS
40
27
29
31
33
35
37
39
41
FOURTH TOE SCALES
KLINIKOWSKII
42
UZZELLI
66
RAVICEPS
74
21
23
25
27
29
31

southwest of Varadero was taken on sandy soil in rather dense grassy cover. The lizards were all captured by hand; this was a relatively simple task since there was such little cover. They sought refuge in land-crab burrows, and when especially hard pressed, would bury themselves in the sand much in the same manner of *Uma* and would quickly disappear from view.

I suspect that other populations of *L. raviceps* remain to be discovered. Sandy areas on the north coast from Matanzas to northern Oriente may well harbor disjunct populations of this lizard. The only other comparable area which I have visited on the north coast is Playa Santa Lucía in eastern Camagüey; no *raviceps* were collected there. However, it is interesting that the type locality of *L. r. klinikowskii* was visited in the summer of 1958, and these lizards were not observed at this or any other collecting locality along the Punta de Hicacos' north coast. Visits in 1958 and 1959 to a locality 13 kilometers northeast of Matanzas did not yield specimens of *L. raviceps,* and I doubt that the species occurs in this immediate region; here there is no beach as such, the shore having a formation of *diente de perro* limestone with sandy dunes behind the limestone, covered with dense herbaceous and woody vegetation which is apparently unsuitable for *L. r. klinikowskii.*

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Explanation of Figures

Fig. 1.—*Leiocephalus r. uzzelli,* new subspecies, dorsal view of type (AMNH 79321).

Fig. 2.—*Leiocephalus r. raviceps,* dorsal view (AMNH 79350).

Fig. 3.—*Leiocephalus r. klinikowskii,* new subspecies, dorsal view of type (AMNH 83326).

Figs. 4 to 10.—Dorsal view of median head scales of *L. raviceps* showing variation in number from four to six scales; figures from specimens as follows: 4. AMNH 79314; 5. AMNH 83327; 6. AMNH 79310; 7. AMNH 83328; 8. AMNH 83331; 9. AMNH 83333; 10. AMNH 83326.

Fig. 11.—Counts of dorsal crest scales in occiput–vent length, scales around one half of body at midbody, and subdigital tricarinate scales on fourth toe in three Cuban subspecies of *Leiocephalus raviceps.* Horizontal line indicates range of variation in sample; vertical line, the mean; hollow rectangles indicate two standard errors on each side of the mean. If rectangles on two sets of data do not overlap, a statistically significant difference between the means is suggested. Sizes of individual samples are given to the left of each line. Higher number of individual counts in fourth toe scales is due to counting the number of subdigital scales on the fourth toe of both the right and left foot.

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A NEW SPECIES OF BAT OF THE GENUS *ANTROZOUS* FROM CUBA

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Until recently the known range of the vespertilionid genus *Antrozous* has been from southern British Columbia south to Querétaro, México, and from the Pacific coastal states east to Kansas. Within this continental area, in the opinion of present writers, there is a single species, *Antrozous pallidus.*

In 1957 an American Museum of Natural History expedition discovered a population of bats belonging to the genus *Antrozous* on Maria Magdalena Island of the Tres Mariás group off the coast of Nayarit, México. Study of specimens secured revealed that they represented a distinct new species which was given the name *Antrozous dubiaquercus* by Van Gelder (Amer. Mus. Nov., 1973: 1–14, 1959).

Meanwhile, the existence of a second insular species of *Antrozous* was suspected. While collecting bats with the aid of a mist net north of the mountains of western Cuba in Pinar del Río Province in the fall of 1956 the junior author and Dr. Karl F. Koopman secured a live individual that, as far as external appearance was concerned, appeared to belong to the genus *Antrozous.* Unfortunately the bat escaped the night that it was caught but not before the collectors had several hours in which to examine it closely and be certain of its generic identity.

It was not until December 2, 1958, that further evidence on the existence of *Antrozous* in western Cuba was obtained. On this date one of us (Silva) secured a skull of a nyctophiline bat in a cave in Pinar del Río Province. The skull may have come from a barn owl pellet as there were a number of the latter present in the cave in various stages of decomposition. No mandibles were found but the skull itself is in an excellent state of preservation. Only the tympanic bullae and parts of the parietals are missing. The sagittal crest is very well developed and the teeth quite worn, indicating an old adult.

On comparing this skull with those of specimens of *Antrozous pallidus* from selected localities throughout its range the specific distinctness of the Cuban specimen was at once apparent. It seems desirable, therefore, to describe this Cuban species even though it is presently known only from a skull.

Antrozous koopmani, new species[1]

Type: Skull only, lacking mandibles; No. 11846, Calif. Acad. Sci.; Cueva del Hoyo García, Municipio de San Juan y Martínez, Provincia de Pinar del Río, Cuba, 2 December 1958; found by Gilberto Silva Taboada.

Diagnosis: Size very large compared with that of other members of the genus *Antrozous*; teeth proportionately small; combined temporal and orbital fossae proportionately large as a result of elongation of the cranium rather than the rostrum.

Comparisons and remarks: Five geographic races of *Antrozous pallidus* are recognized. Some of these are well marked subspecies while others are less clearly defined. Size and color are the principal characters used to distinguish these forms. Measurements of four of these five subspecies (all except *A. p. cantwelli*) are shown in Table 1. As will be noted greatest body size is attained in the Pacific coastal area west of the Sierra Nevada–Cascade axis within the range of the subspecies *pacificus.* Specimens from San Luis Obispo and Kern counties of west-central California exhibit maximum size for the species. Specimens from northwestern California in Mendocino, Napa and Lake counties average smaller. Measurements given for *pacificus* by Van Gelder (op. cit., p. 13) for members of this race from eastern Tulare County in California are even smaller. *Antrozous p. cantwelli* of the northern Great Basin region is, reportedly, smaller than *A. p. pacificus.* The same is true of *A. p. bunkeri* known from Kansas and Oklahoma. The minimum in size is attained by *A. p. minor* of southern Baja California and *A. p. pallidus* which occurs in the desert regions of southwestern United States and northern México. In size, therefore, this species follows Bergmann's Rule in a general way.

One of the characters of *Antrozous koopmani,* however, is its large size. Not only do its measurements greatly exceed those of *Antrozous pallidus pallidus* but even those of the largest individuals of the Pacific coastal race *A. p. pacificus* measured by the writers. The shortest distance between the known range of *A. pallidus* and the tip of western Cuba is approximately nine hundred miles most of which is across the Gulf of México.

[1] Named for Dr. Karl F. Koopman who, with the junior author, first discovered the genus *Antrozous* in Cuba and whose studies have contributed much to our knowledge of bats in the West Indies.

TABLE 1.—Cranial measurements, in millimeters, of adult specimens of *Antrozous.*

SPECIES AND LOCALITY (Specimens measured)	GREATEST LENGTH	CONDYLOBASAL LENGTH	ZYGOMATIC BREADTH
Antrozous koopmani			
Cuba (1)	24.3	21.7	14.0
Antrozous pallidus pacificus			
Northern California (28)	21.6	20.0	13.2
	(21.0–22.7)	(19.2–20.9)	(12.3–13.9)
South-central California (43)	22.6	20.9	13.7
	(21.9–23.6)	(20.0–21.7)	(13.1–14.4)
Antrozous pallidus bunkeri			
Barber County, Kansas (4)	21.8	20.0	13.7
	(21.5–22.3)	(19.7–20.4)	(13.4–14.0)
Antrozous pallidus pallidus			
Southern Arizona and New Mexico (12)	19.6	18.1	12.3
	(18.6–20.5)	(17.3–19.0)	(11.5–13.2)
Coahuila and Durango, México (5)	20.0	18.4	12.3
	(19.5–20.4)	(17.9–19.2)	(12.0–12.6)
Antrozous pallidus minor			
Miraflores, Baja California (2)	20.4		11.9
	(20.3–20.5)	(18.4–18.5)	(11.5–12.3)

It is possible that the genus *Antrozous* may have arrived in Cuba originally from Yucatan. At present these two areas are separated by about one hundred and twenty-five miles of water. To the best of our knowledge, however, no bats of the genus *Antrozous* have been taken on the Yucatan peninsula nor south of a point five hundred and fifty miles north of the Isthmus of Tehuantepec.

Acknowledgments: The writers are indebted to Dr. Richard Van Gelder of the American Museum of Natural History for permission to study his manuscript and drawings of *Antrozous dubiaquercus* prior to publication. For permission to study specimens of the genus *Antrozous* under their care the writers are indebted to Barbara Lawrence of the Museum of Comparative Zoology, the late G. H. H. Tate of the American Museum of Natural History, W. H. Burt of the University of Michigan Museum of Zoology, D. H. Johnson of the United States National Museum, S. B. Benson of the University of California Museum of Vertebrate Zoology and Philip Hershkovitz of the Chicago Museum of Natural History.

Specimens examined: A total of 239 from the following localities:

Antrozous pallidus pacificus: CALIFORNIA—Humboldt County, Hoopa Indian Reservation, 8; Miranda, 1; Mendocino County, near Hearst, 3; Lake County, Mirabel Mine, 19; Napa County, ½ mi S Angwin, 1600 ft, 4; Sonoma County, Cloverdale, 3; Marin County, Inverness, 2; San Rafael, 1; Contra Costa County, Pine Canyon, 1; Walnut Creek, 1; Alameda County, Hayward, 1; 7 mi SE Livermore, 1; San Mateo County, Belmont, 3; Santa Clara County, Stanford University, 41; Bell Station, 1; Gilroy, 1; San Joaquin County, Farmington, 3; Tuolumne County, Long Barn, 1; San Luis Obispo County, 4½ mi NE Shandon, 44; Shandon, 5; 9 mi W Simmler, 1; Kern County, 2½ mi NW Carneros Spring, 21; Carneros Spring, 2; Wheeler Ridge, 600 ft, 2; Lebec, 5; Ft. Tejon, 3; Los Angeles County, 1 mi S Lankershim, 2; Pasadena, 1; Sierra Madre, 5. Total 186.

Antrozous pallidus pallidus: CALIFORNIA—Inyo County, Coso Mountains, 2; ARIZONA—Yavapai County, Camp Verde, 19; Gila County, White Mountains, 1; Gila Mountains, Tinajas Altas, 4; Pima County, Santa Catalina Mountains, 1; Santa Cruz County, 7 mi N Patagonia, 4700 ft, 4; UTAH—Millard County, Desert Range Experimental Station, 1; NEW MEXICO—Bernalillo County, Carasal, 1; Dona Ana County, Las Cruces, 3800 ft, 3; TEXAS—Brewster County, Chisos Mountains, Kibee Springs, 5700 ft, 1; MÉXICO, COAHUILA—San Pedro, 1; Jaral, 1; Los Delicias, 2; DURANGO—10 mi S Lerdo, 4500 ft, 2. Total 43.

Antrozous pallidus minor: MÉXICO, BAJA CALIFORNIA—Miraflores, 2. Total 2.

Antrozous pallidus bunkeri: KANSAS—Barber County, 5½ mi S Sun City, 5; 7 mi S Sun City, 2. Total 7.

Antrozous koopmani: CUBA, PROVINCIA DE PINAR DEL RIO—Municipio de San Juan y Martínez, Cueva del Hoyo García, 1.

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ON THE IDENTITY OF *STENOPHILUS GRENADAE* (CHAMBERLIN) WITH A KEY TO THE KNOWN NORTH AMERICAN CONGENERS (CHILOPODA: GEOPHILOMORPHA: HIMANTARIIDAE)

By R. E. Crabill, Jr.
Smithsonian Institution, Washington, D. C.

In presenting a first synonymical list of the known American Himantariidae I was unable confidently to refer several questionable species even provisionally to a genus (1959b:157). The types were apparently unavailable, and the original descriptions failed to present sufficient information. The identity of one of these species, *Haplophilus grenadae* Chamberlin, 1912, (Note A), unexpectedly has been clarified, first through discovery of the holotype, secondly through the recent collection of a second specimen. The type was eventually located in the collection of the Museum of Comparative Zoology at Harvard University, and the second known specimen was found among an unidentified assortment of Arkansan Chilopoda recently received at the National Museum. I wish to express my gratitude to Drs. Darlington, Levi, and Brown of Harvard for their kindness in permitting me to study typical material in their charge, and to extend my thanks to Nell B. Causey of Fayetteville, Arkansas, for her generous donation of the Arkansan specimens.

If we distinguish generically between the European and North African forms now referred to *Stigmatogaster*, and the American forms which Chamberlin has placed in his *Stenophilus*, then, proceeding on the basis of the fragmentary evidence at hand, we are drawn to the conclusion that *grenadae* evidently appears to belong to *Stenophilus*. It would be difficult to discount as unreasonable the possibility that in *Stigmatogaster* (*sensu lato*) we are dealing with a single, very widely distributed, internally labile, and monophyletic assemblage. Conceivably, future studies could reveal *Stigmatogaster* to be like *Geophilus*, widespread and comprised of numerous species between which, or between groups of which, there are pronounced gaps in many cases. But no one is in a position to approach a confident resolution of these problems yet; hence the more conservative and provisionally the best course seems to be to follow Chamberlin in separating the Old from the New World species generically on existing criteria. Indeed, it may well be that this is actually the correct solution, although the evidence now confronting us surely seems inadequate to permit a definite decision pro or con.

Chamberlin (1953: 37) says: "*Stenophilus* as far as now known differs from the European genera mentioned in lacking conspicuously sclerotic or chitinous lines on the prosternum and in lacking *all* paratergites [my italics]." Both in *Meinertophilus* and *Stigmatogaster* nearly all species have pronounced prosternal sclerotic lines, and although *major* paratergites are totally lacking in both genera, *intercalary* paratergites are present and variously developed in both. (Note B.) We must assume, then, that when Chamberlin reports the *Stenophilus* species to lack "all paratergites," he means they lack both major *and developed intercalary* paratergites. This alone, so far as I can learn from the literature, appears to be the chief key character that will distinguish *Stenophilus* from *Stigmatogaster* and *Meinertophilus*. The *prosternal* character is probably of secondary significance.

On the basis of the information given in Chamberlin's writings, the following characters *in combination* should characterize only *Stenophilus* as it is now known: 1) prosternal sclerotic lines absent; 2) major and intercalary paratergites absent; 3) ventral porefields (a) absent, or (b) present only on anterior sternites, or (c) present on all or nearly all pedal sternites; 4) parasternital pits present at least in some species (*coloradanus* and *grenadae*). The following key to species is based almost wholly upon Chamberlin's published data, which in turn are drawn only from the typical specimens. It is therefore admittedly preliminary and probably unsatisfactory; nonetheless, it is presented in the hope that it may assist in the recognition of some or all of the species of *Stenophilus* now known from North America.

North American Species of *Stenophilus*

1a. Ventral porefields absent 2
b. Ventral porefields present 3
2a. Labral teeth large, broad, about 13 in number; occupying about a third of each labral side (see 1946, p. 37, Fig. 3). Female holotype with 77 pairs of legs, 38 mm long. (Colorado)
coloradanus Chamberlin (1946: 35)
b. Labral teeth smaller and more pointed, about 8 in number; occupying about half of each labral side (see 1930, p. 298, Fig. 2). Male holotype with 97 pairs of legs, 90 mm long. (California)
californicus (Chamberlin) (1930: 298)
3a. Ventral porefields present only on anterior half of body. (Oregon) .... *rothi* Chamberlin (1953: 38)

b. Ventral porefields present on sternites of anterior as well as of posterior parts of body 4

4a. The flexed prehensors nearly reaching level of front of head. Tergites not bisulcate. Anterior spiracles vertically narrowly elliptical. Ultimate leg distotarsus about as long as the proximotarsus. (Idaho) .... *audacior* (Chamberlin) (1909: 177)

b. The flexed prehensors falling far short of level of front of head, reaching as far forward as level of labrum. Tergites distinctly bisulcate. Anterior spiracles circular. Ultimate leg distotarsus conspicuously longer than the proximotarsus. (Mississippi, Arkansas) .... *grenadae* (Chamberlin) (1912: 435)

The following description is based upon the Arkansas specimen, which, when compared directly with the holotype, was found to agree minutely with it in all significant particulars. The second specimen, rather than the holotype, is described in considerable detail here because the condition of the latter is sufficiently poor as to obscure many microscopic details that may prove to be meaningful in the future. The original description of 1912 is accompanied by four figures to which the reader's attention is directed.

Fig. 11 depicts the peculiarly long ultimate distotarsus well, although it fails to show the ultimate presternite which covers the antero-lateral corners of the sternite proper. Neither does it show the biarticulate female gonopods nor the penultimate sternite's porefield. Fig. 13 is a good representation of the head and antennae, but note that the antennae appear to be quite attenuate distally when contracted. In the Arkansan specimen, on the other hand they appear less attenuate, indeed nearly non-attenuate, owing to the fact that their articles are extended. Fig. 10 shows very clearly how short and robust the prehensors are; note that they reach the level of the labrum. The same figure, however, is misleading in that it suggests the right subcondylic sclerotic line to be present; these lines are present neither in the holotype nor in the Arkansan specimen. These figures are augmented by those I have prepared of the clypeus, labrum, maxillae, mandible, and prehensor.

Stenophilus grenadae (Chamberlin)

Haplophilus grenadae Chamberlin, Bull. Mus. Comp. Zool. Harvard, 54(13): 435, (1912). [Grenada, Mississippi.]

Stigmatogaster grenadae (Chamberlin),—Attems, Das Tierreich, Lief. 52: 42, (1929). [Note *lapsus calami,* "Grenada, Misiones."]

Haplophilus grenadae Chamberlin,—Crabill, Ent. News, 70(6): 157, (1959). [Incertae sedis.]

Female: Arkansas: Pulaski County, Little Rock. April, 1953. B. Johnson, leg. Transmitted by N. B. Causey. In U. S. National Museum collection of Chilopoda.

Introductory: Length 20 mm. Pedal segments, 65. Color: brownish-yellow throughout; head and antennae lighter, rear third of body some-

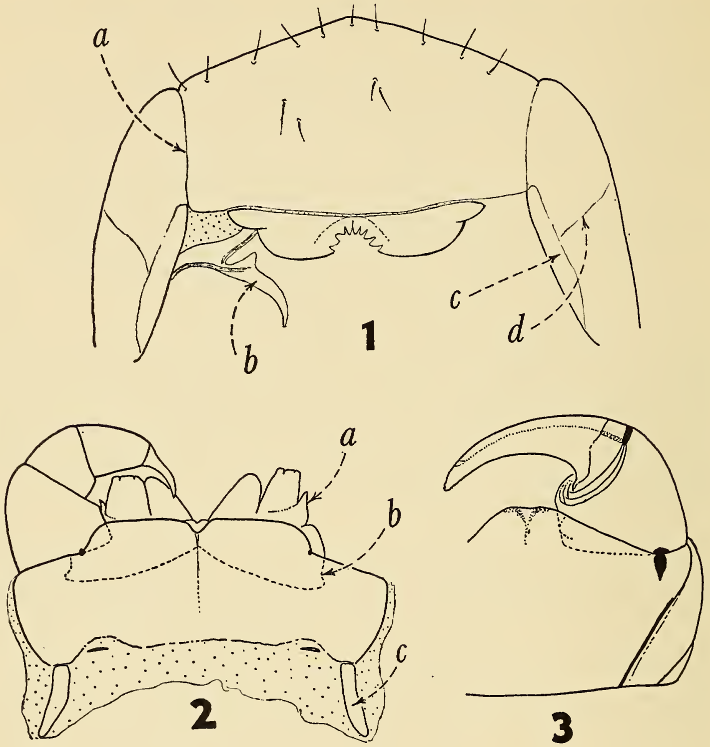

FIG. 1–3

what darker. Body shape: slender; slightly attenuate anteriorly, more strongly attenuate posteriorly. Setae in general are short and sparse.

Antennae (extended in Hoyer's mountant): Length 0.9 mm, head length to antennal length = 1 : 2.3. The two opposing basal articles not contiguous. Each antenna basally very slightly flattened dorso-ventrally; the whole antenna slightly attenuate distally. Articles 1–13 each much wider than long, article 14 is conical and longer than preceding two articles taken together. Ventral vestiture: articles 1–7 very sparsely to moderately sparsely setose; articles 8–14 moderately densely to densely setose. Special sensilla: ultimate article with an outer and an inner elongate patch of short, broad and hyaline, modified setae.

Cephalic plate: Greatest length 0.39 mm, greatest width 0.47 mm, hence much wider than long. Anteriorly rostrate; sides evenly excurved; rear margin straight and slightly overlapping anterior margin of basal plate (prebasal plate thus concealed). Frontal suture absent; no other sulci detected.

Clypeus (Fig. 1): Paraclypeal sutures complete but poorly defined.

Without clypeal areas; with a very weak plagula just anterior to each labral sidepiece. Setae: extreme anterior margin of clypeus with a line of some 5 setae on each side; midclypeal setae, left 2, right 1; posterior geminate (prelabral) setae absent. Bucca: each with 2 antero-ventral setae; transbuccal suture on each bucca very weakly indicated; anterior inner margin strongly sclerotized.

Labrum (Fig. 1): Completely separated from the clypeus by a narrow suture. Completely divided centrally into right and left halves, the whole labrum deeply embayed across its central portion. Each labral half with distinct teeth, 4 or 5 on each half.

First maxillae (Fig. 2): Coxosternum nearly divided in two by a deep central cleft, the coxosternum virtually concealed by the second maxillary coxosternum. Telopodite not perceptibly bipartite. Coxosternal lappets absent; telopodite lappets short, pointed, non-squamulate.

Second maxillae (Fig. 2): Coxosternum antero-medially deeply diastemate, the diastema continuous with a shallow midlongitudinal sulcus. Postmaxillary sclerites atypical, each apparently represented by a minute, vague, bar-like extension of the maxillary postero-lateral corner. Telopodite: 1st article basally bicondylic and very wide; terminal claw very long, distally slightly bent, its under (posterior) surface slightly excavate, its edges smooth, not pectinate, basal bristles (spines) not detected.[1]

Mandible: Axes of dentate lamella and of adjacent pectinate lamellae nearly parallel. Dentate lamella with some 6 strongly sclerotized and 2 nearly hyaline teeth. With 3 pectinate lamellae, these followed by what appears to be a row of simple teeth (incipient pectinate lamellae?, artifacts?).

Prosternum: Without subcondylic sclerotic lines (chitin lines of authors) passing toward or connecting with condyles.

Prehensors: When flexed, attaining level of labrum, falling far short of front of head. Basal article very broad; intermediate articles greatly reduced in size. No denticles detected. Ungula very long and robust, its concave surface concealed from ventral view; both edges smooth, not serrulate or noticeably dissected. Poison calyx weakly developed, long, the digitiform appendices relatively few. Poison gland difficult to trace but apparently very long, passing out of the trochanteroprefemur and deeply into the prosternal segment.

Tergites: Paramedial longitudinal sutures present and conspicuous.

Pleurites: Major paratergites wholly absent. Intercalary paratergites absent, i.e. the lateral ends of the intercalary tergites (pretergites) merge with membrane without forming plates; intercalary tergite lateral ends concealed beneath the large, overlapping dorsal extensions of the intercalary pleurites. Spiracles all round. The last stigmopleurites separated by sutures from the associated tergite.

Legs: First pair slightly shorter than the second. Approximately the first 35 pairs are extremely robust and short, thereafter legs becoming

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[1]In this specimen the claw is flexed such that if basal bristles were present, they would be concealed; they may, nevertheless, be present.

somewhat longer and thinner. Pretarsi very robust and long, at least half as long as associated tarsus. Pretarsal accessory spurs about ¼ as long as claw proper and approximately equal in length to each other.

Sternites: Approximately the first 40 sternites each distinctly wider than long, thereafter becoming longer than wide, eventually much longer than wide. Sulci, depressions, etc. either absent or else too weak to be detected. Porefields of pro- and metacoxal pleurites absent. Antero-lateral sternital porefields absent. Posterior sternial porefields: on sternites from and including 1 through about 40 each is postero-marginal and either transversely subelliptical or transversely subreniform, thereafter porefields become progressively small, nearly subcircular, and move to a position just posterior to central, those of the 5 or 6 sternites preceding the ultimate sternite are slightly larger again. Sternites 26–33 each flanked on each side by 2 prominent, subelliptical to subcircular parasternital pits.

Ultimate pedal segment: Pretergite separated from its pleurites on each side by a distinct suture (or fold?). Tergite wider than long; sides slightly convergent posteriorly; rear margin essentially straight, the corners rounded. Presternite very large and distinctly divided centrally; passing obliquely postero-laterally to cover corners of sternite proper. Sternite slightly longer than width at midlength; sides very slightly bowed outward and slightly convergent; posterior margin essentially straight. Each coxopleuron (seen from below) extending somewhat forward of rear margin of penultimate sternite rear margin; pores numbering between 25 and 35, these distributed dorsally, ventrally and sparsely laterally; the whole structure moderately inflated. Legs slightly longer than penults; each with a tarsus of two articles, the distotarsus notably longer than the proximotarsus; pretarsus totally absent.

Postpedal segments: Female gonopods basally contiguous but not fused; each weakly biarticulate, the distal article only slightly smaller than the proximal. Terminal pores absent.

NOTE A

Since the history and present status of *Haplophilus* are somewhat confusing, some clarification is in order. *Haplophilus* was proposed in 1896 (p. 6) by O. F. Cook, who, curiously enough, buried it in the middle of an article on diplopod nomenclature. He explained that it was proposed to replace *Haplogaster* Verhoeff, 1896, which was preoccupied at least twice: by *Haplogaster* Chaudoir, 1879, for a carabid; by *Haplogaster* Kolbe, 1894, for a cerambycid. At the time of proposal Cook mentioned no inclusive species by name, but he did make perfectly clear his intention, and he did refer to the Verhoeff name whose type-species (by monotypy) was *Himantarium dimidiatum* Meinert, 1870. The same species, then, automatically became the type-species of *Haplophilus,* since if a generic name without originally designated type-species is proposed to replace another generic name with or without type-species, the type-species of either, when established, becomes *ipso facto* the type-species of the other. Therefore the type-species of *Haplophilus* Cook, 1896, is *Himantarium dimidiatum* Meinert, 1870 (= *Stigmatogaster dimidiata* (Meinert) *sensu* Attems, 1929: 40.

In the two most important revisions of the family that have appeared to date the status of *Haplophilus* has been interpreted somewhat differently. In 1909 Chalande and Ribaut regarded *Stigmatogaster* and *Haplophilus* as closely related but separate genera. Those species with freely opening coxopleural pores were referred to *Haplophilus*, whereas species with dorsal porigerous pits were placed in *Stigmatogaster*. In 1929 Attems united the genera, placing *Haplophilus* in synonymy beneath the senior name, *Stigmatogaster*. This solution involves certain difficulties too, but since a satisfactory resolution seems remote at this time, it is best to follow his system.

NOTE B

The distinction between major and intercalary paratergites must be clearly understood. A major paratergite is an elongate plate, a pleurite, which lies between the stigmopleurite and the associated major tergite. An intercalary paratergite is its serial homologue, differing from it notably in at least two important respects. (1) In position: The intercalary paratergite is associated with the intercalary tergite (morphologically the pretergite) and lies just lateral to each of its lateral ends. The intercalary paratergite may be single or subdivided, obscure, or very conspicuous. (2) In size: The intercalary paratergite is always much smaller than the major paratergite; indeed, in many species it can be quite difficult to find. An excellent, illustrated discussion of paratergites is given by Chalande and Ribaut (1909: 216–220).

Explanation of Figures of *STENOPHILUS GRENADAE* (Chamberlin)

Fig. 1.—Clypeus, labrum, buccae. (Ventral aspect: setae shown.) a = right paraclypeal suture. b = posterior arm of labral fultura. c = more heavily sclerotized border of left bucca. d = imaginary line separating weakly sclerotized upper portion of left bucca from its more heavily sclerotized lower portion.

Fig. 2.—First and second maxillae. (Ventral aspect: setae deleted.) a = small but distinct lappet of first maxillary left telopodite. b = dashed line: outline of concealed lower edge of first maxillary coxosternum. c = obscure, hyaline, detached extension of second maxillary coxosternum; presumably a vestigial postmaxillary sclerite.

Fig. 3.—Prosternum and left prehensor. (Ventral aspect: setae deleted.) Tarsungula strongly flexed and tilted slightly toward the observer.

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OCTOLASMIS DAWSONI, NEW SPECIES (CIRRIPEDIA: LEPADIDAE) FROM *BATHYNOMUS GIGANTEUS*

By David Causey

University of Arkansas and Gulf Coast Research Laboratory

The barnacle described here was encountered while studying the genus *Octolasmis* in the Gulf of Mexico. It was first called to my attention by C. E. Dawson, Marine Biologist of the Gulf Coast Research Laboratory, being upon a specimen of the huge, deep water isopod *Bathynomus giganteus* Milne-Edwards in the collection of that institution. It was also present upon a large number of specimens of the same host sent to me by Harvey R. Bullis, Jr., Fish and Wildlife Service, Pascagoula, Mississippi. I am much indebted to Mr. Dawson, after whom the species is named, and to Mr. Bullis for the specimens.

A survey of the species of the genus *Octolasmis* in the Gulf of Mexico will appear elsewhere.

Octolasmis dawsoni, new species

Figs. 1–6

Holotype: A specimen with well-developed ovaries; southeast of Pensacola, Florida, lat. 28° 30′ N, long. 86° 11′ W, 240 fathoms; collected by the Fish and Wildlife Service, M/V "Oregon," 11 March 1955; U. S. Nat. Mus. Cat. No. 104378.

Paratypes: Several specimens, same data as holotype, all from a single host specimen. Many specimens from numerous host specimens; south of the Dry Tortugas, 24° 11′ N, long. 83° 21.5′ W, 400 fathoms; collected by the Fish and Wildlife Service, M/V "Silver Bay" 8 June 1959. No specimens are fully mature, i.e., with eggs or nauplius larvae.

Diagnosis: Similar to *Octolasmis lowei* (Darwin, 1851), from which it is distinguished superficially by its smaller size, the brown color, and the apically notched tergum.

Description: The tergum of *O. dawsoni* (Fig. 2) is notched apically, and the umbo is almost centrally placed in young specimens and subterminal in more mature specimens. Fully matured specimens have not been encountered. In *O. lowei* the apical end is rounded and the small umbo is distinctly terminal (Fig. 1).

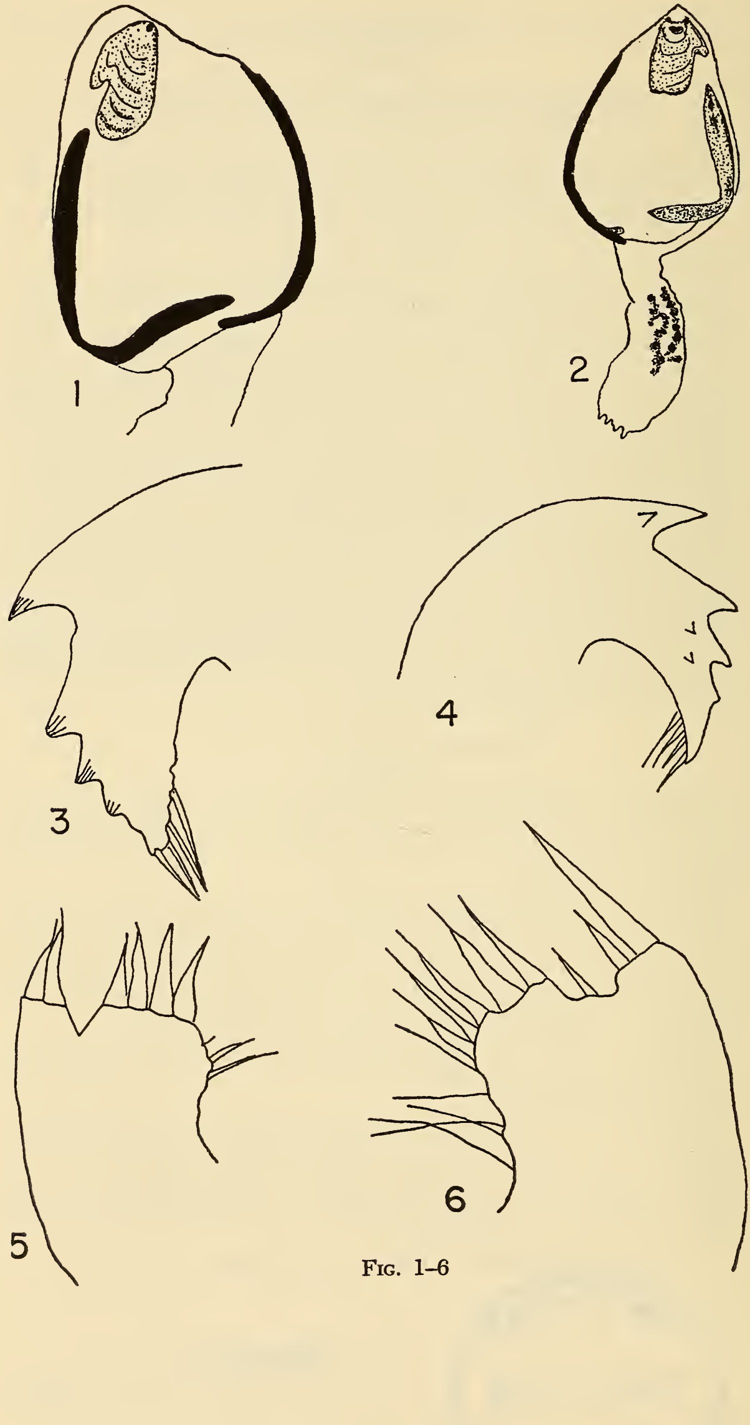

Fig. 1–6

The scutum and the carina do not offer any details of systematic importance, nor does the length of the peduncle. These features are generally emphasized in the description of species in this genus, but they seem based upon the examination of too few specimens. The mandibles (Fig. 4) have either 3 or 4 teeth (I think according to the maturity of the specimen), and apparently the teeth do not have ridges upon them. The mandibles of *O. lowei* (Fig. 3) have 4 teeth (the terminal point is not usually considered a tooth), and the teeth have ridges upon them that are brought out in KOH preparations. In KOH treated specimens, *O. dawsoni* shows hooks at the base of the teeth and *O. lowei* does not. These may be cuticular processes of the body surface in the vicinity of the mandibles. Various patterns of such hooks are present in other species of the genus and may be of specific value. The maxilla of *O. lowei* (Fig. 5) has the customary notch, with relatively few bristles or setae; *O. dawsoni* (Fig. 6) has a broader notch and more bristles or setae. The penis does not appear to be of taxonomic significance.

Size: Measurement of the length of the capitulum of the first 10 specimens encountered (for this purpose) gave an average length of 1.42 mm, with the range between 1 mm and 2 mm. For *O. lowei* a similar 10 specimens gave an average length of 2.39 mm, with the range between 1 mm and 3 mm. Possibly more mature specimens of *O. dawsoni* would approach the dimensions of *O. lowei.*

Ecology: This barnacle has been collected only from the ventral surface of the abdomen of a single host species.

Summary of the characters that distinguish O. dawsoni and O. lowei:

O. dawsoni	*O. lowei*
Living in deep water of Gulf of Mexico on *Bathynomus giganteus.*	Living in shallow water on *Callinectes, Libinia, Portunus,* and *Calappa*; cosmopolitan.
Attached to the ventral surface of the abdomen of the host.	Attached to the gills and the branchial cavity of the host.
Average length of capitulum 1.42 mm.	Average length of capitulum 2.39 mm.
Light brown, almost salmon colored.	Cream colored.
Tergum notched apically.	Apex of tergum rounded.
Umbo almost centrally placed in young specimens and subterminal in more mature specimens.	Umbo smaller and terminal.
Mandibles with 3 or 4 teeth, without ridges, with hooks at base of teeth.	Mandibles with 4 teeth, with ridges on teeth, without hooks at base of teeth.
Maxilla with broad notch and more bristles or setae than in *O. lowei.*	Maxilla with notch and few bristles or setae.

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Explanation of Figures

All figures are camera lucida outlines from KOH preparations mounted in Permount. The exact number of bristles or setae is problematical in such preparations.

Fig. 1.—*O. lowei,* whole specimen.
Fig. 2.—*O. dawsoni,* whole specimen.
Fig. 3.—*O. lowei,* mandible.
Fig. 4.—*O. dawsoni,* mandible.
Fig. 5.—*O. lowei,* maxilla.
Fig. 6.—*O. dawsoni,* maxilla.

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A NEW MARINE CENTIPED FROM THE CALIFORNIA LITTORAL

By Ralph V. Chamberlin

Through the courtesy of Prof. J. W. Hedgpeth, director of the Pacific Marine Station, California, I have been able to examine specimens of the new geophilid centiped here described. This new form is of special interest because of its occurrence under stones between the tide levels near Dillon Beach. It represents a new genus in the family Schendylidae to which several forms of known or probable littoral habitats pertain. However, centipeds of such occurrence are not restricted to this family. Thus the most commonly found of all marine centipeds is *Linotaenia maritima* (Leach) of the European coasts and on the coast of Alaska the author has reported the occurrence of *Brachygeophilus admirinus* Chamberlin, near the lower tide mark, these two species belonging respectively to the Linotaeniidae and the Geophilidae.

In the family Schendylidae long known as a marine centiped is *Hydroschendyla submarina* (Grube), found in the littoral of England, Ireland, and the Bermuda Islands, as well as along the continental coast from Sweden to France. A related genus, *Haplophilus,* has in the Mediterranean area a form of known littoral habits, this being *H. dimidiatus angustus* (Latzel). In the western Atlantic another related genus, *Bimindyla,* is represented by a species *B. gertschi* Chamberlin which is suspected to have similar habits. On the American Pacific coast another related genus, *Pectiniunguis,* is represented in the littoral fauna of Mexico and the Galapagos Islands, and the genus *Thindyla,* allied to the preceding, by a species described by the author from Callao, Peru.

The following tabulation will aid in placing the new genus with reference to these and some other related genera of the Schendylidae.

1. Last coxae with 0 or at most 1 or 2 glands or pores 2
   Last coxae with from 4 or 5 to many pores 8
2. Last coxae with no glands or pores 3
   Last coxae with 1 or 2 pores 5
3. Labrum bearing stout teeth over middle portion .... *Nesonyx* Chamberlin
   Not so, the median part with margin simply undulate or at most crenate 4
4. Labrum deeply incurved or excavated at middle .... *Haploschendyla* Verhoeff
   Not so, the labral margin gently concave or nearly transverse .... *Bimindyla* Chamberlin
5. Coxal glands simple or homogeneous 6
   Coxal glands compound or heterogeneous 7
6. Anal legs with a stout claw; middle of labrum with stout teeth .... *Nyctunguis* Chamberlin
   Anal legs with no claw; labrum deeply incurved at middle, without true teeth .... *Hydroschendyla* Brol. and Ribaut
7. Labrum without true teeth at middle, at most crenate .... *Thindyla* Chamberlin
   Labrum with stout teeth at middle, not deeply incurved .... *Pectiniunguis* Bollman
8. Claw of palpus of second maxillae closely pectinate .... *Escaryus* Cook
   This claw entirely smooth 9
9. Prehensors small, not attaining front margin of head; femuroid and prosternum without teeth .... *Lionyx,* gen. nov.
   Prehensors exposed from above, exceeding the head anteriorly; femuroid and prosternum bearing teeth 10
10. Anal legs with a claw; coxal pores small and numerous .... *Apunguis* Chamberlin
    Anal legs lacking a claw; coxal pores only 4 or 5, larger .... *Sogolabis* Chamberlin

Lionyx, new genus

In general close in structure to *Escaryus* but differing in having the claw of the second maxillae entirely smooth instead of closely pectinate. In the first maxillae the palpus bears a sensory lappet but none occurs on the basal joint of the maxilla proper. The labrum bearing a series of numerous long spines but no true conical teeth, although the spines are abruptly thicker at where they tend to fuse transversely. No ventral pores detected. Last ventral plate broad, coxal pores typically 5 on each side, the glands simple. Anal legs with a normally developed claw, crassate in the male.

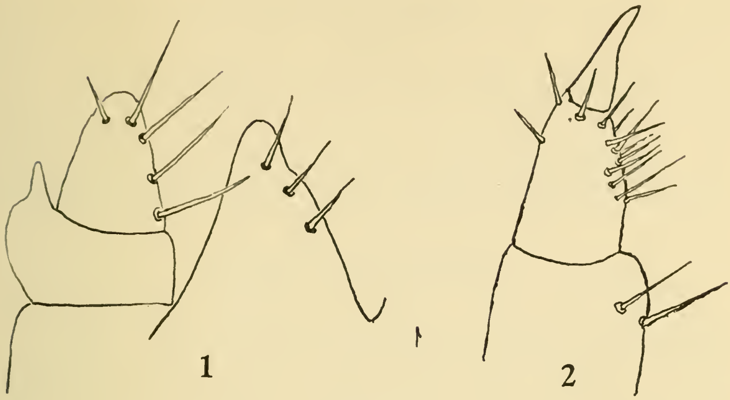
Type species: Lionyx hedgpethi new species

Lionyx hedgpethi, new species

Figs. 1 and 2

Color pale yellow.

Head about three fourths as wide as long, widest a little back of mid-



1 2

Fig. 1–2

dle; with no frontal suture. Antennae long and filiform. The labrum free, evenly concave, armed with numerous processes which are spiniform and separated above their bases which are contiguous. First maxillae with a stout palpus which bears on its first joint a sensory lappet. (See Fig. 1.) The second maxillae with coxal plate without suture or division at middle; palpus bearing a large claw which is entirely smooth. (See Fig. 2.)

Claws of prehensors when closed failing much of attaining the anterior margin of the head. Femuroid of prehensors unarmed, but the claw with a denticle at base. Prosternum unarmed anteriorly; no sclerotic lines obvious.

The relatively large clypeal area finely and uniformly areolate, with no clear non-areolate areas; setae near lateral borders but none detected in middle portion.

Sternites smooth, sparsely setose. In anterior part the sternites have the anterior margin of each sclerotized into an edge below which a similar edge of the preceding sternite seems to fit when the animal coils.

Last ventral plate or sternite broader than long, narrowed caudad, trapeziform. Coxal pores typically 5 on each side; the two innermost of these pores adjacent to or partly covered by the sternite. Anal legs in the male crassate; claw large and smooth.

Pairs of legs 49.

Length: 20 to 25 mm.

Locality: California, near Dillon Beach, Marin Co.; Nick's Cove, Tomales Bay. Type taken 8 July 1959 by J. W. Hedgpeth and students.

Explanation of Figures

Lionyx hedgpethi new species. Fig. 1.—A first maxilla. Fig. 2.—Distal portion of palpus of second maxilla.

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A NEW SUBSPECIES OF *LEIOCEPHALUS STICTIGASTER* SCHWARTZ FROM CENTRAL CUBA

By Albert Schwartz

Department of Biology, Albright College, Reading, Pa.

I (1959) have recently described the species *Leiocephalus stictigaster* from western Cuba and the Isla de Pinos. At the time of this description, I mentioned (op. cit.:110) two lizards from Bayamo, Oriente, which were tentatively considered to represent *L. cubensis cubensis*, despite the fact that these two individuals agreed rather well with my concept of *L. stictigaster.* The occurrence of this species as far east as Oriente left a distributional hiatus of considerable extent, since the easternmost Cuban record was in central Pinar del Río Province.

In the summer of 1959, in the company of Ronald F. Klinikowski and Barton L. Smith, I collected on the north coast of Camagüey Province, at Playa Santa Lucía; this locality lies between the Bahía de Nuevitas on the west and the Oriente border on the east. At this locality we took a long series of *L. stictigaster.* Although both *L. carinatus* and *L. macropus* occur at Playa Santa Lucía, *stictigaster* is the most common of the three and is the only member of the genus which occurs along the beach itself. This locality lies within the known range of *L. c. cubensis* (see map, op. cit.:99), although we took no specimens of *cubensis* near Santa Lucía. In addition to our series, I have been permitted to examine a number of these lizards taken at Santa Lucía by Ernest E. Williams and Rudolfo Ruibal. Their collection also includes a single individual from the serpentine savanna ca. 20 kilometers north of Camagüey city. Although this lizard appears distinct from the Playa Santa Lucía lot, it agrees well with the two specimens previously reported from Bayamo. Additional material from eastern Camagüey and western Oriente will undoubtedly show that another race of *stictigaster* inhabits that area. The lizards from Playa Santa Lucía are distinct from the remaining four races of *L. stictigaster,* and for them I propose the name

Leiocephalus stictigaster lucianus, new subspecies

Type: American Museum of Natural History (AMNH) 83583, an adult male, from Playa Santa Lucía, Camagüey Province, Cuba, taken 30 June 1959 by Ronald F. Klinikowski. Original number 7298.

Paratypes: AMNH 83554–82, same locality as type, 29 June 1959, R. F. Klinikowski, A. Schwartz, B. L. Smith; Museum of Comparative Zoology (MCZ) 59211–28, (Playa) Santa Lucía, east of Bahía de Nuevitas, Camagüey Province, Cuba, 24 August 1959, E. E. Williams, R. Molina, R. Ruibal.

Diagnosis: A subspecies of *Leiocephalus stictigaster* characterized by broad white to tan dorsolateral stripes, dorsal pattern prominently and contrastingly lined longitudinally, the dark dorsal colors ranging from dull tans to brown and black, brown to orange ventral dots on a white to pale yellow ground, and a distinct and persistent black throat pattern on a clear background.

Distribution: Known only from the type locality.

Description of type: An adult male with the following measurements (in mm) and counts: snout–vent length 76, tail (distal quarter regenerated) 119, snout to anterior border of tympanic opening 16.5, head width 13.8, supraocular scales 6/6, loreals 6, temporals 11, enlarged auricular scales 3/4, median head scales 4, prefrontal row complete 3 scales, frontoparietal row complete 5 scales, parietals in contact, semicircles complete, dorsal crest scales occiput to vent 53, dorsal crest scales occiput to axilla 24, scales around one half of body at midbody 23, fourth toe subdigital tricarinate scales 23/24.

Coloration of type: The dorsal coloration of the type is generally dull to darker tan, the pigments arranged in the typical zoned pattern of *stictigaster,* as follows: Zone 1 is brown and confined to the median crest scales. Laterally, zone 2 is dull tan and rather sharply set off from zone 3, the dorsolateral fields, which are brown with scattered darker brown scales. The dorsolateral fields are again sharply differentiated from zone 4, which is wide and very pale tan, and extends from the posterior edge of the temporals to the proximal portion of the tail, becoming less prominent above hindlimbs. Zone 5 is a rich dark brown, much more saturated than the brown of zone 3; it begins posterior to the eye and continues posterior to the hind limb insertion. There appear to be some longitudinal black dashes in zone 5, but because of the depth of the pigmentation of the ground color, these dashes are not well defined. Zone 6 is white, beginning below the eye and proceeding posterior to the groin; both dorsally and ventrally zone 6 is delimited by irregular black to dark brown markings, which set the zone off from the pigmented areas above and below it. Below zone 6 is an additional longitudinal zone, between the fore and hind limbs, which is brown with scattered black dashes; this lowermost zone changes rather abruptly to the whitish venter. The dorsal surface of the head is tan with black dots on the snout, the supraocular semicircles, and the posterior head shields. The postorbital blotch is absent, the temporal region having the same brown pigmentation as zone 5, although in the postorbital region the ground color is somewhat lighter and dorsal and ventral black margins of zone 5 are more pronounced than elsewhere. The dorsal surfaces of the limbs are medium tan, spotted with a lighter tan, which is more prominent on the hind limbs than on the fore limbs. The hind limbs also show dark brown dashes on their dorsal surfaces. The dorsal surface of the tail has about ten indistinct chevrons, the more proximal ones being almost obliterated and their position marked only by paired dark brown dots on the tan caudal ground color. The throat is boldly marked on a clear pale yellow ground; there are two black V's, their apices pointed anteriorly, the second of which is incomplete at the midline, and both of which are preceded by a small black bar. Posterior to these are a pair of paramedian black lines which extend onto the chest. The chest itself is marked with black spots and these spots occur as well on the underside of the fore limbs. The remainder of the venter is marked with dark brown (centrally) to orange (peripherally) dots, which may even appear as longitudinally elongate dashes, and which extend as well onto the underside of the thighs and onto the sides of the tail. The underside of the shank is dull white and lacks well-defined spots.

Variation: In snout–vent length, 20 males (type and paratypes) average 63.9 (52–78), 23 female paratypes average 50.3 (41–58). Dorsal crest scales in occiput–vent length (combined data for both sexes) average 51.6 (45–56) and dorsal crest scales in occiput–axilla length average 22.0 (18–29). One half scales are midbody average 23.8 (21–27), loreals 4.9 (3–8), temporals 11.4 (9–14), subdigital tricarinate scales on the fourth toe 24.3 (21–27). The parietals are more often in contact (73%) than not, the supraorbital semicircles are more often complete (72%) than not. All specimens have four median head scales, three prefrontal scales in a complete row, and usually five frontoparietals in a complete row, although counts of four and six occur as well, and two individuals have the frontoparietal row interrupted.

The paratypes include 22 males, of which three are juveniles (snout–vent lengths 37 to 44). All adult and subadult males agree well with the type in coloration and pattern, although some are even more darkly pigmented. The lateral fields often have more prominent black dashes than those of the type, and the dorsal fields at times show more dark blotches than does the type. The postorbital blotch is consistently absent, and the dorsum is always prominently lined, the pale zone 4 involving parts of three scales (one entire scale and halves of two adjacent scales). The ventral ground color ranges in life from white to pale yellow. The throat pattern is essentially that described for the type, but it may show some fragmentation which is not extensive. The most anterior of the throat V's may be preceded by a small transverse black bar, the paramedian lines may be joined to the more posterior of the V's, there may be an additional pair of paramedian lines adjacent to the central pair; all these variations do not disturb the inherently obvious pattern of the throat. All have the venter dotted with brown, although the three juveniles lack the dots centrally, but have them peripherally. The dorsal surfaces of the hind limbs usually show both tan and dark brown markings, but one or both features may be absent, so that this member may have an unmarked dorsal surface.

Aside from their smaller size, the females present no special features. They resemble the males in all characteristics, even to the throat pattern and heavily spotted venters, although juvenile females, like juvenile males, have few to no dots centrally on the belly.

Comparisons: L. s. lucianus differs from the races *stictigaster*, *sierrae* and *exotheotus* by virtue of its dorsal pattern; in these three subspecies, zone 4 regularly involves one and one-half scales, in contrast to three scales in *lucianus*. In addition, *lucianus* has a definite throat pattern and ventral dots; *exotheotus* may lack ventral dots, and all three western races usually have the throat pattern disintegrated in adults and have some gray clouding on the ground color. *L. s. lucianus* most closely resembles *astictus* dorsally; both have a wide zone 4. However, *astictus* lacks ventral dots, has the parietals usually (73%) not in contact, and has red sides with green dots, whereas *lucianus* has brown sides without other lateral chromatic markings.

Remarks: L. s. lucianus is known to occur only along the sandy beach at Playa Santa Lucía; in this area it is the most abundant lizard and large numbers were seen daily. That the species does not occur only at this single isolated locality is shown by one specimen (MCZ 59229) from about 20 kilometers north of Camagüey. I hesitate to call this single lizard *lucianus,* since it appears to be distinctively colored dorsally, has especially heavy dark throat markings, a narrow zone 4, and rather prominent dark markings in the lateral fields. In all these characteristics this specimen agrees well with the two Bayamo lizards referred to previously. It is probable that *L. stictigaster* has a much wider distribution in eastern Cuba than is currently known, and it should be looked for at least in Camagüey and western Oriente.

Literature Cited

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NOTES ON SOME NORTH AMERICAN TEPHRITIDAE, WITH DESCRIPTIONS OF TWO NEW GENERA AND TWO NEW SPECIES (DIPTERA)

By Richard H. Foote

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This paper comprises some notes and descriptions accumulated during a compilation of a definitive catalog of North American Tephritidae. Included are the descriptions of *Metatephritis fenestrata*, n. gen., n. sp.; the genus *Mylogymnocarena*, n. gen., for *Urellia apicata* Thomas; and *Gymnocarena bicolor*, n. sp. *Eutreta aurantiaca* Doane is placed in the genus *Xenochaeta*; a first United States record for *Acrotaenia testudinea* (Lw.) is given; and the genera *Gymnocarena, Oedicarena*, and *Zonosemata* are discussed.

Assistance was received from M. T. James, Washington State University, Pullman; R. B. Lattimore and E. W. Jackson, U. S. Department of Agriculture, Brownsville, Texas; C. W. Sabrosky, U. S. Department of Agriculture, Washington, D. C.; and H. V. Weems, Jr., State Plant Board of Florida, Gainesville. The collections of the Museum of Comparative Zoology, Cambridge, Massachusetts, and the U. S. National Museum were indispensable.

Acrotaenia testudinea (Loew)

(Fig. 1)

Trypeta testudinea Loew, 1873, Smiths. Misc. Coll. 11(256): 272; pl. XI, Fig. 13.

Acrotaenia testudinea: Loew, 1873, Smiths. Misc. Coll. 11(256): 274.—Hendel, 1914, Abh. u. Ber. Anthrop.-Ethn. Mus. Dresden (1912) 14: 59.—Bates, 1933, Bull. Brooklyn Ent. Soc. 28: 164.—Bates, 1934, Rev. de Ent. 4: 9.—Aczél, 1949, Acta Zool. Lilloana 7: 269.

Figs. 1–3

A female of this species was collected 26 January 1936, on Big Pine Key, Monroe Co., Florida, by T. J. Cooper in a glass McPhail fruit fly trap. The specimen has been assigned Florida State Plant Board Accession No. 58178 and is deposited in the collection of that organization at Gainesville. This constitutes the first United States record of the genus and species, and is the only one known to me. It is significant that this fruit fly has never been recorded from the United States since 1936 despite the large number of traps used in the extensive Florida fruit fly survey conducted during and after the 1956–1957 Medfly outbreak.

The type locality of *testudinea* is stated by Loew (1873) as Cuba; the specimen is in the Berlin Museum. The species has been reported from Cuba and Puerto Rico several times, and specimens in the U. S. National Museum represent several localities on each of these islands. The National Museum also contains a specimen bearing the label "Jacaqua, Dominican Republic."

The wing illustrated in Figure 1 is that of a Puerto Rican female.

Xenochaeta aurantiaca (Doane), new combination

Eutreta aurantiaca Doane, 1899, Jour. New York Ent. Soc. 7: 185; pl. III, Fig. 10.—Aldrich, 1905, Smiths. Misc. Coll. 46(1444): 608.

Tephritis aurantiaca: Coquillett, 1899, Jour. New York Ent. Soc. 7: 264.

Through the courtesy of Maurice T. James, I have been able to examine the holotype of *aurantiaca* Doane. This female is headless and has but one wing, but is otherwise intact. Although the hyaline spots in the wing of *aurantiaca* are smaller, much more discrete, and separated from each other by greater distances than in *dichromata* Snow, the only other species in the genus, the general pattern of spotting, as illustrated by Doane (1899), is similar. Both species have a shiny yellow abdominal dorsum with large, dark, partially or completely confluent spots covered by mixed black and yellow setae; the mesonotum covered by some pollinosity and dense reddish or yellowish hairs; the dorsal one-third of the thoracic pleural area with a light yellow stripe that includes the humerus and prothoracic spiracle; and shining black postscutellum and metathorax. An intact specimen of *aurantiaca* from Fort Lewis, Washington, collected by Paul H. Arnaud, Jr., has a sharply pointed third antennal segment, much more so than in *dichromata*. The arrangement of the three lower fronto-orbitals in both species is distinctive; the anterior two are situated close to each other near the antennal bases, and the posterior one is considerably removed from them and in a transverse line with the anterior pair of uppers. The front at the vertex is very wide. The two species may be distinguished from each other by the following key:

Wing pattern consisting of small, discrete, hyaline spots; one small dark mid-ventral spot on each femur; dark spots fused, or nearly so, on all but basal abdominal tergum; scutellum dark basally and centrally, yellow laterally .... *aurantiaca* (Doane)

Wing pattern consisting of large, diffuse hyaline spots; only hind femur with one dark mid-ventral spot, remaining femora entirely yellow; dark spots not fused on any but terminal abdominal tergum; scutellum with dark area only at base of each bristle .... *dichromata* Snow

The genera *Paracantha* Coquillett, *Eutreta* Loew, *Eurosta* Loew, *Icterica* Loew, *Xanthomyia* Phillips, *Jamesomyia* Quisenberry, and *Acidogona* Loew belong with *Xenochaeta* in the tribe Ditrichini of the subfamily Tephritinae, as outlined in Hering's (1947) detailed key to the suprageneric groups of the family. These genera are characterized by having a wide frons with the upper fronto-orbitals set well inside the lowers, the dorsocentrals in a transverse line through the supra-alars, the wing pattern consisting essentially of light spots on a dark field, and well-defined marks forming a pattern on a light colored abdominal dorsum. These genera, including *Xenochaeta,* have dark spots on one or more pairs of femora or possess partially or entirely dark femora, and all have yellow postocular bristles. From the first five genera named above, *Xenochaeta* may be distinguished by the very different wing pattern, and from *Icterica* and *Acidogona* by the much smaller size of its species. *Xanthomyia* and *Jamesomyia* are heavily pollinose species with very stout head hairs; the former genus carries only two pairs of lower fronto-orbitals and has a very broad wing with the hyaline spots of the pattern very differently disposed than those of *Xenochaeta.*

Metatephritis, new genus

Diagnosis: Labellum normal in size and shape, not elongate or geniculate; face somewhat produced anteriorly at oral margin; frons at vertex as wide as one eye; from lateral view, gena less than one-half the maximum eye height; third segment of antenna rounded apically; three pairs well-developed lower fronto-orbitals; two pairs upper fronto-orbitals, the posterior pair very light colored and not convergent; post-oculars pale and blunt. Humerals and supra-alars present; one pair dorsocentrals situated immediately behind suture and distinctly anterior to anterior supra-alars; two pairs scutellars.

Type species: Metatephritis fenestrata, new species.

Metatephritis fenestrata, new species

(Fig. 2)

Male: In lateral view head 1.3 times as high as long; frons and proximal half of face flat, meeting at an angle of about 120 degrees; gena narrow, 0.1 to 0.15 times as high as one eye; lower fronto-orbitals strongly curved inwardly; ocellar longer than any other head bristle except inner vertical; genal bristle situated directly under eye; antenna about 0.5 times as long as face, entirely yellow.

Mesonotum yellow with indistinctly margined brown marking occupying a narrow area behind head and extending posteriorly to suture on each side of a central yellowish spot situated immediately anterior to suture, and occupying most of notum from suture to scuto-scutellar suture; scutellum entirely yellow, the posterior bristles crossed; entire postscutellum and median two-thirds of metathorax brown, this spot with indistinct margins; remainder of thorax, including halter and legs, yellow. Wing pattern as in Fig. 2; vein R_{4+5} and node entirely bare; cell 1st A distally extending into a distinct point; vein r-m distinctly distad of midpoint of cell 1st M_2.

Abdomen yellow above and below; setae on dorsum of segment I yellow, those on dorsal terga of remaining segments brown; claspers with black apical and subapical teeth, the latter very long and slender; remainder of genitalia yellow.

Wing length: 7 mm.

Female: Not known.

Types: Holotype ♂, North Side, Buffalo Bill Reservoir, near Cody, Wyoming (no further data available). U. S. National Museum No. 64871. Paratypes: 1 ♂, same data as type (USNM); 1 ♂, Boundrant, Wyoming, 13 June 1958, in gall of *Artemisia tridentata* (Fronk) (USNM).

Discussion: The unusual wing pattern sets *fenestrata* apart morphologically from all North American tephritids; the species may be recognized immediately by the brown border completely surrounding the wing field, thereby forming a central hyaline area occupying most of cells R, R_5, and 1st M_2.

The genus belongs in the typical tribe of the subfamily Tephritinae, as outlined in Hering's extensive key (1947), but is placed there with difficulty because of the absence of hyaline spots in a dark field. The remaining characters are so like those of *Neotephritis* Hendel and *Euarestoides* Benjamin that the genus would be improperly placed elsewhere in the family. Both *Euarestoides* and *Neotephritis* have been reviewed by Foote (1958 and 1960, respectively).

Mylogymnocarena, new genus

Diagnosis: Frons bare, about as wide as one eye at vertex; in profile gena broad and without well-developed bristles anterior to genal bristle; face retreating, without median carina, oral margin not produced anteriorly; holotype with 4 lower fronto-orbitals on one side, 5 on the other; 2 pairs upper fronto-orbitals, the posterior pair not convergent; postoculars pale; antenna about two-thirds as long as face, third segment rounded apically. Humeral, supra-alar, and presutural present; 1 pair dorsocentrals, in a line drawn between anterior supra-alars; 2 pairs scutellars. Femora without stiff short setae ventrolaterally. Vein r-m situated distinctly apicad of midpoint of cell 1st M_2; vein R_{4+5} bristled dorsally.

Type species: Urellia apicata Thomas.

Mylogymnocarena apicata (Thomas), new combination

Urellia apicata Thomas, 1914, Canadian Ent. 46: 428; Fig. 35.

The original description of Thomas (1914) places this rare species very well. As far as known, the holotype is the only existing specimen. This female is in the Museum of Comparative Zoology, Cambridge, Massachusetts, and bears the following labels: "Colo 2277," "Urellia apicata Th.," "Holotype No. ....," and "Type 7731."

The wing pattern of *apicata* indicates an affinity with *Trupanea,* from which it differs by the presence of setae on vein R_{4+5}, the more posterior position of the dorsocentrals, and the larger number of lower fronto-orbitals. The characters of *apicata* do not allow its placement in any of the known tephritid genera.

Genus *Gymnocarena* Hering

Gymnocarena Hering, 1940, Siruna Seva 1: 4.

The genus *Oedicarena* was established by Loew in 1873 (see below) for *tetanops,* n. sp., a yellowish Mexican species with a wing pattern very much like *Rhagoletis basiola* (O.S.) and *Zonosema vittigera* (Coq.) but having a prominent facial carina arising between the bases of the antennae and extending to the oral margin. In 1877 Osten Sacken described *Oedicarena persuasa* from Denver, Colorado, and in 1894 Snow placed his new species *diffusa* in *Oedicarena.* The genus as thus constituted caused considerable confusion among tephritid taxonomists, a situation aggravated by the lack of an adequate generic position for *tricolor* Doane, 1899, originally described as an *Euaresta* but closely related to *diffusa* and quite different from *tetanops* and *persuasa.*

Hering (1940) effectively resolved the confusion by establishing *Gymnocarena* for *diffusa,* and Quisenberry (1950) assigned *tricolor* to it. A single specimen in the U. S. National Museum represents yet a third species and is described below as *bicolor,* n. sp.

Generic diagnosis: Frons bare; gena directly below eye distinctly less than one-half the eye height; proboscis not geniculate; face without carina; three pairs lower fronto-orbitals; two pairs upper fronto-orbitals, the posterior pair not convergent; postoculars pale but slender and pointed; third antennal segment rounded apically. Humeral, supra-alar, and postsutural present; 1 pair dorsocentrals, situated in a transverse line between anterior supra-alars; vein r-m distinctly apicad of midpoint of cell 1st M_2.

Key to Known Species of Gymnocarena Hering

1. Wing pattern with an almost continuous transverse hyaline band between costa and posterior margin of cell Cu_1, in addition to other hyaline markings .... *diffusa* (Snow)
   Wing pattern without such a continuous band, although other markings are present 2
2. Cell R_1 with two hyaline marks distad of apex of stigma; wing field consisting of two distinctly different shades of brown, one anterior and one posterior to veins M and M_{1+2} .... *tricolor* (Doane)
   Cell R_1 with one hyaline mark distad of apex of stigma; wing field unicolorous .... *bicolor,* n. sp.

Gymnocarena diffusa (Snow)

Oedicarena diffusa Snow, 1894, Kansas Univ. Quart. 2: 161; pl. VII, Fig. 9.—Doane, 1899, Jour. New York Ent. Soc. 7: 179.—Curran, 1934, Fam. Gen. North American Dipt., p. 290; Fig. 30.
Straussia diffusa: Coquillett, 1899, Jour. New York Ent. Soc. 7: 261.
Strauzia diffusia [*sic*]: Cresson, 1907, Trans. American Ent. Soc. 33: 100.
Gymnocarena diffusa: Hering, 1940, Siruna Seva 1: 4.

The wing of this species has been excellently illustrated by Curran (1934), and is distinctive in having an almost continuous transverse hyaline band from the costa to the posterior margin of the wing in cell Cu_1 in addition to a number of other hyaline markings. The field color is such a light shade of brown in some specimens that the pattern of hyaline markings is difficult to distinguish.

The species inhabits the Great Plains region of the United States. The eastern limit of its range is Missouri, the northernmost record is Montana; the species extends into the southwest as far as Arizona. Although *diffusa* is a rather common species, nothing is known about its larval habitat.

Gymnocarena tricolor (Doane)

Euaresta tricolor Doane, 1899, Jour. New York Ent. Soc. 7: 191; pl. IV, Fig. 9.—Aldrich, 1905, Smiths. Misc. Coll. 46(1444): 613.
Tephritis tricolor: Coquillett, 1899, Jour. New York Ent. Soc. 7: 264.
Gymnocarena tricolor: Quisenberry, 1950, Jour. New York Ent. Soc. 58: 10.

Doane's (1899) description and wing figure are quite sufficient to place this little-known species. The wing pattern consists of clear hyaline spots on a field of two contrasting shades of brown distinctly divided from each other along veins M and M_{1+2}, the dark shade lying anterior and the light shade posterior to this line.

The species was originally described from South Dakota. The only cabinet specimen other than the holotype is in the U. S. National Museum and bears the label "Cranmoor, Wisc., VIII.16.09."

Gymnocarena bicolor, new species

(Fig. 3)

Male: Frons yellow, parallel-sided, 0.8 times as wide as one eye at vertex; in lateral view, head 1.4 times as high as long; gena directly below eye 0.2 times as high as eye; face whitish, produced anteriorly at oral margin; antenna 0.8 times as long as face. Mesonotum yellow with fine yellow setae in addition to the larger bristles; thorax without dark markings of any kind; scutellum with 4 bristles; head and thoracic bristles light brown. Wing pattern as in Fig. 3; vein R_{2+3} haired nearly to apex; vein r-m situated distad of apex of stigma, distad of mid-point of cell 1st M_2, and at a distinct angle to vein m; cell 1st A drawn to a point along vein Cu_2 + 2nd A. Legs and abdomen completely yellow, without dark markings.

Wing length: 9 mm.

Holotype: ♂, Indian Creek Canyon, Chiricahua Mountains, Arizona, 6100 ft. U. S. National Museum Type No. 64872.

Discussion: In addition to the characters given in the generic description, the wing figures and key adequately characterize this species. It is easily separable from *tricolor* by the even brown color of the wing field and the different arrangement of hyaline spots as shown.

Genus *Oedicarena* Loew

Oedicarena Loew, 1873, Smiths. Misc. Coll. 11(256): 247. Type species *tetanops* Loew (*ibid.*, p. 245, pl. XI, Fig. 15).

A discussion of the history of this genus will be found under the treatment of *Gymnocarena* in the present paper. The species of *Oedicarena* differ markedly from those of *Gymnocarena* in possessing a prominent facial carina, a gena at least as high as one-half the eye height, golden mesonotal pollen, and the dorsocentrals situated very close to the acrosticals. *Oedicarena* very closely resembles *Rhagoletoides* Foote (1960) in having a prominent facial carina, golden mesonotal pollen, and a suggestion of paired brown mesonotal spots, but differs from that genus in lacking strong femoral spines and a narrow gena.

The two species now comprising *Oedicarena, tetanops* (Lw.) and *persuasa* (O.S.), are represented by holotypes in the Museum of Comparative Zoology. They may be recognized by the following characters:

1. Cells 1st and 2nd C, basal half of cell R, and cell 1st A yellow; brown spot in apex of cell R_5 continuous along costa with transverse band covering vein m .... *persuasa* (O.S.)

   Cells 1st and 2nd C, basal half of cell R, and cell 1st A hyaline; brown spot in apex of cell R_5 isolated .... *tetanops* (Lw.)

O. persuasa was originally described from Denver, Colorado, and has not been recorded since; *tetanops,* as far as known, occurs only in Mexico and has not been captured within the United States.

Genus *Zonosemata* Benjamin

(Fig. 4)

Zonosemata Benjamin, 1934, U. S. Dept. Agric. Tech. Bull. 401: 17. Type species: *Trypeta electa* Say.

The diagnosis and a discussion of this close ally of *Rhagoletis* Loew are detailed by Benjamin (1934). *Zonosemata* is a North American genus containing two species, *electa* (Say), the pepper maggot, and *vittigera* (Coq.). A short but excellent summary of the distribution, hosts, and economic importance of *electa* is already available (Anon, 1959), and a more detailed account is given by Benjamin (1934). *Z. vittigera,* however, has been generally overlooked in discussions of the genus.

Adults of *vittigera* have been collected from alfalfa, cotton, *Helianthus* spp., orange, peach, and quince and are commonly attracted to traps baited for the Mexican fruit fly (*Anastrepha ludens* (Lw.)) in the Rio

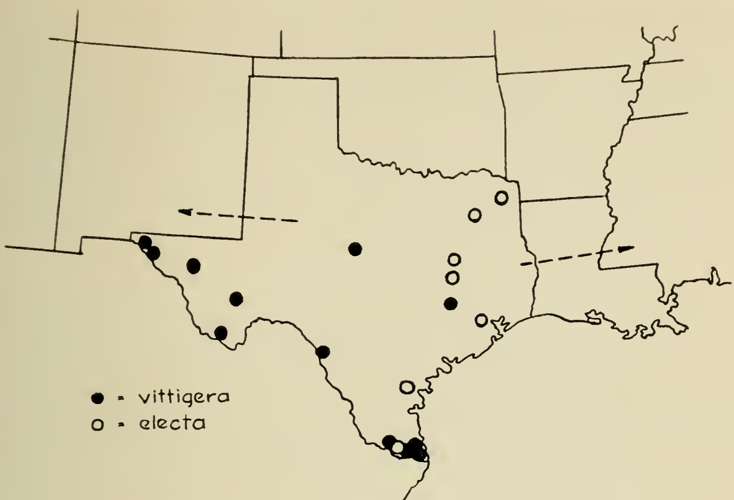

FIG. 4

Grande valley of Texas. However, the only plant authenticated as a larval habitat is *Solanum eleagnifolium,* the silverleaf or white horse-nettle. This plant is found in dry, open woods, prairies, waste places and disturbed soil in southwestern United States and adjacent Mexico; the northern limit of its range is in Missouri, and the plant has been found occasionally in Louisiana, Ohio, and Florida (Fernald, 1950). This distribution agrees well with that of *vittigera,* based on specimens seen in this study from the following localities:

UNITED STATES. ARIZONA: Amado, Aura Valley, Benson, Buckeye, Douglas, Ft. Apache, Lavern, Mesa, Nogales, Pearce, Sedona, White River, and Wilcox. NEW MEXICO: Belen, Las Cruces, Mesilla, Rodeo, and 7 mi southeast of Rodeo. CALIFORNIA: A single female captured in Santa Fe R.R. Pullman, San Francisco (1929). TEXAS: Brownsville, Bryan, Coleman, Donna, Eagle Pass, El Paso, Ft. Davis, Harlingen, Pine Springs, Presidio, and Weslaco (all shown on map, Fig. 4). MEXICO. TAMAULIPAS: Matamores and Reynosa.

Figure 4 is based only on specimens seen in this study and shows the limited area in which the ranges of *vittigera* and *electa* overlap. No intergrading characters in any of the Texas specimens of either species could be found.

The mesonota of both species are yellow laterally and centrally and have wide, paired, sublateral brown stripes which are united anteriorly but divided posterior to the suture. In *vittigera* these stripes are united by a dark transverse streak at the base of the scutellum; this mark is usually absent in *electa.* In addition, *vittigera* has paired sublateral black spots anterior to the mesonotal suture, much of the post-scutellum is black, the metanotum has paired lateral black stripes, and black spots are present in the center of the thoracic pleural area and on the sternopleuron centrally, characters never present in *electa*. The wing bands of *vittigera* are narrower and more sharply defined, although their arrangement is nearly the same in the two species. Few external structural differences distinguish them from each other, but the aedeagus of *vittigera* is narrower in proportion to its width (2:6) than that of *electa* (2:5), a reliable means for separating them.

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Explanation of Figures

Right wing, dorsal view, Tephritidae. Fig. 1, *Acrotaenia testudinea*

(Lw.); Fig. 2, *Metatephritis fenestrata,* n. gen., n. sp.; Fig. 3, *Gymnocarena bicolor,* n. sp.

Fig. 4. Distribution of *Zonosemata electa* and Z. *vittigera* in Texas. Arrows indicate approximate direction of additional locality records (left, *vittigera*; right, *electa*).

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PROCEEDINGS

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A NEW SPECIES OF *KURODAIA* (MALLOPHAGA: AMBLYCERA) FROM THE COLLARED SCOPS OWL OF THAILAND

By Robert E. Elbel and K. C. Emerson
Department of Zoology, University of Oklahoma, Norman, Oklahoma and Stillwater, Oklahoma

Scops Owls and Screech Owls are parasitized by the mallophagen genera *Kurodaia* and *Strigiphilus*. Species of both genera are found on other hosts of the Avian order Strigiformes. *Kurodaia painei* (McGregor, 1912) and *Strigiphilus otus* Emerson, 1955, are found on the Screech Owl, *Otus asio* (Linnaeus). *Strigiphilus heterogenitalis* Emerson and Elbel, 1957, was described from the Collared Scops Owl, *Otus bakkamoena lettia* (Hodgson). The fact that the *Kurodaia* from the latter host was new, has been mentioned previously by the authors (1959) in a discussion of the taxonomic position of the Collared Scops Owl as indicated by the Mallophaga. The new species of *Kurodaia* is herewith described and illustrated from material collected by Robert E. Elbel, while he was assigned to the United States Operations Mission to Thailand. The skins of the host are in the U. S. National Museum and were identified by H. G. Deignan. Appreciation is expressed to John S. Wiseman and the Texas State Department of Health for the loan of specimens of *Kurodaia painei*.

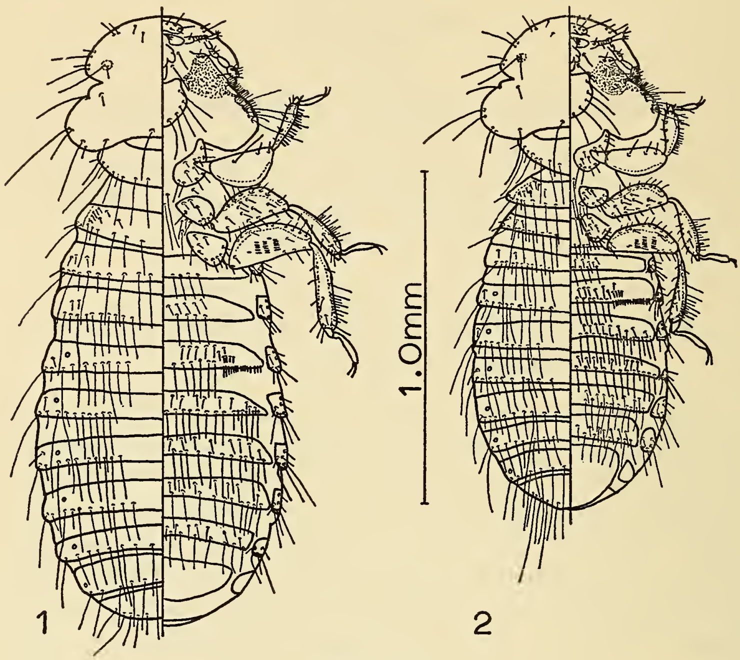
Kurodaia deignani, new species

Holotype male: General shape and chaetotaxy as shown in Figure 2. Ventral chaetotaxy of terminal abdominal segments as shown in Figure 5. Genitalia as shown in Figure 7.

Allotype female: General shape and chaetotaxy as shown in Figure 1. Ventral chaetotaxy of terminal abdominal segments as shown in Figure 3.

Type host: Otus bakkamoena lettia (Hodgson).

Type material: Holotype male and allotype female, collected at Ban



FIGS. 1–2

Muang Khai, Tha Li, Loei, Thailand on 29 January 1955 by Robert E. Elbel, have been deposited in the U. S. National Museum. Paratypes: 4 males and 3 females, from the type host, were collected at Ban Thung Chuak, Salok Bat, Khanu, Kamphaeng Phet, Thailand, on 22 June 1953 by Robert E. Elbel, of which 2 males and 1 female were deposited in the U. S. National Museum and a pair each in the collections of the authors.

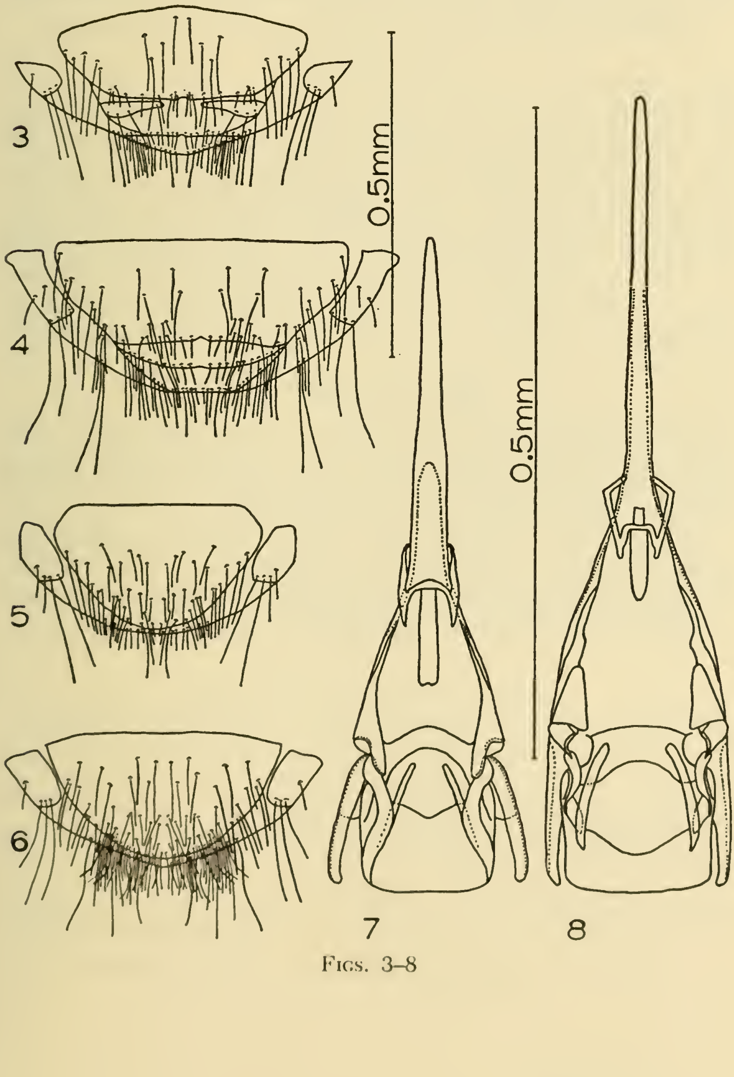
Measurements of *K. deignani*

	HOLOTYPE MALE (mm)	ALLOTYPE FEMALE (mm)
Length of head	0.34	0.37
Width of head	0.54	0.59
Width of prothorax	0.33	0.39
Width of mesothorax	0.41	0.50
Width of abdomen	0.59	0.71
Total length	1.46	1.86

Discussion: Kurodaia deignani differs from *K. painei* (McGregor) in size, chaetotaxy of terminal abdominal segments, and structure of the male genitalia. *K. deignani,* especially the male, is smaller than *K. painei.*

Measurements of *K. painei*

	MALE (mm)	FEMALE (mm)
Length of head	0.40	0.40
Width of head	0.64	0.64
Width of prothorax	0.41	0.45
Width of mesothorax	0.49	0.54
Width of abdomen	0.69	0.80
Total length	1.71	1.97



FIGS. 3–8

These measurements are greater than those given by McGregor in his original description. Differences in chaetotaxy of terminal abdominal segments are apparent from a comparison of Figures 3 and 5 for *K. deignani* with Figures 4 and 6 for *K. painei.* Differences in the male genitalia between *K. deignani* and *K. painei* may be seen by comparing Figures 7 and 8. The measurements and illustrations of *K. painei* are from specimens in the Texas State Department of Health, collected from *Otus asio* in Travis County, Texas, on 5 April 1951 and Zavalla County, Texas, on 25 April 1951 by Johnson and Walker. *Kurodaia deignani* is named for H. G. Deignan, who considered the evidence from the Mallophaga to help determine that the American and Asian forms of *Otus* were not conspecific (Elbel and Emerson, 1959).

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Explanation of Figures

Kurodaia deignani, new species. Fig. 1.—Dorsal-ventral view of female. Fig. 2.—Dorsal-ventral view of male. Fig. 3.—Ventral view of terminal abdominal segments, female. Fig. 5.—Ventral view of terminal abdominal segments, male. Fig. 7.—Male genitalia.

Kurodaia painei (McGregor, 1912). Fig. 4.—Ventral view of terminal abdominal segments, female. Fig. 6.—Ventral view of terminal abdominal segments, male. Fig. 8.—Male genitalia.

Illustrations of similar structures are drawn to the same scale.

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PROCEEDINGS
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A NEW CRAYFISH OF THE GENUS PROCAMBARUS FROM SOUTHERN ALABAMA (DECAPODA, ASTACIDAE)

By Horton H. Hobbs, Jr. and Margaret Walton
Mountain Lake Biological Station, University of Virginia

On 4 June 1940, Lewis Berner, Charles Benton, and the senior author collected four specimens of this new species from simple burrows in a drying creek-bed near the southeastern city limits of Haynesville, Lowndes County, Alabama. Not until April, 1958 were additional specimens obtained when Thomas L. Johnson and the senior author collected 109 specimens from five localities in Lowndes, Montgomery, and Wilcox counties, Alabama.

This crayfish is a member of the Blandingii Group and is closely related to *Procambarus acutissimus* (Girard, 1852) and *P. hayi* (Faxon, 1884). While the extent of its range is not known, failure to find it in collections to the north and east in habitats similar to those in which it occurs suggests that Montgomery and Lowndes counties lie near the northern and eastern limits.

We wish to acknowledge, with thanks, the assistance given by those persons mentioned above in collecting the specimens on which this description is based.

Procambarus lophotus,[1] new species

Diagnosis: Rostrum with small lateral spines or if spines absent margins interrupted; areola 12 to 17 times longer than broad with one or two punctations in narrowest part and constituting from 32 to 37 per cent of total length of carapace; postorbital ridges terminating cephalically in small spines or tubercles; lateral spines small, often tuberculiform; inner margin of palm of chela of first form male with one or two irregular rows

[1] lophotus, G.—crested. So named because of the helmet-like cephalic process of the first pleopod of the male.

of eight or nine tubercles; male with hooks on ischiopodites of third and fourth pereiopods. First pleopods of first form male asymmetrically situated, reaching coxopodite of third pereiopod and with a cephalolateral knob at base of terminal elements; no prominent cephalic hump or shoulder. Mesial process noncorneous, slender, subspiculiform and directed caudodistally and somewhat laterally; cephalic and caudal processes and central projections all corneous and directed caudodistally (Figs. 1 and 6). Annulus ventralis broader than long with a broadly S-shaped sinus that terminates caudally on an elevated prominence; cephalic portion hidden by multi-tuberculate extensions of the sternum immediately cephalic to annulus.

Holotype male, Form I: Body subovate, compressed laterally; abdomen narrower than thorax (15.5 and 18.8 mm respectively); width and height of carapace subequal in region of caudodorsal margin of cervical groove (18.8 and 18.4 mm).

Areola narrow (14 times longer than broad) with one or two punctations in narrowest part and constituting about 34.1 per cent of entire length of carapace.

Margins of rostrum not swollen, strongly convergent and with acumen indistinctly delimited from remainder of rostrum. Acumen narrowly triangular and reaching distal end of penultimate podomere of peduncle of antennule; upper surface of rostrum shallowly concave with a few widely scattered setiferous punctations. The usual submarginal row of setiferous punctations continuous onto acumen. Subrostral ridges weak and evident only at base of rostrum.

Postorbital ridges clearly defined, grooved laterally, and terminating cephalically in small tubercles; suborbital angle small and obtuse; branchiostegal spine small and tuberculiform. Lateral surface of carapace strongly granulate, lateral spines represented by a pair of tubercles that are only slightly larger than adjacent granulations.

Abdomen and carapace subequal in length (40.5 and 41.0 mm).

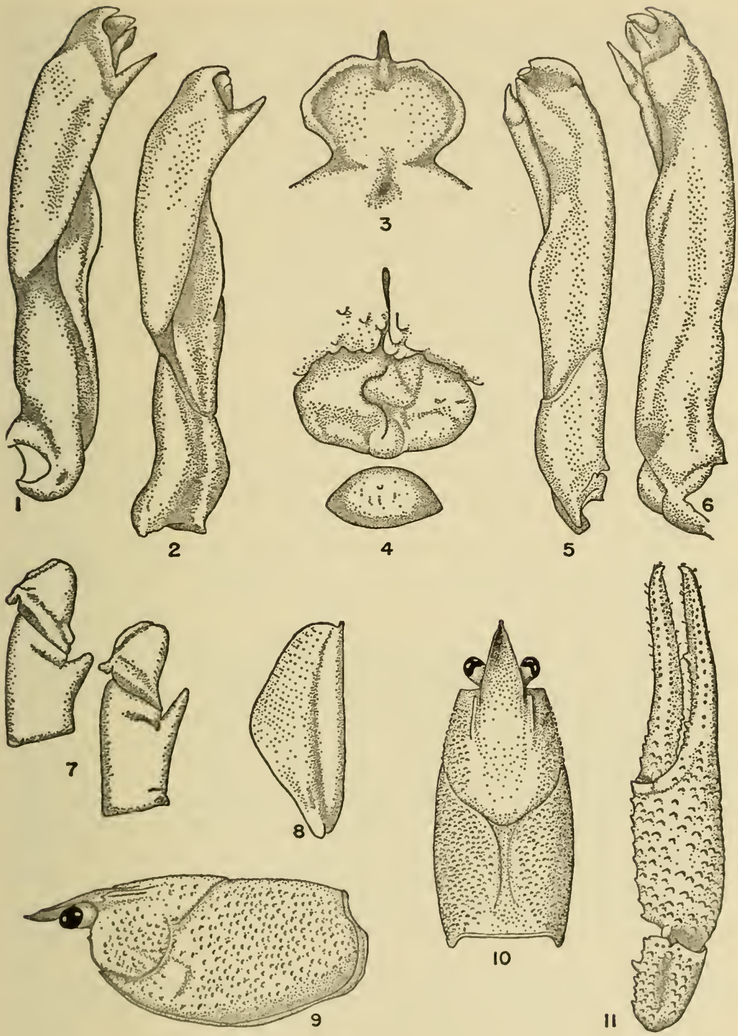
Cephalic section of telson with two spines in each caudolateral corner.

Epistome (Fig. 3) broader than long with a prominent cephalomedian spine and a median longitudinal carina near cephalic margin.

Antennules of the usual form with a small spine on lower surface of basal segment.

Antennae extend caudad to fifth abdominal tergum. Antennal scale (Fig. 8) of moderate width, broadest near midlength, and with a small spine at extremity of outer distal margin; lamellar portion with no distinct angles.

Right chela elongate, four times longer than broad and length of chela greater than length of carapace (42.5 and 41.0 mm). All surfaces of palm studded with squamous tubercles. Inner margin of palm with poorly defined rows of tubercles (in silhouette, nine tubercles may be seen extending above the surface). Lower surface of palm with one tubercle somewhat larger than the others at base of dactyl. Fingers not gaping, both with poorly defined submedian ridges above and below,



Figs. 1–11

especially on dactyl. Opposable margin of immovable finger with a row of 16 knob-like tubercles, only the third and fourth from base of which are conspicuous; below this row at base of distal third is the usual prominent tubercle. Crowded minute denticles along entire length of opposable margin. Lateral margin with a row of squamous tubercles along proximal fourth and continuous with it to tip of finger a row of setiferous punctations. Opposable margin of dactyl with an upper row of 14 knob-like tubercles along proximal two-thirds of finger; additional tubercles irregularly placed below this row between the fourth and twelfth tubercles; upper row with crowded minute denticles along distal three-fifths. Mesial margin of dactyl with a row of five tubercles along proximal fourth, distal to which continues a row of setiferous punctations. Mesial, upper and lower proximal portion of dactyl with a few scattered tubercles; elsewhere with rows of setiferous punctations.

Carpus of first right pereiopod about 1.7 times longer than broad with a shallow, slightly oblique, longitudinal furrow. Tuberculate except on lower and upper lateral surfaces. Usual semicircular arrangement of four tubercles between the upper and lower condyles distinct but none spiniform; remaining tubercles on mesial surface smaller and none conspicuously larger than others.

Merus of first right pereiopod with tubercles on upper, lower, and mesio-distal surfaces; elsewhere punctuate. Two prominent tubercles on upper surface near distal extremity. Lower surface with a mesial row of 16 spine-like tubercles and a lateral one of 13; additional tubercles flanking both rows. Lower margin of ischiopodite with a single row of six tubercles.

Ischiopodites of third and fourth pereiopods with hooks (Fig. 7); hooks simple and that on fourth heavier and opposed by a small knob on corresponding basipodite.

Coxopodites of fourth and fifth pereiopods with the usual projecting prominences—those on fourth knob-like and those on fifth tuberculiform.

First pleopod (Figs. 1 and 6) reaching coxopodite of third pereiopod when abdomen is flexed. (See *Diagnosis* for description.)

Allotypic female: Differs from the holotype in the following respects: Epistome slightly more irregular and lacking median carina; cephalic section of telson with three spines in the caudodextral corner. Inner margin of palm of chela with a well-defined row of eight tubercles; fingers gaping; opposable margin of immovable finger with a row of 11 tubercles along proximal two-thirds with fourth and fifth from base larger. Opposable margin of dactyl with 11 tubercles, the third from base largest and with a gap between it and the second that received the fourth tubercle on dactyl when fingers are closed. A single row of minute denticles along distal third of opposable margin of both fingers. (See *Measurements.*)

Annulus ventralis (Fig. 4) broader than long with an S-shaped sinus, the caudal extremity of which lies on a prominent caudomedian elevation. Sternum immediately cephalic to annulus produced caudally in multituberculate prominences that overlap slightly on the median line.

Morphotypic male, Form II: Differs from the holotype in the following respects: Cephalic portion of telson with three spines in the caudosinistral corner. Carpus with the tubercles more acute and several on mesial surface larger than those elsewhere on podomere; hooks on ischiopodites of third and fourth pereiopods reduced and neither opposed by a knob on corresponding basipodite. First pleopod (Figs. 2 and 5) with all terminal elements of holotype but noncorneous and not so distinctly delineated.

Measurements (in millimeters)

	HOLOTYPE	ALLOTYPE	MORPHOTYPE
Carapace:			
height	18.4	19.6	17.6
width	18.8	20.3	17.9
length	41.0	42.4	40.5
Areola:			
width	1.0	1.0	1.0
length	14.0	13.9	13.7
Rostrum:			
width	6.5	6.9	6.2
length	10.2	11.0	10.2
Right chela:			
length of inner margin of palm	15.9	9.6	11.3
width of palm	10.6	9.3	8.3
length of outer margin of hand	42.5	27.3	33.0
length of dactyl	24.0	16.2	18.8

Type locality: Roadside ditch, 3.4 miles northeast of Haynesville, Lowndes County, Alabama, on State Route 11. Here the road passes through gently sloping pasture lands with no trees in the immediate vicinity. The ditch, nowhere more than 1.5 feet deep, has a muddy bottom that supports a few grasses, particularly along the shallow margins. The current was sluggish to moderate at the time collections were made, and there is evidence that at times the ditch is dry. The open mouths of many burrows were observed before the water was clouded by dragging the seine over the muddy bottom. Specimens of *Procambarus lewisi* Hobbs and Walton (1959) and *Cambarus striatus* Hay (1902) were also collected here.

Disposition of types: The holotypic male, allotypic female, and morphotypic male are deposited in the U. S. National Museum (Nos. 104404, 104405, and 104406, respectively). A paratypic series, consisting of a first form male, a second form male, and a female are in the collection of Tulane University. The remaining paratypes are in the collection of the senior author at the University of Virginia.

Color notes: The ground color is pinkish-cream, almost flesh-colored. A pair of small purplish-tan spots occur immediately cephalic to the cervical groove near the attachments of the mandibular muscles, and extending caudally from the vicinity of the spots is a pair of narrow, longitudinal, grayish-green bands that extend to the caudal margin of the branchiostegites. The areola is distinctly pink delimited laterally by tan branchiocardiac grooves. The abdomen bears a broad, dorsomedian, wedge-shaped purplish-tan band, the apex of which lies on the fifth tergite; in addition, at the bases of each epimeron, which is pink, is a narrow longitudinal grayish-green bar. Viewed laterally, these bars are in line with the bands on the branchiostegites. The chelae are pinkish-cream with purplish-brown to greenish-black tubercles. Variations occur in the actual colors with a suffusion of tan in the pinkish areas and a darkening of the bands and spots, but the pattern seems to be constant.

Variations: The principal variations noted in this species seem to be associated with age. The young specimens are more spiniform, with well-defined marginal spines on the rostrum, lateral spines on the carapace, and spines on the cephalic extremities of the postorbital ridges. Too, the areola is proportionally broader in the immature animals, occasionally being only seven times longer than broad. None of the variations observed seem to be restricted to local populations.

Relationships: Procambarus lophotus, a member of the Blandingii Group (see Hobbs, 1942) has its closest affinities with *P. hayi* and *P. acutissimus.* It may be distinguished from the former by the position of the lateral knob-like prominence near the distal end of the first pleopod; in *P. hayi* it lies proximolateral to the caudal process and in *P. lophotus,* proximolateral to the cephalic process. The pleopod of *P. acustissimus* is almost straight and the tips of the cephalic process and central projection are directed approximately at right angles to the shaft of the appendage; in *P. lophotus* the entire appendage is bent caudally and the corresponding processes are directed caudodistally. The annuli ventrales of the three possess a caudomedian elevation on which the caudal extremity of the sinus terminates; however, the contour of the sinus of *P. lophotus* is decidedly more sinuous than in the other species.

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——— and Margaret Walton. 1959. A new crayfish of the genus Procambarus from Alabama (Decapoda, Astacidae). Proc. Biol. Soc. Washington, 72: 39–44.

Explanation of Figures

Procambarus lophotus, new species. Fig. 1.—Mesial view of first pleopod of male, form I. Fig. 2.—Mesial view of first pleopod of male, form II. Fig. 3.—Epistome of male, form I. Fig. 4.—Annulus ventralis of female. Fig. 5.—Lateral view of first pleopod of male, form II. Fig. 6.—Lateral view of first pleopod of male, form I. Fig. 7.—Basipodites and ischiopodites of fourth and third periopods of male, form I. Fig. 8.—Antennal scale of male, form I. Fig. 9.—Lateral view of carapace of male, form I. Fig. 10.—Dorsal view of carapace of male, form I. Fig. 11.—Distal podomeres of cheliped of male, form I.

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PROCEEDINGS

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A NEW FAMILY OF MILLIPEDS OF THE ORDER SPIROBOLIDA, WITH NOTES ON AN ESTABLISHED FAMILY

By William T. Keeton

Department of Entomology (Biology Section), Cornell University

The milliped order Spirobolida is a well-defined taxonomic group with representatives in all of the zoogeographic regions of the world. Many genera (152 according to Hoffman and Keeton, 1960) and hundreds of species have been described during the past 150 years. Yet, in few groups of animals has there been less serious effort to establish a satisfactory classification at the family level of the taxonomic hierarchy. At the time of their original description, many genera have simply been allocated to the order, with no mention of family position.

One important paper by Brölemann (1914) is an outstanding exception to the general lack of attention to the classification of the Spirobolida. Brölemann's work established a basis on which later research could have built a sound taxonomic system. But this basis has been largely ignored, and most workers have continued to place all new genera in "convenient" and widely known families such as Spirobolidae, Rhinocricidae, or Trigoniulidae, or not to place them in any family. Thus such validly described Brölemann families as Spirobolellidae (to which several "spirobolid" genera such as *Microspirobolus, Aporobolus, Spirobolinus,* and their relatives apparently belong) and Pseudospirobolellidae (to which such genera as *Guamobolus, Javobolus, Saipanella, Azygobolus,* etc. obviously belong) have all but disappeared from the literature.

Having become interested in the taxonomy of the Spirobolida while preparing a comprehensive revision of the family Spirobolidae (1960), I have begun a long-term study of the order, with the goal of eventually providing for it an adequate and meaningful classification. In the course of this study, it has become evident not only that many genera must be moved from their existing positions to other families, but also that several new families are needed to accommodate genera which cannot any longer be left in the families into which they customarily have been shoved. I have (1959) proposed one such new family, and here propose another for two "orphan" genera.

ALLOPOCOCKIIDAE, New Family

Diagnosis: A family of the Spirobolidea as indicated by the structure of the phallopods, which do not possess the well-developed seminal bladders typical of the Trigoniulidea. Phallopods independent; telopodite, coxa, and coxal apodeme arranged in the essentially linear manner often seen in Spirobolidea. Distinguished from all other families of the Spirobolidea except Spirobolidae and Floridobolidae by the presence of well-developed coxae of the phallopods. Differs from these two families in having large apodemes of the coxal endites of the coleopods. Lacks the prominent basal sclerite present in Floridobolidae. Sternum of coleopods narrow, thus differing from the large sternum typical of Rhinocricidae and Spirobolellidae, but in its presence differing from the condition of Pseudospirobolellidae where the sternum is almost or completely absent.

Included genera: Allopocockia Brölemann, 1913, and *Chelogonobolus* Carl, 1919.

Discussion: The genus *Allopocockia* was first described by Brölemann (1913: 478; 1914: 34) for *Spirobolellus tylopus* Pocock, 1908, from Guatemala. Brölemann's knowledge of this species was limited to Pocock's published description, which included four drawings. Although this description was far superior to most being published during Pocock's time, it gave no information regarding the critical characters of the basal portions of the gonopods. As a result, Brölemann had to rely on his own best guess as to which family *Allopocockia* represented. He placed the genus in the Trigoniulidae, but indicated his uncertainty by putting a question mark before the name.

Five years later Carl (1919) reported the results of his examination of the type specimens of *Spirobolus nahuus* Saussure and Humbert. He found that this Mexican species closely resembled *Allopocockia tylopus*, but differed from it in lacking the striking modifications of the pregenital legs of males and in not having pronounced mesial ventral productions of the coxal endites of the coleopods. Carl made *nahuus* the type of a new genus, *Chelogonobolus*, and redescribed the species at the same time. In his usual thorough fashion, Carl carefully studied the basic characters of *nahuus* and made known for the first time the details of the more internal portions of the gonopods—the characters that had been unknown to Brölemann in the case of *tylopus*. These characters made it necessary, as Carl remarked, to remove *Allopocockia* from the Trigoniulidae and to assign it and *Chelogonobolus* to some other family. Carl recognized the unusual characteristics of these two genera saying, " Ce qui est certain, c'est qu'ils occupent dans le système actuel une position tout à fait isolée et ne rentrent dans aucune des familles établies par Brölemann." In spite of this, however, having removed the genera from the Trigoniulidae, his natural conservative nature led Carl neither to establish a new family for them nor to place them in any other existing family. It now seems time to rescue these genera from the no-man's land in which they have lain neglected, and to describe for them the new family which they so obviously deserve.

I have chosen to base the new family name on the older of the two included genera in view of the possibility that future studies may necessitate regarding the two as congeneric.

My own first-hand knowledge of the group is limited to the type specimens of *Chelogonobolus nahuus*, which were lent to me for study by Hermann Gisin of The Muséum d' Histoire Naturelle, Genève, Switzerland, to whom my sincere thanks are extended. I shall here contribute no new information regarding the other species of the Allopocockiidae, but shall give more detailed treatment to *nahuus*.

Genus *Allopocockia* Brölemann

Allopocockia Brölemann, 1913, Bull. Soc. ent. France, p. 478. Type: *Spirobolellus tylopus* Pocock, by original designation.

Allopocockia Brölemann, 1914, Ann. Soc. ent. France, 83: 34.

Diagnosis: Distinguished from *Chelogonobolus* by the presence of a "distinct papilla" or bladder-like structure on the protarsus of the third leg of males; by having the last segment of the third to seventh legs of males "inflated," and the claws of these legs reduced to minute vestigial structures; and by having the mesial ventral corners of the coxal endites of the male coleopods produced ventrad.

Discussion: In some other spiroboloid groups striking modifications of male pregenital legs frequently occur and have often been found to warrant only specific recognition. Generic level differences in these characters are generally accompanied by gonopodal differences more elaborate than those known to exist between *Allopocockia* and *Chelogonobolus*. In the absence of study specimens of *Allopocockia*, however, and in our present meagre state of knowledge of this small but very distinct family, I do not feel it advisable at present to regard the two genera as synonymous.

Included species: Only *A. tylopus* (Pocock), from Tecpam, Guatemala.

Genus *Chelogonobolus* Carl

Chelogonobolus Carl, 1919, Rev. Suisse Zool., 27: 399. Type: *Spirobolus nahuus* Saussure and Humbert, by original designation.

Diagnosis: Distinguished from *Allopocockia* by the characters of the male pregenital legs and gonopods mentioned above.

Chelogonobolus nahuus (Saussure and Humbert)
(Figs. 1–7)

Spirobolus nahuus Saussure and Humbert, 1869, Rev. Mag. Zool., ser. 2, 21: 154.

Spirobolus nahuus Saussure and Humbert, 1872, Mission scientifique Mexique, Myriapodes, p. 86.

Spirobolellus nahuus, Pocock, 1908, Biol. Centr.-Amer., Chilopoda and Diplopoda, p. 88.

Chelogonobolus nahuus, Carl, 1919, Rev. Suisse Zool., 27: 401, Figs. 32–39.

Description and discussion: I shall not attempt to give a full redescription of this species inasmuch as Carl's treatment is an excellent one. My concern here is only in adding some details not fully covered in previous publications. My discussion is based on an examination of the type material belonging to the Geneva Museum. This material, all in a single vial, consists of: one anterior portion of head + 21 segments, with male gonopods *in situ*; two mid-body sections of 5 and 7 segments; three posterior portions of 14, 15, and 16 segments respectively, each with complete anal areas; and a separate set of male gonopods.

The original description gives segment counts of 35 for a female, and 32 and 35 for males. These are small millipeds compared to many spiroboloids, being 16–23 mm long according to the literature, and averaging about 1.7 mm in width according to my measurements.

Clypeus broad, its margins very rounded, there being no distinct ventral corners. Lateral corners of clypeus not very distinct, sloping rather gradually into moderately shallow antennal grooves. Parietal sclerites unmodified. Mandibular cheeks not appreciably grooved for reception of antennae; ventrodistal corners of stipites of mandibles abruptly angular, the stipites being thus rather square distally but with distal margins very slightly concave. Eye patches subcircular, the eyes not arranged in distinct rows; about 17–20 eyes per patch. Labrum small, with 3 indistinct teeth assymetrically arranged. Clypeal setae 3 + 3; labral setae 5 + 3 (both counts based on only one specimen). Antennae very short and stout; second segment slightly longer than the others, slightly surpassing lateral margins of clypeus; few small scattered setae on first 4 antennal articles, more distal articles densely hirsute; 4 antennal sensory cones. Gnathochilarium (Fig. 1) of the usual general spiroboloid construction, including an undivided prebasilare, but mentum (M) somewhat distinctive in having distinctly swollen lateral areas at bases of stipites (S), these convex areas (ca) being partially set-off by indistinct grooves (apparently not sutures); stipital setae 3 + 3.

Collum not unusually large, covering only vertex of head, subtruncate laterally, the anterior corners much more pronounced than the posterior corners; anterior margining ridges present but not pronounced. Second segment not produced ventrolaterally, bending abruptly mesad at level of lateral ends of collum.

Tergites smooth, without rugulae but with a few scattered puncta; striae on extreme ventral portions only. Segmental suture extremely indistinct, not marked by any external groove, visible only as an obscure light line in cleared specimens. Repugnatorial pores located more posteriorly than in Spirobolidae, their exact location relative to the segmental suture being difficult to determine because of the obscure nature of the latter; apparently about a third of peritreme area of each pore is anterior to the line of the suture, and about two-thirds of peritreme area is posterior to this line. I was unable to detect the suture itself in the immediate vicinity of the pore, and thus cannot say whether it curves around the pore anteriorly or posteriorly.

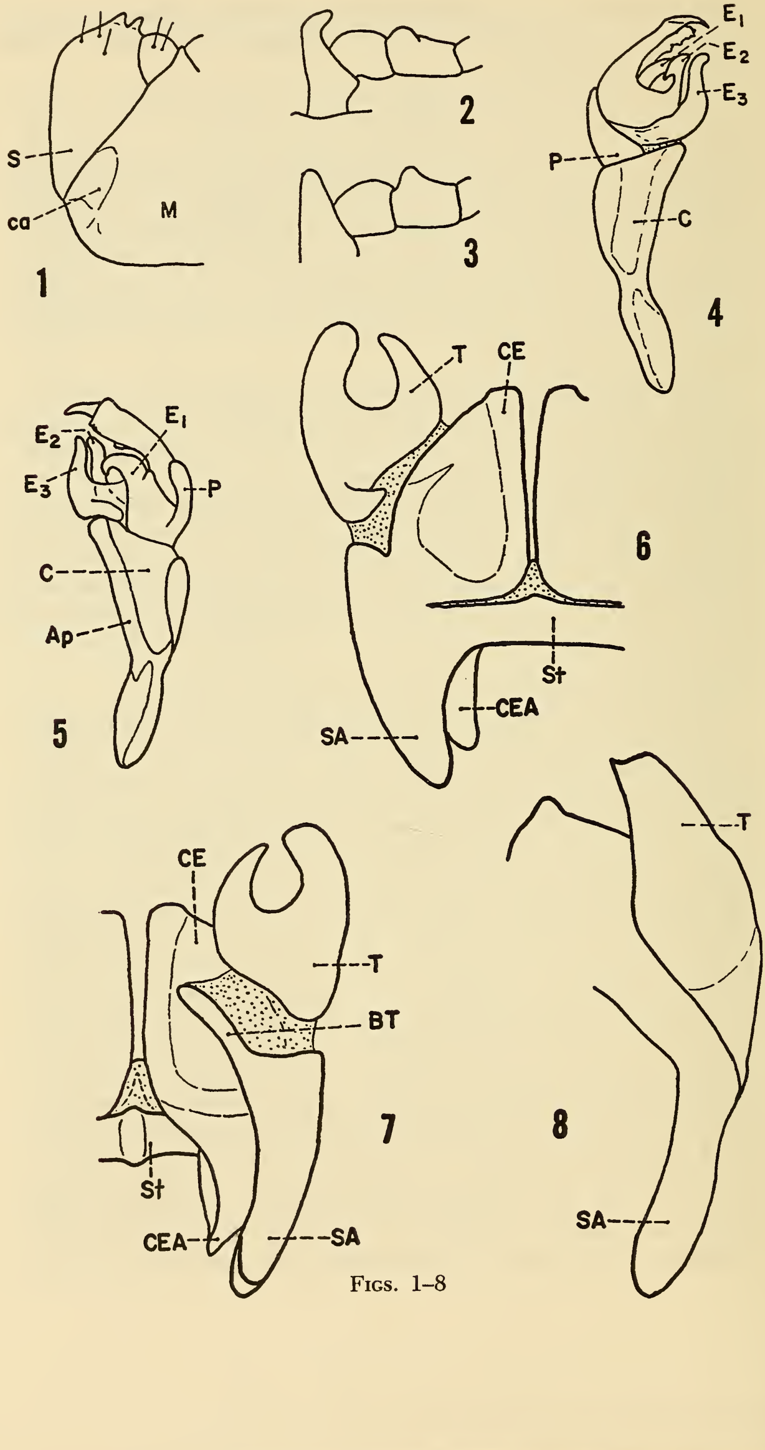
Entire tergum of telson broadly triangular, its obtuse apex just reaching posterior border of anal valves, which are thus not visible from dorsal view. Valves with smoothly convex surfaces, these meeting evenly with no trace of anal lips and no reentrant angle.

Coxae of third legs of males (Fig. 2) much produced ventrad; distal portions of lobes thus formed bent laterad. Coxae of fourth (Fig. 3) and fifth legs of males also produced ventrad forming lobes with narrowly rounded apexes, but these not bent laterad. Coxae of sixth legs only slightly produced; those of seventh legs not produced. All legs with very few ventral setae and no ventral pads. Claws ⅓–½ the length of the last podomeres.

Postgenital bar forming a large ridge behind gonopod socket.

The gonopods, so important in classification, have been well described and figured by Carl. I shall mention only a few details here. As shown in Figures 6 and 7, the coxal endites of the coleopods are not uniformly scleratized; a heavily scleratized region runs along the mesial border of each endite, curves laterad along the base of the endite, then ventrad along the ventrolateral border, and ends at about the midpoint of this border. The portion of the endite enclosed by this heavier area is very thin, almost membranous. The sternum (S) is narrow, but the sternal apodemes (SA) are broad and each curves around onto the caudal face of the coleopod, thus enclosing a large mesial concavity. The "bride trachéenne" (BT), as Brölemann (1914) calls it, is very well developed and is attached by a membrane directly to the telopodite, there being between them no well-defined posterior coxal bar ("fémoroïds" of Brölemann) such as is seen in most families. The telopodites (T; shown in the figures pulled ventrolaterad from the normal position) are not closely united to the rest of the coleopod structure, but are connected to it only by membranes. The prominent condyle on the cephalolateral corner is shown in Figure 6, as is the unusual shape of the telopodite. Figure 7 shows the very stout, mesially concave apodeme of the coxal endite (CEA).

Figures 4 and 5 show the phallopods, the details of which are more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Figs. 1–8

easily understood from the drawings than from lengthly verbal descriptions. I shall here only call attention to the large expanded coxal piece (C) fused with the more strongly scleratized apodemal ridges (Ap); to the three separate endites of the telopodite (E_1, E_2, E_3); and to the separate and strongly scleratized plate (P) on the outer surface of the base of the telopodite. Insofar as Pocock (1908, Tab. 7, Fig. 8c) has shown the details of the phallopods of *Allopocockia tylopus* (Pocock), they seem to correspond closely with those here shown for *Chelogonobolus nahuus*, even to the shape of the distal portion of the second endite (E_2). It is this close similarity that prompts me to question the validity of the separate genera proposed for these two species.

I have seen no female cyphopods of *C. nahuus*, but would predict that the cephalic and caudal plates will be found to be fused along a lateral suture, as seems to be typical in the Spirobolidea.

Chelogonobolus atriculus (Pocock), new combination

Spirobolellus atriculus Pocock, 1908, Biol. Centr.-Amer., Chilopoda and Diplopoda, p. 88, tab. 7, Figs. 9a-c.

Discussion: Pocock's description and drawings establish the fact that this form does not exhibit the characters of the male pregenital legs and coleopods which distinguish *Allopocockia.* It seems to resemble closely *C. nahuus* and to belong in *Chelogonobolus.* I can say nothing regarding the possible conspecificity of this Guatemalan species with the Mexican *C. nahuus.*

FLORIDOBOLIDAE

Floridobolus penneri Causey

(Fig. 8)

Floridobolus penneri Causey, 1957, Proc. Biol. Soc. Washington, 70: 206, Figs. 1–3.

Floridobolus penneri, Keeton, 1959, Bull. Brooklyn Ent. Soc., 54: 2, Figs. 1–12, 14–16.

Discussion: Both previous published accounts of this species were based on relatively few specimens. Recently, however, Thomas Eisner, of Cornell University, and his assistants Roger S. Payne, Benjamin Dane, and Ralph L. Ghent spent a week at the type locality, Archibold Biological Station, Lake Placid, Highlands County, Florida. There they collected a large series of *F. penneri* for use in physiological and behavioral studies in their laboratory at Cornell. They have given me 25 adult specimens (24 male, 1 female) from their series, and I wish to express my appreciation to them. These specimens make it possible to give more accurate information regarding several characters of this species.

The number of segments shows less variation than is commonly encountered in spiroboloid millipeds, the count varying from 47 to 51 but most specimens having 48 (16 of 25 specimens) or 49 (5 of 25 specimens), with an average of 48.3. Lengths of adults examined range from

60 mm to 92 mm (average 74.2 mm); widths from 10.0 mm to 12.8 mm (average 11.6 mm). The L/W ratios of adults over 70 mm long vary from 6.3 to 7.4, averaging 6.7; the same ratios for adults 60–69 mm long vary from 5.6 to 6.4, averaging 5.9; the average for all adults examined, regardless of size, is 6.4.

The total number (both sides combined) of clypeal foveae ranges from 5 in one specimen to 11 in two specimens, but most individuals have 8–10, with an average of 9.1. In addition to the usual 4 or 5 such foveae on each side of the clypeus, most specimens have on each side an additional fovea-like depression or cleft located on the prominent ventral corner of the clypeus; these do not bear setae and are not included in the counts given above. The total of labral setae varies from 13 to 24, with an average of 17.5.

The number of eyes per patch is usually greater than in most spirobolids, ranging from 52–66 with an average of about 60.

The convexity of the apex of the mentum of the gnathochilarium has been found to be constant and is thus a trustworthy key character. The structure of the gnathochilarium is in other respects of the typical spiroboloid pattern. It should be mentioned here that well-formed cardines are present in this genus as well as in other members of the order Spirobolida, in spite of Attem's statement (1926: 192) to the contrary (mentioned by Hoffman and Orcutt, 1960: 101). These small sclerites often cannot be seen on the outer face of the gnathochilarium as each is covered by a membrane located in the area between the base of the stipes and the basal corner of the mentum. If the entire mouthpart is removed from the head and viewed from the inner surface, the cardines are readily seen. As seems to be true of all spiroboloid species, each lingual lamella bears two prominent setae. The number of macrosetae on the distal portion of each stipes varies from 6 to 11, with the total number averaging 16.3.

The knob-like productions on the distal portions of the ventral surfaces of the second podomeres of the walking legs apparently vary greatly, and they are often small and much less noticeable than I previously (1959, Fig. 4) indicated.

My earlier interpretation of the structure of the male gonopods needs some revision in light of recent findings using cleared specimens. I indicated (1959: 6 and Figs. 10–12) that there was only one posterior structure of the coleopod, and considered this to be the posterior coxal bar, a telopodite not being present. In cleared specimens, however, a faint sutural line can be seen as indicated here in Figure 8. Apparently, then, the telopodite and posterior coxal bar have become fused together, the former thus being no longer movable. This condition is unique in the order so far as I know. Variation in the details of the distal portions of the phallopods seems to be very slight, although the expanded portion of the distolateral coxal surface shows much variation in extent. The basal sclerite is always present and is easily seen in cleared specimens.

Eisner reports several interesting observations on the habits of this species in the wild. Specimens were abundant between 9 and 14 September 1959, under dead logs on sand. They were not common under logs that were buried more deeply in the sand. The species could only be found in areas where there were stands of woody plants, thus differing from *Narceus gordanus* (Chamberlin) which was common in open sandy places where there were few such woody plants. The collectors are sure that *F. penneri* never burrowed deep into the sand in the manner typical of *N. gordanus,* the latter species making characteristic round tunnels, the mouths of which dotted sandy areas. *F. penneri* was often seen feeding on the fruiting bodies of the palmetto plants. Eisner notes that the species was far more common in September, 1959, than in late June, 1958, being as common as *N. gordanus* in September but much less common than that species in June.

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Explanation of Figures

Figs. 1–7, *Chelogonobolus nahuus* (Saussure and Humbert). Fig. 1.—gnathochilarium, right half. Fig. 2.—basal portion of right third leg, cephalic view. Fig. 3.—basal portion of right fourth leg, cephalic view. Fig. 4.—left phallopod, cephalic view. Fig. 5.—left phallopod, caudal view. Fig. 6.—left coleopod, cephalic view. Fig. 7.—left coleopod, caudal view (in both Figs. 6 and 7 the telopodite has been pulled out of normal position). Fig. 8.—*Floridobolus penneri* Causey, portion of left coleopod, caudal view, showing indistinct sutural line between telopodite and posterior coxal bar. Abbreviations: Ap—apodemal ridges, BT—bride trachéene, C—coxal piece, ca—convex area of mentum of gnathochilarium, CE—coxal endite, CEA—apodeme of coxal endite, E_1, E_2, E_3—endites of the telopodite, M—mentum, P—scleratized plate, S—stipes, SA—sternal apodeme, St—sternum, T—telopodite.

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GEOGRAPHIC VARIATION IN THE WESTERN WOOD PEWEE (*CONTOPUS SORDIDULUS*)

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In March 1866, Elliott Coues published a paper on the birds of southern Arizona (A List of the Birds of Fort Whipple, Arizona, Proc. Acad. Nat. Sci. Phila., March 1866, 18: 39–100) in which he commented on the variation that he noted in his series of skins of the western wood pewee. He states: "There has been made upon me an impression that there are two species. By far the majority of specimens are of the regulation *Richardsonii* type. A few others . . . differ in being all over of a more decided and uniform grayish brown; with less of olive above . . . the breast more purely gray. The bird may be well described as a miniature of *C. borealis*. Prof. Baird has always, to me, *verbis et literis*, indicated his decided conviction that there are two species in the collection."

Many years later Robert Ridgway (Bull. U. S. Nat'l Museum, No. 50, Part 4, 1907, pp. 521–524) expressed much the same opinion in discussing the characters of this species. In a footnote he comments as follows: "Although convinced, from intimate personal acquaintance of both in life, that this form and *M. virens* are specifically distinct I am at present unable to give a better diagnosis. The differences are more easily seen than described; but nevertheless it is often difficult to identify specimens as one or the other without doubt. It is not at all unlikely that this difficulty may be in part owing to the inclusion under the name *richardsonii* of what may be in reality two or three distinct forms; otherwise it is hard to account for the unusual variations of coloration noticeable in a large series. The group is an exceedingly difficult one, which will require not only a very large amount of material, but also much time and patience for its satisfactory elucidation."

Phillips and Parkes (Condor, 57(4): 244–246, July, Aug. 1955) comment on the fact that uncertainty has always existed as to the type of *Contopus richardsonii* (*Tyrannula richardsonii* Swainson) and that study on their part has convinced them that the type specimen, no longer extant, was actually a Phoebe (*Sayornis phoebe*) and not a *Contopus*. They base their conclusions on Swainson's plate (Fauna Bor. Am. 1831: 146), representing an immature bird, stating that it "bears little or no particular resemblance to juvenal plumage Contopus," and also on the measurements given that are those of *Sayornis*. This would place *richardsonii* in the synonomy of *Sayornis phoebe*, and in its place they suggest *veliei*, a name somewhat hesitantly suggested by Coues should the Arizona bird be considered distinct. This suggestion was subsequently approved by the A.O.U. Committee on Nomenclature, and appears in the 1957 Check-List.

In connection with a detailed report on the birds of Idaho, I had occasion to examine critically a series of western wood pewees personally collected in various parts of this state. Not only did they appear to differ in appearance from specimens of *veliei* from east of the Continental Divide, but in the large series of *Contopus sordidulus* available in the collections of the National Museum, the considerable variation noted by both Coues and Ridgway was clearly evident. It appeared desirable, therefore, to compare breeding birds from throughout the range of this species in the United States. Arranged geographically it was apparent that not only did the western wood pewees of the Columbia Basin represent a distinct and undescribed race, but that, as suspected by both Coues and Ridgway, there are two races occurring within the present accepted range of *veliei* as given in the 1957 Check-List. Accordingly, *Contopus sordidulus* north of the Mexican border is represented by four recognizable races; these are as follows:

Contopus sordidulus veliei Coues

Characters: Upper parts fuscous-olive; throat grayish white, tinged with yellow; chest and sides of breast dark gray; belly pale yellow; under tail coverts whitish.

Measurements: Adult male (8 breeding specimens from Arizona): wing 82–89 (86.5) mm; tail 61–67 (63.8); exposed culmen 11–12 (11.5). Adult female (8 breeding specimens from Arizona): wing 79–86.5 (82.1); tail 58–63 (60); exposed culmen 10–12.5 (11.1).

Type: Adult male No. 36938, U. S. National Museum, Fort Whipple (Prescott), Arizona, 10 August 1864; Dr. E. Coues, original number 522.

Distribution: Breeds from northern California, Nevada, Utah, and Colorado south through Arizona, New Mexico, and western Texas to northern Baja California, eastern Sonora, and northern Chihuahua. Migrates south at least to Panama and probably winters in South America.

Remarks: In commenting on the variation he noted in the series of specimens of the western wood pewee that he collected in Arizona, Coues called attention to the fact that the "majority" were characterized by the olive tone of the upper parts. Although he admitted being reluctant to describe a new race from the southwestern United States he nevertheless designated a type that he called *veliei,* with the type locality Fort Whipple. On rather inconclusive evidence, Phillips and Parkes (1955) reject Fort Whipple as the type locality, but as pointed out by Alexander Wetmore, in notes he has kindly placed at my disposal, they overlooked the specimen that had been selected by Coues. This bears a label on which is printed "Explorations in Arizona, Dr. Elliott Coues, U.S.A.," and on which Coues has written in his own handwriting "Contopus veliei Coues ♂ August 10/64," adding in parentheses after Fort Whipple "(Prescott)." It was entered in the Museum catalog in March 1865, so it appears certain that Coues had it available when he wrote his account under the heading *Contopus richardsonii.* In effect, therefore, Coues has designated definitely the type locality. This specimen, although showing evidences of "foxing," represents the olivaceous form typical of the breeding birds of Arizona, so Coues' name is applicable to this breeding population.

Specimens of Contopus sordidulus veliei *examined:* Total number 56 from the following localities: Texas: El Paso, 21 June 1889, ♀; Presidio County, 10 June 1890, ♂; Fort Hancock, 14 June 1893, ♂; Fort Clark, 14 May 1898, ♂; Tascosa, 4 June 1899, ♂; Marathon, 13 May 1901, ♂; 15 May 1901, ♀; 16 May 1901, ♀; 18 May 1901, ♂; Boquillas, 24 May 1901, ♂; Chisos Mts., 13 June 1901, ♀; Frijole, 29 April 1939, ♂. Arizona: Fort Verde, 24 May 1884, ♂; Huachuca Mts., 4 May 1888, ♂; Rice, 20 May 1916, ♂; Madera Canyon, Santa Cruz County, 6 August 1918, ♀; Maricopa County, 10 June 1918, ♂; Yuma County, 29 May 1918, ♂; Mayer, 23 May 1927, ♀; 24 May 1927, 2 ♂ ♂; 26 May 1927, ♂; 29 May 1927, ♀; Lukachukai Mts., 21 June 1927, ♂. New Mexico: Capitan Mts., 15 July 1903, ♂; Tres Piedras, 31 July 1904, ♀; Animas Peak, Grant County, 27 July 1908, ♂; Zuni Mts., 16 June 1909, ♀. California: Mendocino County, 4 June 1889, ♂; Shasta County 9 June 1906, ♂; Mt. Veeder, 23 August 1909, ♀; Nevada City, 27 May 1911, ♂; Truckee, 10 August 1940, ♀. Nevada: Glenbrook, 28 May 1889, ♀; Mt. Magruder, 4 June 1891, ♂; Peavine, 1 June 1898, ♀; Elko, 3 June 1898, ♂. Utah: Pinto, Washington County, 14 June 1938, ♀; 18 June

1938, ♀; E. Pine Valley, Washington County, 15 June 1938, ♂; Silver Lake P. O., Salt Lake County, 12 June 1943, ♂; 19 June 1943, ♀; 26 June 1943, ♂; Midway Fish Hatcheries, Wasatch County, 4 June 1944, ♂; 7 June 1944, ♂; Big Glade, Wasatch County, 20 June 1946, ♂; Posy Lake, Garfield County, 10 June 1952, ♀; Skull Valley, Tooele County, 14 June 1954, ♀; Spring Canyon, Wayne County, 26 June 1956, ♀. COLORADO: Ft. Garland, 6 June 1873, ♂; Grand Junction, 28 June 1893, ♂; Granby, 10 June 1910, ♀; Lake Eldora, 26 June 1910, ♂; Boulder County, 29 June 1933, ♀; 1 July 1933, ♂. PANAMA CANAL ZONE: 12 October 1953, ♂.

Contopus sordidulus amplus, new subspecies

Characters: Similar to *veliei* but upper parts darker, and distinctly more brownish, less olivaceous; yellow of belly paler and approaching dull white in extreme specimens; wing and tail longer.

Measurements: Adult male (10 breeding specimens from Wyoming and Montana): wing 89–93 (90.8) mm; tail 65–71 (67.6); exposed culmen 10–13 (12). Adult female (6 breeding specimens from Wyoming and Montana): wing 82–88 (85.3) mm; tail 63–67 (64.5); exposed culmen 10–12 (11.2).

Type: Adult male No. 463925, U. S. National Museum (Fish and Wildlife Service collection), Havre, Montana, 12 August 1955; Thomas D. Burleigh, original number 16316.

Distribution: Breeds from central Alaska, southern Mackenzie, Saskatchewan, and southern Manitoba south through British Columbia and eastern Montana to Wyoming and in western North Dakota and extreme western South Dakota. Migrates through Costa Rica and Panama, and probably winters in South America.

Remarks: Being a late migrant in the spring, *amplus* can be found well south of its breeding range at a time when its occurrence then would suggest nesting. It was this fact that caused the uncertainty as to the actual characters of the breeding wood pewees in Arizona when Coues, and later Ridgway, examined the series of presumably breeding birds, and noted the considerable variation in color. It is the latter part of May before western wood pewees can be found in any numbers on their more northern breeding grounds, and even at this late date belated individuals of *amplus* doubtless occur within the range of *veliei.*

Specimens of Contopus sordidulus amplus *examined:* Total number 28, from the following localities: MONTANA: Ft. Keogh, 16 June 1889, no sex; Glasgow, 18 June 1910, ♀; 21 June 1910, ♂; Powder River, 15 June 1916, ♂; Moorhead, 22 June 1916, ♀; Crow Agency, 11 July 1916, ♂; Dillon, 9 August 1917, ♂; Big Timber, 13 June 1917, ♂; Terry, 10 June 1918, ♂; Miles City, 5 July 1918, ♂; Lismas, 28 June 1919, ♀; Havre, 12 August 1955, ♂. WYOMING: Greybull, 7 June 1910, 3 ♂♂; 8 June 1910, ♀, ♂; 10 June 1910, ♂; 13 June 1910, ♀; Bridge Peak, Sierra Madre Mts., 18 June 1911, ♀; 20 June 1911, ♂; Pinedale, 25 July 1911, ♀; Kendall, 28 July 1911, ♀. SOUTH DAKOTA: Buffalo Gap, 23

June 1888, ♂. ALASKA: Ft. Egbert, 19 June 1901, ♂. BRITISH COLUMBIA: Okanagan Landing, 13 May 1922, ♀; Bulkley Lake, 29 July 1949, ♀. COSTA RICA: Liberia, 30 October 1940, ♀. PANAMA CANAL ZONE: 30 September 1953, ♀; 9 October 1953, ♂.

Contopus sordidulus siccicola, new subspecies

Characters: This is the palest of the four races. It differs from both *veliei* and *amplus* in having the upper parts washed with gray, the gray of the under parts much paler and the yellow of the belly largely replaced with dull white. In size it is similar to *veliei,* being smaller in both wing and tail measurements than *amplus.*

Measurements: Adult male (10 breeding specimens from Idaho): wing 85–90 (87) mm; tail 62–65.5 (63); exposed culmen 11–13 (11.9). Adult female (6 breeding specimens from Idaho and eastern Washington): wing 83–86 (84.5) mm; tail 60–65 (63.3); exposed culmen 11–12 (11.5).

Type: Adult male No. 420775, U. S. National Museum (Fish and Wildlife Service collection), Potlatch, Idaho, 19 May 1952, Thomas D. Burleigh, original number 14647.

Distribution: Breeds in southern British Columbia east of the coast ranges, Washington east of the Cascades, Idaho, Oregon, and western Montana west of the Continental Divide. No specimens seen from south of the breeding area indicative of distribution in migration or winter.

Remarks: In its characters, notably the gray of the upper parts, *siccicola* suggests the racial differences evident in the races of other species described from this region. This emphasizes the significance of the western slopes of the northern Rocky Mountains as an area of morphological differentiation. In its distribution this new race is characterized by its disregard for altitude. In Idaho it has been found nesting at Lewiston, Nez Perce County, at an altitude of 840 feet (the lowest in the state), and at Galena Summit, Blaine County, at an altitude of 8,795 feet. Specimens taken at these extreme limits show no appreciable differences in color or size, and are in every respect typical of *siccicola.*

Specimens of Contopus sordidulus siccicola *examined:* Total number 39, from the following localities: IDAHO: Moscow, 15 May 1948, ♂; 20 June 1948, ♂; 10 July 1948, ♂; 23 July 1948, 2 imm. ♂ ♂; 17 July 1949, ♂; 25 August 1949, ♂ imm.; 30 August 1949, ♀ imm.; 5 September 1949, ♂ imm.; 7 September 1949, ♂ imm.; 18 May 1950, ♂; 25 July 1951, ♀; 14 September 1951, ♂ imm.; 18 September 1951, ♀ imm.; 8 July 1952, ♂; 18 May 1953, ♂; 7 September 1957, ♂ imm.; 16 September 1957, ♂ imm.; Potlach, 26 May 1949, ♂; 19 May 1952, ♂; Lewiston, 21 June 1950, ♂; 28 July 1957, ♀, ♂ imm.; Galena Summit, Blaine County, 26 June 1950, ♀; MacKay, Custer County, 13 July 1958, ♀. WASHINGTON: Bly, 3 June 1919, ♀; Grand Ronde River, 14 June 1919, ♀; Anatone, 26 June 1919, ♀; Ferry Lake, 16 June 1942, ♀; Palouse, 24 July 1949, ♂; Pullman, 8 June 1951, ♀; Spokane, 21 July 1955, ♀; 7 August 1958, ♀. OREGON: Disaster Peak, 14 June 1915, ♀; Meacham, 21 July 1915, no sex indicated; Homestead, 4 June 1916, ♂; 6 June 1916, ♀; Reston, 5 July 1916, ♀; Portland, 30 May 1954, ♀.

Contopus sordidulus saturatus Bishop

Characters: This is the darkest of the four races. It most closely resembles *amplus* in the brown coloration of the upper parts, and is the least olivaceous of the four races. Compared with *amplus* the brown of the upper parts is noticeably darker, the gray of the under parts darker and more extensive. In size it is similar to *veliei*, both the wing and tail being shorter than in *amplus*.

Measurements: Adult male (5 breeding specimens from Oregon, Washington, and British Columbia): wing 86–90 (88.6) mm; tail 61–66.5 (64); exposed culmen 10–12 (11.3). Adult female (5 breeding specimens from Washington and Oregon): wing 82.5–85 (84.2); tail 60–64 (61.5); exposed culmen 10–11 (10.6).

Type: Adult male, Chicago Natural History Museum, Haines, Alaska, 2 June 1899; L. B. Bishop, original number 4142.

Distribution: Breeds from southeastern Alaska south through western British Columbia, western Washington, including the Cascade Mountain area, western Oregon, and possibly the coast region of northwestern California. Migrates southward through Central America (Guatemala), probably wintering in South America.

Remarks: For many years after it was described, *saturatus* was not considered a valid race by the Committee on Classification and Nomenclature of the A.O.U. This was probably due to the uncertainty resulting from the variation noted in supposedly breeding birds from various areas in the western United States. This situation results from the late date in the spring when transients can still be found well south of their breeding range. In common with so many species occurring in the northwest coastal area, *Contopus sordidulus* is characterized by a dark coloration and is quite distinct from breeding populations of this species east of the Cascades.

Specimens of Contopus sordidulus saturatus *examined:* Total number 15 from the following localities: ALASKA: Lake Mansfield, 18 July 1921, ♀. BRITISH COLUMBIA: Hazelton, 21 July 1918, ♂. WASHINGTON: Mt. Vernon, 26 June 1897, ♂, ♀; Blewett, 23 June 1941, ♀; Soda Springs, 23 June 1946, ♂; Yakima, 31 August 1951, ♂ imm. OREGON: Fort Klamath, 15 July 1883, ♂; Diamond Lake, 10 August 1896, ♀; Tillamook, 3 July 1897, ♀; Maury Mts., 30 June 1896, ♂; Roseburg, 12 July 1955, ♀. CALIFORNIA: Pacific Grove, 8 June 1909, ♀. GUATEMALA: Alotenango, east base of Volcan de Fuego, 5 November 1936, ♂; Panajachel, 14 November 1936, ♀.

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PRELIMINARY DESCRIPTIONS OF ONE NEW GENUS, TWELVE NEW SPECIES AND THREE NEW SUBSPECIES OF SCYLLARID LOBSTERS (CRUSTACEA DECAPODA MACRURA)

By L. B. Holthuis

Rijksmuseum van Natuurlijke Historie, Leiden

A study of the Scyllarid collections of the U. S. National Museum and some other institutions resulted in the discovery of a relatively great number of undescribed or unnamed taxa. As the publication of a proposed world-wide revision of the entire family containing full descriptions of these taxa will take some time, it was thought advisable to provide here preliminary descriptions of these new species and subspecies and of the new genus in order to make them known without delay.

Ibacus ciliatus pubescens, new subspecies

This subspecies is very close to the typical *Ibacus ciliatus ciliatus* (Von Siebold, 1824), but differs in that the adult specimens have the dorsal surface of the carapace and the abdomen covered with a short and dense pubescence; in the typical form this surface is quite naked in the adults. Furthermore the number of posterolateral teeth of the carapace (i.e., the teeth of the lateral margin behind the cervical incision) varies between 11 and 13 in the new subspecies, being usually 12. In the typical subspecies this number varies between 10 and 12, being usually 11.

Distribution: The typical subspecies is known from Japan, China, Formosa, and the Philippines, the new subspecies has so far only been found in the Philippines (depth 52 to 391 m).

Holotype: A male specimen from "Albatross" Station D 5394, near Talajit Island, Philippines, 12° 00′ 30″ N, 124° 05′ 36″ E, 13 March 1909 (U.S.N.M. Cat. No. Crust. 104285).

Parribacus caledonicus, new species

The rostrum bears a blunt dorsal tooth. The posterior of the two anterolateral teeth of the carapace is smaller than the anterior. The anterior part of the second to fifth abdominal somites (namely the part which disappears under the previous somite when the abdomen is fully stretched) is provided with distinct tubercles which have a fringe of very short stiff hairs along the posterior margin. The transverse groove between the two halves of the abdominal somites is rather narrow and filled with short stiff hairs and tubercles. The median carina on the posterior half of the second to fifth abdominal somites is hardly if at all elevated above the level of the somite itself, at least in large specimens. The fourth segment of the antenna is usually provided with 7, seldom with 6, teeth on the outer margin (the final tooth of the segment not included). The pereiopods are shorter and less slender than those of *Parribacus antarcticus* (Lund, 1793). The first abdominal somite shows dorsally in each half two large dark red lateral spots, which have an irregular outline and are partly fused anteriorly; a small red spot is present in the median line of the somite. All these spots are situated near the posterior margin; no other red spots are present on the somite.

Distribution: So far the species is only known from New Caledonia where it is found on the reefs, being rather common there.

Holotype: A female (c.l. 72 mm) from Ile des Pins, April–May 1960, leg. Dr. Merlet (Rijksmuseum van Natuurlijke Historie, Cat. No. Crust. D. 14506).

Parribacus scarlatinus, new species

The rostrum bears a small sharp dorsal tooth. The posterior anterolateral tooth of the carapace is slightly less strong than the anterior. The anterior part of the second to fifth abdominal somites is smooth and naked, showing at most a few inconspicuous reticular grooves. The transverse groove between the two halves of these abdominal somites is narrow and filled with short hairs and tubercles. The median carina of the second to fifth abdominal somites is hardly at all elevated in the adults. The fourth antennal segment bears usually 6, seldom 5, external teeth (the final tooth of the segment excluded). The pereiopods are slender. The first abdominal somite shows dorsally five red spots on the posterior margin; no spots are placed in front of these five. The spots are irregular in outline, not sharply defined and without a dark ring.

Distribution: Kapingamarangi Atoll, Marshall, Gilbert, and Phoenix Islands.

Holotype: A male (c.l. 66 mm) from Enderbury Island, Phoenix Archipelago, 3° 08′ 29.7″ S, 171° 05′ 34.4″ W, 19 May 1939, L. P. Schultz (U.S.N.M. Cat. No. Crust. 100826).

Parribacus japonicus, new species

The rostrum bears no dorsal tooth. The posterior of the two anterolateral teeth of the carapace is only slightly smaller than the anterior. The anterior half of the second to fifth abdominal somites is practically smooth, sometimes with a few very shallow reticular grooves. The groove between the two halves of these somites is narrow and filled with short hairs and tubercles. The median carina of these somites is low and hardly at all elevated above the surface of the somites. The fourth antennal segment has five external teeth (not including the final tooth of the segment). The pereiopods are slender. The first abdominal somite shows dorsally one small median and on each half two large lateral dark colored spots.

Distribution: Japan.

Holotype: A male (c.l. 61 mm) from Kururi District, Tokyo Bay, March 1893, leg. F. Sakamoto (U.S.N.M. Cat. No. Crust. 18883).

Scyllarus batei arabicus, new subspecies

This new subspecies is closely related to the typical *Scyllarus batei batei* Holthuis, 1946, but differs mainly in the following points. The branchial region of the carapace is inflated so that the branchio-cardiac groove becomes distinct. The transverse groove on the first abdominal somite is well developed and only narrowly interrupted by the narrow median carina.

The present new form has been reported upon under the name *Scyllarus orientalis* (Bate) by Ramadan (1938, Sci. Rep. John Murray Exped., 5(5): 126, Fig. 2) and under the name *Arctus orientalis* Bate by Alcock and Anderson (1894, Journ. Asiat. Soc. Bengal, 63(2): 165) and Alcock (1901, Descr. Catal. Indian Deep Sea Crust. Macr. Anom. p. 181).

Distribution: The typical subspecies is known from the Philippines. The new subspecies inhabits the Arabian Sea.

Holotype: A specimen from the Gulf of Aden (13° 16′ – 13° 16′ 36″ N, 46° 20′ 24″ – 46° 14′ E, depth 220 m, "John Murray" Expedition Sta. 194, 7 May 1934); the specimen forms part of the collection of the British Museum, London.

Scyllarus modestus, new species

The material from Hawaii which Rathbun (1906, Bull. U. S. Fish Comm., 23(3): 896, pl. 18, Fig. 2) identified as *Scyllarus martensi* Pfeffer proved to be distinct from, but nevertheless closely related to that species. The Hawaiian form differs from S. *martensii* in that the longitudinal grooves on the first abdominal somite are curved and partly branched instead of being straight and unbranched. Furthermore the median carinae of the second to fifth abdominal somites are hardly raised. The anterior half of the second to fifth somites is smooth in the present species, while in S. *martensii* they bear a transverse ciliated groove. The distal antennal segment bears 7 teeth in S. *modestus,* 5 in S. *martensii.*

Distribution: Hawaiian Islands; 32–43, 43, and 53–220 fathoms.

Holotype: An ovigerous female (c.l. 14 mm) from Mokuhooniki Islet N.3 E., 16.6′, Auau Channel, 12 April 1902, "Albatross" Sta. D. 3872 (U.S.N.M. Cat. No. Crust. 30263).

Scyllarus aesopius, new species

This is another species related to *Scyllarus martensii* but differing in certain respects. A small but distinct rostral tooth is present. The longitudinal grooves of the first abdominal somite are not straight, but curved and branched. The anterior half of the second to fifth abdominal somites shows two or more transverse rows of tubercles. The median ridge of the second and third abdominal somites are conspicuously higher than those of the fourth; the ridge of the third somite being highest. The distal antennal segment bears seven broad anterior teeth which have the anterior margin truncate.

Holotype: A male (c.l. 11 mm) from the Sulu Archipelago, Philippines, 4° 58′ 20″ N, 119° 50′ 30″ E, 9 or 18 fathoms, 24 February 1908, "Albatross" Sta. D. 5165 (U.S.N.M. Cat. No. Crust. 104528). No other specimens of this species have so far been examined.

Scyllarus cultrifer meridionalis, new subspecies

The species *Scyllarus cultrifer* (Ortmann, 1897) needs to be divided into two subspecies. Ortmann's (1897, Zool. Jb. Syst., 10: 272) original description of *Arctus cultrifer* is a composite one, being based on its two subspecies and on *Scyllarus bicuspidatus* (De Man). By selecting the lectotype of *Arctus cultrifer* Ortmann from among the material collected by Döderlein from Tokyo Bay in 1880–1881, which material was reported upon by Ortmann, the Japanese form of the present species becomes the nominate subspecies. The southern subspecies is described here as new. This southern form in all probability is the one described by Bate (1888, Rep. Voy. Challenger, Zool., 24: 66, Pl. 9, Fig. 3) and Barnard (1926, Trans. Roy. Soc. S. Afr., 13: 122, Pl. 10) under the names *Arctus* or *Scyllarus sordidus* and later reported upon by Barnard (1947, Ann. Mag. Nat. Hist. (11)13: 382; 1950, Ann. S. Afr. Mus., 38: 577, Fig. 104a) as *Scyllarus cultrifer.*

The new subspecies S. *c. meridionalis* differs from S. *cultrifer cultrifer* in that the posterior part of the postrostral carina lacks squamiform sculpture but instead has a number of transverse hairy ridges. The posterior half of the first abdominal somite in S. *c. meridionalis* possesses more longitudinal grooves, every other pair of which is connected by transverse grooves. The fourth abdominal somite shows no median incision in the posterior margin. The anterior part of the sternum is wider than in S. *c. cultrifer* and is not gutter-like depressed, showing only a median longitudinal groove.

Distribution: If Bate's and Barnard's specimens belong to this form, it inhabits the Philippines, the Moluccas, and S. E. Africa.

Holotype: A female (c.l. 22 mm) from the Philippines, 11° 35′ 12″ N, 124° 13′ 48″ E, 114 fathoms, 15 March 1909, "Albatross" Sta. D. 5398 (U.S.N.M. Cat. No. Crust. 104525).

Scyllarus timidus, new species

In discussing the material which he identified with *Scyllarus cultrifer* (Ortmann), Holthuis (1946, Temminckia, 7: 93, Pl. 8, Figs. c-e) mentioned several differences with the descriptions of Ortmann's species given by previous authors. Actual comparison of the true S. *cultrifer* with Holthuis' form showed that the differences between the two are of a specific nature. The name *Scyllarus timidus* is proposed here for the form described and figured by Holthuis (1946). This species indeed is closest related to S. *cultrifer* but may at once be distinguished from it by lacking the sharp anteroventral tooth on the propodus of the third pereiopod.

Distribution: Sulu Archipelago (Philippines), and Hawaii.

Holotype: A male (c.l. 18 mm) from Basilan Strait, Sulu Archipelago, 6° 58′ N, 121° 52.5′ E, depth 72–80 m, 5 September 1929, "Snellius" Expedition Sta. 60° (Rijksmuseum van Natuurlijke Historie, Cat. No. Crust. D. 14507).

Scyllarus nearctus, new species

The specimens reported under the name *Scyllarus arctus* from American Atlantic waters prove to be closely related to, but nevertheless distinct from the true European *Scyllarus arctus* (Linnaeus, 1758). These American specimens represent a new species for which the name *Scyllarus nearctus* is proposed here. The differences from the true *Scyllarus arctus* are the following: The rostral tooth of the carapace is directed forward and hardly at all upward. The cardiac tooth and the posterior postrostral carina are less conspicuous. The abdominal pleurae are more slender, the anterior margin of the pleuron of the second somite is less convex. The anterior margin of the antennular somite bears only two teeth and entirely lacks the two to four additional smaller teeth found in S. *arctus*. The teeth of the distal antennal segment have the tips more narrowly rounded and the spaces between them are wider. The color of preserved specimens is very pale cream with a darker color pattern.

Distribution: Atlantic coast of America from North Carolina (U.S.A.) to São Paulo State (Brazil); depth 30–100 fathoms.

Holotype: A female (c.l. 20 mm) from south of Dry Tortugas, Florida, 28 July 1932, W. L. Schmitt (U.S.N.M. Cat. No. Crust. 104502).

The specimen reported by Rathbun (1900, Proc. U. S. Nat. Mus., 22: 309) from Mazatlan, west coast of Mexico, proves to be a typical S. *arctus*, and is probably labelled incorrectly as to the locality.

Scyllarus ornatus, new species

Reexamination of material from off the Arabian coast (18° 03.5′ N, 57° 02.5′ E, depth 38 m) collected by the "John Murray" Expedition and reported upon by Ramadan (1938, Sci. Rep. John Murray Exped. 5(5): 126) as *Scyllarus arctus paradoxus* Miers, shows that it represents a new species. This species is indeed very close to *Scyllarus paradoxus* Miers but differs in certain points. *Scyllarus ornatus* is a rather small species (c.l. 7–8 mm). It differs from S. *paradoxus* by possessing a distinct rostral tooth. The anterior margin of the sternum shows a U- rather than a V-shaped emargination. The posterolateral angles of the thoracic sternum are not produced tooth-like in the male. In the presence of a strong pointed median tooth on the last thoracic sternite, the present species resembles *S. paradoxus* and differs from most other species of the genus.

Syntypes: The species so far is known only from the specimens which were collected by the "John Murray" Expedition at its Sta. 45, and at present are preserved in the collection of the British Museum, London.

Scyllarus chacei, new species

Under the name *Scyllarus americanus* (Smith) two species have currently been confused. The true *Scyllarus americanus* is known to inhabit the Atlantic coast of the U.S.A. from North Carolina to Florida, and the eastern Gulf of Mexico, including Cuba; it has been found in depths between 0 and 19 (usually between 3 and 12) fathoms. The other species, for which the name *Scyllarus chacei* is proposed here, has a far wider range, which extends from North Carolina to northeastern Brazil and throughout the Caribbean area; it is found in greater depths (usually 19 to 31 fathoms).

Scyllarus chacei has been extensively described and well figured by Bouvier (1925, Mem. Mus. Comp. Zool. Harvard, 47(5): 448–450, Pl. 7, Fig 3), who identified his specimen as *Scyllarus americanus,* though he already noticed differences between it and a type specimen of *Scyllarus americanus.* Fenner A. Chace, Jr., Curator, Division of Marine Invertebrates, U. S. National Museum, was the first to draw my attention to the fact that the differences between this form and *S. americanus* are of a specific nature; it is therefore a great pleasure for me to dedicate this new species to him.

The main differences between *Scyllarus chacei* and *S. americanus* are the following: The pregastric tooth of the carapace (i.e., the first median tooth following the rostral tooth) is practically always bilobed in the latter species, while in *S. chacei* it is broadly rounded anteriorly, never being incised there. Between the posterior marginal groove of the carapace and the posterior margin there are two, seldom three, distinct parallel transverse grooves in *S. chacei,* whereas *S. americanus* usually has a single distinct groove. In *S. americanus* the first to fourth abdominal somites show a deep, narrow, median incision in the posterior margin; this incision is very shallow in *S. chacei.* The fourth abdominal somite is more or less ridge-like elevated in the median line in *S. americanus*; no such ridge is present in *S. chacei.*

Holotype: A female specimen (c.l. 10 mm) from north-northwest of the mouth of the Marowijne River, about 20 miles off the coast of Suriname, 29 April–3 May 1957, third voyage of the "Coquette" (Rijksmuseum van Natuurlijke Historie, Cat. No. Crust. D. 13169).

Scyllarides astori, new species

The dorsal surface of the carapace is rather evenly arched, showing hardly any elevations or teeth; its grooves are wide and not very deep. The cervical incision of the lateral margin is absent or indistinct. There is no median carina on the second to fifth abdominal somites, though there may be a median row of larger tubercles there. The basal part of the posterior margin of the pleura of the second abdominal somite is concave. The carpus of the first pereiopod shows no dorsal carinae, and is not conspicuously swollen. The sternite of the first abdominal somite is serrate in the male, but the median incision is not deeper than the others. The eyes show longitudinal color stripes on the peduncle. The smooth area of the first abdominal somite has two large, almost circular lateral spots of a dark red color. The area between these spots is yellowish with numerous much smaller red spots, which are placed closest together in the median area but do not actually form a big spot there.

The species is closest to *Scyllarides aequinoctialis* (Lund) but may immediately be distinguished from that species by the shape of the carpus of the first leg, which is swollen basally in *S. aequinoctialis,* and by the different coloration of the first abdominal somite, which in that species shows a horseshoe-shaped median dark spot.

Distribution: The species proves to be rather common in the Galapagos Archipelago whence a fairly great number of adults and postlarvae have been collected. Apart from a postlarva found 200 miles north of Clipperton Island, the species is not known from outside the Galapagos.

Holotype: A male (c.l. 116 mm) from Post Office Bay, Charles Island, Galapagos Archipelago, 5 February 1933, Allan Hancock Expedition (U.S.N.M. Cat. No. Crust. 104557).

Scyllarides delfosi, new species

This species has been figured and discussed by Holthuis (1959, Zool. Verhand. Leiden 44: 127, Pl. 3, Fig. 2), who with some doubt identified his specimen as *Scyllarides americanus* Verrill, 1922. *Scyllarides delfosi* differs from the true *S. americanus*—the correct name of which is *Scyllarides nodifer* (Stimpson, 1866)—in the following points. The median carinae of the abdomen are absent in the new species. The fourth abdominal somite of juvenile specimens of *S. nodifer* forms a conspicuous hump, while such a hump is absent in the juvenile specimen of *S. delfosi* seen by me. The new species agrees with *S. nodifer,* and differs from other species in which the median carinae of the abdomen are absent, in that there is a longitudinal row of large pointed tubercles on the branchial region of the carapace.

Distribution: Off British and Dutch Guiana, South America; depth 23–44 fathoms.

Holotype: The male specimen (c.l. 63 mm) from off the Suriname coast (6° 41′ N, 55° 26.5′ W, depth 23 fathoms, bottom mud, shells, and coral) dealt with by Holthuis, 1959 (Rijksmuseum van Natuurlijke Historie, Cat. No. Crust. D. 12735).

The new species is named in honor of J. A. G. Delfos of the Rijksmuseum van Natuurlijke Historie, Leiden, in recognition of his excellent work in the interest of the division of Crustacea of the Museum.

Arctides, new genus

The body is rather highly arched and not depressed, resembling thereby that of *Scyllarides* Gill, 1899. The carapace shows a shallow cervical, but no postcervical incision in the lateral margin. The first abdominal somite bears an uninterrupted transverse dorsal groove. The following somites show complicated sculpture in the posterior half. The distal antennal segment bears many distinct teeth. The mouth parts and the branchial formula are identical with those of *Scyllarides.*

So far the species of this genus have been placed in the genus *Scyllarides,* which indeed is closely related, but which differs in the characters of the abdomen and antennae mentioned above.

Distribution: Atlantic (Bermuda, West Africa) and Pacific regions (Eastern Australia).

Type species: Scyllarus guineensis Spengler, 1799.

The only other species of this genus known so far is the following new species.

Arctides antipodarum, new species

Until 1922 both the Australian and Bermudan specimens of *Arctides* were generally referred to as *Scyllarus sculptus* Latreille. Then Verrill (1922, Trans. Connecticut Acad. Arts Sci., 26: 30) pointed to differences between the two forms and described the Atlantic one as a new variety *bermudensis.* A comparison of the various descriptions with material of both species makes it clear that *Scyllarus guineensis* Spengler (1799), *Scyllarus sculptus* Latreille (1818) and *Scyllarides sculptus bermudensis* Verrill (1922) are all three based on the Atlantic form and that no name is available for the Australian form, for which the name *antipodarum* is now proposed.

An extensive, accurate, and illustrated description of *Arctides antipodarum* was provided by Whitelegge (1899, Rec. Australian Mus., 3(6): 155–162, pl. 29) who indicated the species by the name *Scyllarus sculptus.* The differences between *Arctides antipodarum* and *A. guineensis* are slight. In *A. antipodarum* the teeth on the distal segment of the antenna are far smaller than in *A. guineensis,* especially those on the inner half; the difference in size between the inner and outer teeth is far less conspicuous than in the type species of the genus. The abdomen of *A. antipodarum* is more uniformly tuberculated than that of *A. guineensis*; because of this tuberculation the characteristic sculpture pattern of the abdomen is rather inconspicuous in the new species.

Distribution: East coast of Australia.

Holotype: A male (c.l. 102 mm) from off Malabar, New South Wales, Australia, depth 80 fathoms, March 1956, leg. A. A. Racek (Rijksmuseum van Natuurlijke Historie, Cat. No. Crust. D. 10648).

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NOTES ON THE OSBORN MALLOPHAGA TYPES

By K. C. Emerson
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For more than ten years, I have conducted an extensive search for the type material of the Mallophaga species described by Herbert Osborn. All possible clues as to the location of this material, given in his published papers, have been explored. Of the forty-one species described by Osborn, the holotype or syntypes for thirty-four species have been located.

Some syntypes are known to be at Stanford University, and are not reported in this paper. When visiting with the late G. F. Ferris in January 1941, I examined syntypes of *Colpocephalum kelloggi* Osborn. Since the death of Ferris, the Mallophaga Collection at Stanford University has not been placed in proper order so that it is possible to determine if other Osborn type material is present. I suspect that if there is other Osborn type material in that collection, it will be a portion of some of the larger series, and not be type material of the seven species still unaccounted for. Osborn apparently distributed to Kellogg, at Stanford University, and to the U. S. National Museum duplicates from the larger series that he collected. For the smaller series, he either retained the material in his collection, or returned it to the individuals and institutions mentioned in his papers. Therefore, it is believed that types for seven species are no longer in existence.

In the designation of lectotypes, first preference has been given to the material at Ohio State University, since this was Osborn's Collection. The slides in the Ohio State University Collection have small "type" or "cotype" labels which apparently were added sometime after the descriptions were published, as they do not correspond to published data and are not present on the slides in other collections. Most of the material from the Boston Society of Natural History is now in the Museum of Comparative Zoology. Some of the material provided by L. Bruner is now in the collection of M. A. Carriker. None of the material supplied by C. F. Baker is now at Colorado State University. The material originally from Iowa State University and Cornell University, which is unaccounted for, is assumed to be lost. Museum authorities at these two institutions have been unable to locate the specimens.

All hosts have been verified by comparison with known collections, and except as noted are correct as given in the original description.

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Colpocephalum kelloggi Osborn. 1902. Ohio Naturalist, 2: 175, pl. II, Fig. 2.

Osborn recorded the type series from Ames, Iowa, and Lincoln, Nebraska; and illustrated a female in the description. Ohio State University has two slides from Lincoln, Nebraska, which have a total of seven males, fourteen females and five nymphs; and from Ames, Iowa, there are three slides with a total of five males, five females and ten nymphs. The female on a slide with four nymphs from Ames, Iowa, dated 21 April 1890 is designated Lectotype.

Present status: *Colpocephalum kelloggi* Osborn, 1902.

Colpocephalum pectinatus Osborn. 1902. Ohio Naturalist, 2: 201, pl. 14, Fig. 2.

Osborn did not record the number of specimens in the type series. He illustrated a female. Ohio State University has five females and eight nymphs. The female located in the lower right portion of the slide is designated Lectotype.

Present status: *Kurodaia pectinata* (Osborn, 1902).

Docophorus agelaii Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 220.

Osborn did not record the number of specimens in the type series. Ohio State University has one male, three females and three nymphs. The male in the Ohio State University Collection is designated Lectotype. M. A. Carriker has one male. The Museum of Comparative Zoology has slide number 194 with one nymph; and slide number 195 with one male, one female, and one nymph.

Present status: *Philopterus agelaii* (Osborn, 1896).

Docophorus barbatus Osborn. 1902. Ohio Naturalist, 2: 201, pl. 14, Fig. 1.

Osborn did not record the number of specimens in the type series. He illustrated a female. Emerson (1955) noted that the true host is *Asio otus wilsonianus* (Lesson). Ohio State University has two slides. One slide with four males, four females and two nymphs. The other slide has two males, two females and one nymph. The female located in the upper right portion of the latter mentioned slide is designated Lectotype.

Present status: *Strigiphilus barbatus* (Osborn, 1902).

Docophorus bubonis Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 219.

Ohio State University has a slide with one male and one female, which are the two specimens recorded by Osborn. The male is designated Lectotype. Two species of *Strigiphilus* are found on *Bubo virginianus* (Gmelin). Osborn's types are conspecific with *S. oculatus* (Rudow, 1870), therefore the form with the narrow forehead found on this host has not been described. Carriker (1958) designated specimens as "neo-paratypes" of *S. oculatus* (Rudow, 1870). Since he did not establish a neotype, his action is not valid.

Present status: A synonym of *Strigiphilus oculatus* (Rudow, 1870).

Docophorus coccygi Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 222, Fig. 143.

Osborn did not record the number of specimens in the type series. A female was illustrated. Ohio State University has one slide with two males, two females, and one nymph with collection date of 30 May 1890. The female located in the bottom center of the slide is designated Lectotype. M. A. Carriker has two males with collection date of 29 May 1890.

Present status: *Cuculoecus coccygii* (Osborn, 1896).

Docophorus corvi Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 220, Fig. 142. (*not* Linnaeus, 1758).

Philopterus osborni Edwards. 1952. Psyche, 59: 27. (Nomen novum).

Osborn did not record the number of specimens in the type series. A female was illustrated. The Museum of Comparative Zoology has slide number 27344(242) with one female and two nymphs, slide number 27344(243) with one male and one nymph, and slide number 27344(248) with three females. The female on slide number 27344(242) is designated Lectotype. Ohio State University has one male with collection data "Crow, Ft. Collins, Colorado, Monroe Co., Ind., 7-12-92, R. M. Harve, 35, C. F. B." Even though this slide bears a "type" label, it is not a syntype because there is no reference to it in the original description.

Present status: *Philopterus ocellatus osborni* Edwards, 1952.

Docophorus fusco-ventralis Osborn. 1896. Bull. U. S. Ent. (n.s.), 5: 221.

Osborn did not record the number of specimens in the type series. The Museum of Comparative Zoology has slide number 27342(244) with two males, one female, and one nymph. The female on slide number 27342(244) is designated Lectotype. The Museum of Comparative Zoology also has slide number 27342(250) with two males, two females and two nymphs from "Tyrannus (Muscicapa) atra" which are not conspecific with the lectotype and bear collection data not mentioned in the description. Therefore, the specimens on slide number 27342(250) are not syntypes despite the fact that the slide is labeled "type."

Present status: *Philopterus fuscoventralis* (Osborn, 1896).

Docophorus halieti Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 218.

Osborn did not record the number of specimens in the type series. Ohio State University has a slide with two females and one male. The male is designated Lectotype.

Present status: *Craspedorrhynchus halieti* (Osborn, 1896).

Docophorus minuto-trabeculatus Osborn. 1896. Bull. U. S. Bur. Ent., 5: 221.

The type material for this species could not be located. Hopkins and Clay (1952) consider it to be a synonym of *Rallicola advenus* (Kellogg, 1896).

Docophorus phaëtonus Osborn. 1890. *In* Howard, Proc. U. S. Nat. Museum, 12: 189.

The type material for this species could not be located. Hopkins and Clay (1952) consider the present status of this species to be *Saemundssonia phaëtona* (Osborn, 1890).

Docophorus quiscali Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 219, Fig. 141.

Osborn did not record the number of specimens in the type series. A female was illustrated. Ohio State University has a slide with one female and one nymph. The female is designated Lectotype.

Present status: *Philopterus quiscali* (Osborn, 1896).

Docophorus sialii Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 220.

Osborn did not record the number of specimens in the type series. Ohio State University has a slide with one male, two females, and four nymphs. The male is designated Lectotype. This slide bears a collection date of 21 March 1874.

Present status: *Philopterus sialii* (Osborn, 1896).

Docophorus speotyti Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 222, Fig. 144.

Osborn recorded one male and one female from Lincoln, Nebraska, and two males and two females from Fort Collins, Colorado. He illustrated a female. M. A. Carriker has one female collected at Lincoln, Nebraska, 17 April 1890 which is designated Lectotype. Ohio State University has one male from Lincoln, Nebraska, collected on 16 April 1890. In addition, Ohio State University has four females with collection data "Burrowing Owl, Ft. Collins, Colo., 4-13-92, C. F. Baker Coll., CFB. 25." Either Osborn made a mistake in recording the sex of these specimens, or they are not syntypes. For that reason, the female in Carriker's Collection is designated Lectotype.

Present status: *Strigiphilus speotyti* (Osborn, 1896).

Lipeurus botauri Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 234.

Osborn did not record the number of specimens in the type series. Ohio State University has one female collected at Ames, Iowa. This specimen is considered the Holotype.

Present status: *Ardeicola botauri* (Osborn, 1896).

Lipeurus infuscatus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 234, pl. II, Figs. e and f.

Osborn recorded four specimens, all of which are in the Museum of Comparative Zoology. Edwards (1952) discussed this material and designated the male on slide number 27343(334) as Lectotype.

Present status: *Rhynonirmus infuscatus* (Osborn, 1896).

Lipeurus marginalis Osborn. 1902. Ohio Naturalist, 2: 176.

Osborn recorded two females from Ames, Iowa. Ohio State University has a slide with two nymphs, which obviously would have been females upon reaching maturity. The specimen located on the bottom portion of the slide is designated Lectotype.

Present status: *Falcolipeurus marginalis* (Osborn, 1902).

Menopon alternatum Osborn. 1902. Ohio Naturalist, 2: 175, pl. II, Fig. 1.

Osborn recorded the type series as being from Ames, Iowa, and Lincoln, Nebraska; but did not note the number of specimens. He illustrated a male. Ohio State University has a slide with one male, one female, and one nymph collected at Lincoln, Nebraska, 23 June 1891. The male on this slide is designated Lectotype.

Present status: *Cuculiphilus alternatus* (Osborn, 1902).

Menopon expansum Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 245, pl. II, Fig. j.

Osborn recorded and illustrated a female on slide number 67. This specimen, on slide number 67, is in the Museum of Comparative Zoology. Although the host is given in the original description and on the slide as *Dolichonyx eryzivorus*, the specimen is not a species found on passerine hosts but is an *Austromenopon* and agrees perfectly with specimens of *A. aegialitidis* (Durrant, 1906) from *Charadrius vociferus* Linnaeus.

The draft Internationtal Rules of Zoological Nomenclature passed by the 15th Int. Congress Zool. contains provision that a senior synonym which has been unused in the primary zoological literature for more than 50 years shall be considered a *nomen oblitum* and shall not be used to replace its junior synonym until after reference to the Commission, who will either place it on the Index of Rejected Names or on the Official List. *Menopon expansum*, having been unused for 64 years, comes under this provision and must not be used in place of *Austromenopon aegialitidis* (Durrant, 1906) in use for 54 years.

Menopon fusco-marginatus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 245.

Osborn did not record the number of specimens in the type series. The Museum of Comparative Zoology has slide number 258 with one male, one female, and one nymph; slide number 264 with one male, and two females; and slide number 265 with one male and three nymphs. The male on slide number 264 is designated Lectotype.

Present status: *Myrsidea fuscomarginata* (Osborn, 1896).

Menopon interruptus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 245, pl. II, fig. h.

Osborn did not record the number of specimens in the type series. A male was illustrated. The Museum of Comparative Zoology has slide number 45 with one male; slide number 51 with one male, one female, and one nymph; slide number 142 with one male, one female, and one nymph; slide number 249 with three nymphs; slide number 257 with one male and two females; slide number 259 with one male, one female, and one nymph; slide number 260 with two males and one female; and slide number 261 with one male and two nymphs. The male on slide number 259 is designated Lectotype.

Present status: *Myrsidea interrupta* (Osborn, 1896).

Nirmus abruptus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 229, pl. II, Fig. c.

Osborn recorded one adult and one nymph, and illustrated a female. The Museum of Comparative Zoology has slide number 27338(307) with one female and one nymph. Host data on the slide is "*Perdix americanus*." The female is designated Lectotype. Hopkins and Clay (1952) correctly noted that these specimens are stragglers from some member of Icteridae.

Present status: *Brüelia abrupta* (Osborn, 1896).

Nurmus cordatus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 228, pl. II, Fig. a.

The Museum of Comparative Zoology has slide number 27336(329), with one female and one nymph, as recorded by Osborn. Edwards (1952) has discussed and illustrated this material. The female is designated Lectotype.

Present status: *Rotundiceps cordatus* (Osborn, 1896).

Nirmus marginatus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 228, pl. II, Fig. b. (*not* Burmeister, 1838).

Degeeriella marginatulus Harrison. 1916. Parasitology, 9: 117. (Nomen novum).

Osborn did not record the number of specimens in the type series. A female was illustrated. The Museum of Comparative Zoology has slide number 27339(326) with three females. The female located on the right side of the slide is designated Lectotype.

Present status: *Picicola marginatulus* (Harrison, 1916).

Nirmus ornatissimus var. *xanthocephali* Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 224.

The type material for this species could not be located. Hopkins and Clay (1952) consider the present status of this species to be *Brüelia xanthocephali* (Osborn, 1896).

Nirmus orpheus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 227.

Osborn recorded two males which are on the Museum of Comparative Zoology slide number 27340(312). The host listed on the slide is "*Orpheus carolinensis*." The male located on the top portion of the slide is designated Lectotype.

Present status: *Picicola orpheus* (Osborn, 1896).

Nirmus pallidus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 227. (*not* Piaget, 1880).

Degeeriella pallidula Harrison. 1916. Parasitology, 9: 120. (Nomen novum).

Ohio State University has a slide with four nymphs which were recorded by Osborn. These specimens are too young for specific determination beyond the fact that they belong to the genus *Brüelia*.

Present status: *Brüelia pallidula* (Harrison, 1916).

Nirmus parallelus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 229, pl. II, Fig. d.

Osborn did not record the number of specimens in the type series. A male was illustrated. The Museum of Comparative Zoology has slide number 27336(323) with three females; slide number 317 with one male and three females; and slide number 318 with three females. The male on slide number 317 is designated Lectotype.

Present status: A synonym of *Quadraceps hiaticulae boephilus* (Kellogg, 1896).

Nirmus picturatus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 226.

The type material for this species could not be located. Hopkins and Clay (1952) consider the present status of this species to be *Brüelia picturata* (Osborn, 1896).

Nirmus rotundatus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 226.

Osborn recorded only one specimen, which could not be located.

Ansari (1957) considers the present status of this species to be *Brüelia rotundata* (Osborn, 1896).

Nirmus secondarius Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 227.

The type material for this species could not be located. Clay (1958) stated "It is not possible to assign this species with certainty to the *Degeeriella*; if the types are no longer in existence the name should be discarded as a nomen dubium."

Nirmus tyrannus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 228.

Osborn recorded two females in the type series. The Museum of Comparative Zoology has slide number 27341(313) with two females. The female on the top portion of the slide is designated Lectotype. These specimens are stragglers from *Chordeiles minor* (Forster) and are conspecific with material from that host.

Present status: A synonym of *Mulcticola macrocephalus* (Kellogg, 1896).

Physostomum hastatum Osborn. 1896. Ohio Naturalist, 2: 203, pl. 14, Fig. 3.

Osborn recorded two females from *Junco hyemalis oregonus* which could not be located. He also recorded one female from *Junco aikeni*, which is on a slide at Ohio State University; and which is herewith designated Lectotype.

Present status: *Ricinus hastatus* (Osborn, 1902).

Physostomum lineatum Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 248.

Osborn recorded three specimens, none of which could be located. Hopkins and Clay (1952) consider the present status of this species to be *Ricinus lineatus* (Osborn, 1896).

Trichodectes castoris Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 241, Figs. 149a-d.

Osborn did not record the number of specimens in the type series. Both sexes were illustrated. The University of Nebraska has five females, three males, and two nymphs. The United States National Museum has seven females and seven males. Ohio State University has three males, two females and three nymphs; the male located on the left center portion of this slide is designated Lectotype. All slides bear the additional data "Lincoln, Nebr., Nov. 17, 1890." These specimens are stragglers from *Mephitis mephitis hudsonica* Richardson and are conspecific with material from that host.

Present status: A synonym of *Neotrichodectes mephitidis* (Packard, 1873).

Trichodectes geomydis Osborn. 1896. Bull. U. S. Bur. Ent., 7: 54, Fig. 42.

Osborn did not record the number of specimens in the type series. A male was illustrated. Ohio State University has one slide with four females and two males. The male in the lower right position on the slide is designated Lectotype.

Present status: *Geomydoecus geomydis* (Osborn, 1896).

Trichodectes mephitidis Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 242, Figs. 150a-f. (*not* Packard, 1870).

Neotrichodectes osborni Keler. 1944. Stettin. ent. Ztg., 105: 182. (Nomen novum).

Osborn recorded type material from three collections. The series from "Polecat, Spilogale interrupta, Tama County, Iowa" was described and illustrated. Since this form is not conspecific with *T. mephitidis* Packard, 1870, Keler (1944) published *Neotrichodectes osborni* as a nomen novum; thereby restricting the name to the form found on this host. The series has not been located, so the designation of a Lectotype cannot be accomplished at this time.

Osborn also recorded type material from "Mephitis mephitica, Holt Co., Nebraska," which has been located as follows: University of Nebraska—nine females, two males, and thirty-two nymphs; and Ohio State University—one male, one female, and six nymphs. He also recorded specimens from *Mephitis mephitica* from "Palo Alto, California, Johnson Collection." Iowa State University has six males, sixteen females and one nymph with collection data "Meph. meph., Palo Alto, Calif., June 26, 1893, W. G. J." which are probably this series. All specimens from "Mephitis mephitica" are conspecific with *Neotrichodectes mephitidis* (Packard, 1870).

Trichodectes nasuatis Osborn. 1896. Ohio Naturalist, 2: 178, pl. II, Fig. 3.

Osborn recorded three females and one nymph, which are on a slide at Ohio State University. The female located on the upper left portion of the slide is designated Lectotype.

Present status: A synonym of *Neotrichodectes pallidus* (Piaget, 1880).

Trichodectes parallelus Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 240, Fig. 148.

Osborn recorded three females received from J. H. Comstock of Cornell University. Ohio State University has a slide with three teneral females. The collection data on the slide are "Deer, Ithaca, N. Y., 12 Aug. 86, L. Pearson, Coll., From Cornell Univ." The uppermost specimen, also in the center, is designated Lectotype. The types of *Trichodectes odoecoilei* McGregor have been examined, and are conspecific with these specimens. The specimens that Peters (1930) referred to as *T. parallelus* Osborn are probably those that Osborn identified and illustrated as *Trichodectes tibialis* (Bull. U. S. Bur. Ent. (n.s.), 5: 240, Fig. 147) since that series contained both males and females.

Present status: *Tricholipeurus parallelus* (Osborn, 1896).

Trichodectes thoracicus Osborn. 1902. Ohio Naturalist, 2: 178, pl. II, Fig. 4.

Osborn did not record the number of type specimens. A female was illustrated. Ohio State University has one slide with two males, three females, and two nymphs. The female located in the top center portion of the slide is designated Lectotype; the collection data are "Mar. 3, Lake Co., Calif. W. G. Johnson." Iowa State University has eight males, fifteen females and seven nymphs on three slides with collection data "Bassaris, Ringtail or Racoon Fox, Lake Port, Lake Co., Calif., 4 Mch 93, W. G. Johnson."

Present status: *Neotrichodectes thoracicus* (Osborn, 1902).

Trinoton minor Osborn. 1896. Bull. U. S. Bur. Ent. (n.s.), 5: 248.

Osborn recorded a female on slide number 102, which is in the Museum of Comparative Zoology. The specimen is a nymph, and not a female. It is in such poor condition that a satisfactory comparison could not be made with specimens from *Oidema nigra,* the type host.

Present status: *Trinoton minor* Osborn, 1896.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW LONG-TAILED VOLE (*MICROTUS LONGICAUDUS* (MERRIAM)) FROM UTAH

BY M. RAYMOND LEE AND STEPHEN D. DURRANT
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The Henry Mountains located in Wayne and Garfield counties of south-central Utah, constitute a small range having 5 major peaks of which only 3 exceed 10,000 feet in elevation. The entire range is surrounded on all sides by low-lying desert. Thus, these mountains are effectively isolated from neighboring highlands and at their higher elevations form a montane island in a desert. Because of the inaccessibility of these mountains, few mammals had been obtained previously from there. When Durrant prepared his "Mammals of Utah, Taxonomy and Distribution" (Univ. Kansas Publs. Mus. Nat. Hist., 6: 371–375, 10 August 1952), he knew of no specimens of *Microtus longicaudus* from the Henry Mountains. During the past four years, we have collected these mountains intensively and have disclosed the occurrence there of the long-tailed vole. A study of these mice reveals that they merit subspecific recognition.

All measurements are in millimeters. Capitalized color terms are after Ridgway (Color Standards and Color Nomenclature, Washington, D. C., 1912).

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Microtus longicaudus incanus, new subspecies

Type: Adult male, skin and skull, number 14,286, Museum of Zoology, University of Utah; ¼ mile southeast of Burned Ridge, Mount Ellen, Henry Mountains, 10,300 feet, Garfield County, Utah; 10 September 1957, collected by M. Raymond Lee, original number 1512.

Range: Henry Mountains of Wayne and Garfield counties, Utah.

Diagnosis: Size: Small (see statistics); caudal index (ratio of length of tail to length of head and body) small (see statistics). Color: Light, dorsum and top of head near Light Ochraceous-Buff with slight admixture of dark hairs; sides, face and feet gray (gray of sides extends well onto back in majority of specimens); hairs of venter white-tipped, plumbeous basally. Skull: Small (see statistics); relatively smooth at all ages; nasals short and wide distally; interparietal long (anteroposteriorly) and nearly rectangular in shape; maxillary plate of orbit wide with straight or convex anterior margin; anterior opening of infraorbital foramen narrow.

Statistics: Analyses of the external and cranial characters of the type and adult topoytpes and near topotypes from Burned Ridge, Eagle and Sawmill basin are:

CHARACTER	SEX	n	x̄ ± S.E.	S.D.	R
Total length	F	12	170.4 ± 2.68	9.30	186–155
	M	5	172.6 ± 3.74	8.38	182–162
Length of tail	F	12	53.1 ± .90	3.12	58–49
	M	5	52.8 ± 1.91	4.28	59–49
Length of hind foot	F	12	21.1 ± .36	1.24	24–19
	M	5	21.4 ± .31	.70	22–21
Length of ear	F	12	14.3 ± .25	.87	15–13
	M	5	14.0 ± .32	.71	15–13
Caudal index	F	12	.454 ± .011	.039	.542–.398
	M	5	.441 ± .015	.033	.480–.389
Condylobasilar	F	9	24.93 ± .25	.76	26.1–24.0
length	M	3	25.5 ± .56	.97	26.1–24.4
Palatilar length	F	12	13.54 ± .15	.53	14.5–13.0
	M	5	13.62 ± .31	.70	14.7–13.0
Length upper	F	12	6.58 ± .06	.21	6.8–6.3
molar series	M	5	6.52 ± .13	.30	7.1–6.3
Zygomatic breadth	F	11	14.92 ± .2	.65	16.4–14.2
	M	5	15.06 ± .31	.70	15.7–13.9
Width of bulla	F	9	5.84 ± .06	.24	6.1–5.4
	M	3	6.2 ± .11	.20	6.4–6.0

n = sample size
x̄± = mean and standard error
S.D. = standard deviation
R = extremes

In the majority of characters listed, the difference between males and females is insignificant.

Comparisons: Members of the subspecies *Microtus longicaudus incanus* are the grayest of any population within the species that has been studied. Specimens of *M. l. incanus* can be distinguished from topotypes of *M. l. latus* and *M. l. mordax* as follows: Size: Smaller; caudal index decidedly less (.450 as compared to .505 and .516). Color: Grayer. Skull: Less angular in adults, smaller; distal ends of nasals wider and more inflated; maxillary plate of orbit wider and with anterior border straight or convex as opposed to concave; tympanic bullae narrower and longer; anterior opening of infraorbital canal narrower; interparietal longer (anteroposteriorly) and more rectangular as opposed to pentagonal; foramen magnum smaller.

Compared with topotypes of *M. l. alticola* specimens of *M. l. incanus* show the following: Size: Larger; caudal index about equal. Color: Markedly grayer. Skull: Larger; distal ends of nasals wider; rostrum relatively shorter; tympanic bullae longer and more inflated; interparietal larger and more rectangular; interpterygoid space narrower; foramen magnum larger.

Remarks: Morphological studies reveal that *M. l. incanus* was derived from the same ancestral stock from which the *M. l. mordax–M. l. latus* group arose. Although distinctive, specimens of *M. l. incanus* are most closely allied to the long-tailed voles which inhabit the Aquarius Plateau to the west of the Henry Mountains. The Henry Mountains are separated from the Aquarius Plateau by approximately 20 miles of desert which, at its lowest point, extends downward to an elevation of approximately 5,800 feet. These voles were not found below 8,000 feet on either the Henry Mountains or the Aquarius Plateau and thus it is evident that these mammals are totally isolated on the Henry Mountains. Moreover, the extent and degree of their isolation is reflected in the considerable amount of differentiation which they have undergone.

The factors responsible for this isolation are not completely understood although it is generally known, that at this latitude, these voles require a montane type of vegetation in addition to rather mesic conditions. On the basis of the knowledge relative to past climatic conditions, we are able now to give an estimate of the minimal time of isolation of *Microtus longicaudus* on the Henry Mountains. Also, this knowledge enables us to explain how these voles became isolated on these mountains. Because of the colder climate during the Valders glacial substage of the Wisconsin glacial period, the montane vegetation was known to have been depressed 2,500 feet in elevation. This is sufficient to bridge the now existing desert area between the Henry Mountains and the Aquarius Plateau. This occurred 10,000 to 11,000 years ago, and the voles would have had ready access during this time to both areas.

Antevs (American Antiquity, 20 (4): 326) has shown that since the Cary Maximum, climatic conditions in the Great Basin and contiguous areas have become in general progressively warmer and drier. During the Anathermal approximately 8,500 years ago, the climate was similar to that of today. Approximately 4,000 to 7,500 years ago, or during the Altithermal, a maximum of aridity and warmth was attained which accentuated the desert conditions between the Henry Mountains and the western plateaus, and effectively destroyed the bridge of montane vegetation which previously had enabled these mammals to cross back and forth between these two areas. The climate during the Medithermal or that period succeeding the Altithermal, although fluctuating somewhat, was less arid than the latter. According to Antevs (*loc. cit.*), it appears unlikely, however, that the fluctuations toward cooler and more moist conditions during the Medithermal were of sufficient magnitude to reestablish a suitable habitat for these voles to enable them to bridge the area between the Henry Mountains and the plateaus to the west. In addition, there is little doubt but that these voles were even more effectively isolated during the Altithermal when the climate was considerably more arid than at present. From the foregoing, it seems justifiable to consider that during the past 8,500 to 9,000 years no gene exchange has occurred between the populations of *Microtus longicaudus* on the Henry Mountains and those on the plateaus to the west.

Specimens examined: Total, 26, distributed as follows: Garfield County: S end Sawmill Basin, Henry Mtns., 9,500 ft, 1; Sawmill Basin, 9,100 ft, 1; Burned Ridge, Mt. Ellen, 10,300 ft, 10; ¼ mi SE Burned Ridge, Mt. Ellen, 10,300 ft, 6; Eagle, E slope Mt. Ellen, 7,800 ft, 5; Straight Creek, E slope Mt. Pennell, 9,000 ft, 3.

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A NEW JUMPING MOUSE (*ZAPUS PRINCEPS* ALLEN) FROM UTAH

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When Durrant wrote the Mammals of Utah, Taxonomy and Distribution (Univ. Kansas Publs. Mus. Nat. Hist., 6: 385–388, 10 August 1952), jumping mice were unknown from the La Sal Mountains of eastern Utah. Krutzsch also lacked specimens from here when he reviewed the North American Jumping Mice (Univ. Kansas Publs. Mus. Nat. Hist., 7: 375, 21 April 1954). During a collecting trip to these mountains in August, 1955, we trapped two of these mammals and since that time, despite intensive efforts, only three additional specimens have been obtained. Analysis of these five specimens reveals that they represent an undescribed subspecies which herein is given nominal recognition.

Grateful acknowledgments are extended to Seth B. Benson, Museum of Vertebrate Zoology, University of California, Berkeley, California, for the loan of comparative materials and to Guy G. Musser, University of Utah, Salt Lake City, Utah, for his special efforts in collecting specimens of this new subspecies.

All measurements are in millimeters and capitalized color terms are after Ridgway (Color Standards and Color Nomenclature, Washington, D. C., 1912). Financial assistance for this study was provided by the National Science Foundation under grants NSF-G339 and NSF-G1412.

Zapus princeps chrysogenys, new subspecies

Type: Adult male, skin and skull, number 13,834, University of Utah, Museum of Zoology; 2½ miles northeast of La Sal Peak, La Sal Mountains, 8,500 feet, Grand County, Utah; 17 July 1956; collected by M. Raymond Lee; original number 1,436.

Range: La Sal Mountains of Grand and San Juan counties, Utah.

Diagnosis: Size: Small (see measurements). Color: Mid-dorsal dark stripe markedly reduced being indistinct in 3 of 5 specimens; dorsum and sides Pale Yellow-Orange to Pale Ochraceous-Buff with considerable admixture of black hairs; lateral line Capucine Buff; venter white, lightly washed with Pale Yellow-Orange to Pale Ochraceous-Buff; cheeks Pale Yellow-Orange to Capucine Buff without admixture of black hairs; tail bicolored, whitish below and grayish above; hind feet grayish-white to yellowish-white above; ears distinctly edged with yellowish-white. Skull: Small (see measurements); superior ramus of zygoma wide and robust; maxillary tooth-row long relative to length of skull; tympanic bullae small with medial ends directed anteromedially; antorbital foramen small; nasals wide; presphenoid wide; projection present on inferior ramus of zygoma.

Measurements: Average and extreme measurements of the type and 4 topotypes (3 ♂♂, 1 ♀), collectively, are as follows: Total length, 215.2 (232–203); length of tail, 131.2 (139–117); length of hind foot, 31 (32–30); greatest length of skull, 23.5 (24.8–23.0); length of nasals, 9.4 (10.2–9.1); length of incisive foramina, 4.6 (5.1–4.2); width across M1, 5.16 (5.4–4.9); length of maxillary tooth-row, 4.08 (4.15–4.0).

Comparisons: Topotypes of *Zapus princeps chrysogenys* differ from those of *Z. p. princeps* as follows: Size: Smaller; tail relatively longer. Color: Paler, mid-dorsal dark stripe not as distinct; cheeks with less admixture of black hairs; lateral line Capucine Buff as opposed to Light Ochraceous-Buff or Cinnamon-Buff; margins of ears lighter. Skull: Smaller in most measurements; superior ramus of zygoma wider and more robust; tympanic bullae smaller; incisive foramina more ellipsoid as opposed to nearly parallel-sided; presphenoid wider; maxillary tooth-row longer; antorbital foramen smaller.

Compared with specimens of *Z. p. luteus* from the West Fork of Black River, Apache County, Arizona, topotypes of *Z. p. chrysogenys* differ as follows: Size: Larger. Color: Markedly less Ochraceous; sides near Pale Yellow-Orange as opposed to near Cinnamon-Buff; tail grayish as opposed to brownish. Skull: Posterior ends of nasals wider; antorbital foramen markedly smaller; incisive foramina longer and wider posteriorly; tympanic bullae smaller; maxillary tooth-row longer; superior ramus of zygoma wider and heavier.

From near topotypes of *Z. p. utahensis*, topotypes of *Z. p. chrysogenys* differ as follows: Size: Smaller. Color: Lighter; mid-dorsal dark stripe less blackish and markedly less distinct; venter lightly washed with pale buff as opposed to pure white; distinct light cheek patch present as opposed to none. Skull: Markedly smaller; zygomata parallel rather than bowed laterally; inferior and superior rami of zygoma actually as well as relatively more robust; upper tooth-rows diverging less anteriorly;

palatal bridge longer relative to length of skull; presphenoid wider; tympanic bullae less inflated ventrally.

Remarks: The La Sal Mountains are completely isolated and are surrounded by desert. In Utah, jumping mice are restricted to mountains at the higher elevations; hence, this population is completely isolated because of the lack of montane habitat between the La Sal and the neighboring mountains. Comparisons clearly indicate that the affinities of Z. *p. chrysogenys* are with the Z. *p. princeps*–Z. *p. luteus* complex of jumping mice and not, as would be expected with Z. *p. utahensis,* the closest subspecies geographically. In order to evaluate more precisely the relationship of Z. *p. chrysogenys* with the Z. *p. princeps*–Z. *p. luteus* complex the following observations are presented. Although paler and more yellowish, specimens of Z. *p. chrysogenys* most nearly resemble those of Z. *p. princeps.* In external measurements, they are intermediate between those of Z. *p. princeps* and Z. *p. luteus.* Specimens of Z. *p. chrysogenys* are reminiscent of those of Z. *p. princeps* in the shape of the nasals and incisive foramina and approach those of Z. *p. luteus* in generally smaller cranial dimensions. All characters considered, the affinities of Z. *p. chrysogenys* are closer to Z. *p. princeps* than to Z. *p. luteus.*

The fact that Z. *p. chrysogenys* shows some characteristics of both Z. *p. princeps* and Z. *p. luteus* suggests that the initial population of the La Sal Mountains was derived from an ancestral population which also possessed these characters. That the ancestral population had these characters might be explained in two possible ways: either it consisted of animals having characters like intergrades between Z. *p. princeps* and Z. *p. luteus,* or it was characterized by animals ancestral to all three of these subspecies and had some characters of each kind.

Among these three subspecies, Z. *p. luteus* is the most widely divergent, and it is suggested that this divergence required a longer period of time than was required for the divergence between Z. *p. princeps* and Z. *p. chrysogenys.* In other words, differentiation of Z. *p. luteus* from Z. *p. princeps*–Z. *p. chrysogenys* had progressed to a considerable degree before the differentiation between Z. *p. princeps* and Z. *p. chrysogenys* was initiated. It is assumed that the time of isolation is approximately proportional to the degree of morphological differentiation. If this were true, then it suggests that Z. *p. chrysogenys* was derived from a population of Z. *p. princeps* in which some characters of Z. *p. luteus* were still present, that is, an intergrading population which has subsequently undergone divergence.

Krutzsch (op. cit.: 415) reported one specimen from Florida, Colorado, that was intermediate between Z. *p. princeps* and Z. *p. luteus* and that similar intergrades are known from localities in northern New Mexico. Florida, Colorado, is south of the Rico and San Juan mountains. Hence, the nearest affinities of the members of the species *Zapus princeps* on the La Sal Mountains, like those of the red squirrel (*Tamiasciurus hudsonicus* (Erxleben)) and the pika (*Ochotona princeps* (Richardson)) from the same region, appear to be with animals occurring on mountains to the southeastward in Colorado.

Specimens examined: Total, 5, distributed as follows: Grand County: 2½ mi NE La Sal Peak, La Sal Mtns., 8,500 ft, 1; Beaver Creek, 2 mi NE Mt. Waas, La Sal Mtns., 8,720 ft, 2; Beaver Creek, 1½ mi E La Sal Peak, La Sal Mtns., 9,000 ft, 2.

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THE ELLISELLIDAE (OCTOCORALLIA) AND THEIR BEARING ON THE ZOOGEOGRAPHY OF THE EASTERN PACIFIC

By Frederick M. Bayer and Elisabeth Deichmann
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The complete absence of the gorgonacean family Gorgonellidae (properly Ellisellidae) from the eastern Pacific has been cited as an example of distribution illustrating the view that the shelf fauna of the American Pacific coast is not as closely related to the western Pacific fauna as is that of the Caribbean (Ekman 1935: 66; 1953: 40). However, this idea of the distributional pattern of the Ellisellidae is the result of incomplete knowledge of the composition of the west American fauna, and seems to derive largely from the works of Kükenthal, notably his monograph of the Gorgonaria in the reports of the German Deep Sea Expedition (1919: 856–862). Material now in our hands, preserved in the collections of the U. S. National Museum and the Museum of Comparative Zoölogy, shows conclusively that members of the Ellisellidae do indeed occur along the Pacific coast of the Americas, a graphic demonstration that thorough faunal sampling is an indispensable foundation for zoogeographic speculation. In this case, increased knowledge of distribution does not alter the basic zoogeographic conclusion; it merely requires the selection of some new examples from a relatively unaltered body of evidence. Moreover, the two examples of gorgonacean genera cited by Ekman as occurring in the eastern Pacific as well as in its western parts, contrary to his theory—*Psammogorgia* and *Heterogorgia*—do not, in fact, have any such distribution. This erroneous notion resulted from a misunderstanding of the two genera, as well as from misidentifications made by Nutting

(1910a, 1910b) and mostly accepted by Kükenthal (1919, 1924). So far as we know at this writing, neither *Psammogorgia* nor *Heterogorgia* occurs anywhere outside of the Panamic province, a further demonstration that zoogeography is no better than the systematics upon which it is based.

Family Ellisellidae

This exceptionally well-defined family is characterized by a remarkably uniform type of spicule and a strongly calcified axial cylinder with its calcareous fibers oriented radially and without a soft, cross-chambered medulla. Its genera and species, on the other hand, are with few exceptions especially difficult to separate. The genera *Ctenocella* (Indo-west-Pacific) and *Riisea* (Caribbean) are unmistakably recognized by their peculiar modes of branching, and *Junceella* (Indo-west-Pacific) by its spicules, but the rest—*Ellisella, Toeplitzella, Verrucella* and *Nicella*—are not always so easy to recognize. The genera as now accepted may be differentiated according to the following key:

I. Colonies whiplike, flagelliform or, if branched, with only a few long, slender, and comparatively straight branches
  - A. Colonies branched in one plane, with several long, straight terminal branches arising in a lyrate or bipectinate manner . . . *Ctenocella* Valenciennes
  - B. Colonies simple or, if branched, not lyrate
    - 1. Cortical spicules include many symmetrical clubs . . . *Junceella* Valenciennes
    - 2. Cortical spicules are always dumb-bells, never clubs
      - a. The calicles contain spindles that are longer than the dumb-bells of the cortex . . . *Ellisella* Gray
      - b. The calicles contain only dumb-bells like those of the cortex . . . *Toeplitzella* Deichmann

II. Colonies abundantly branched, the terminal branchlets rather short and usually quite crooked, sometimes anastomosing
  - A. Branching openly pinnate, terminal branchlets short, bearing only 1–4 polyps of which one is apical, bent like the bowl of a clay pipe; the diameter of the polyps is greater than that of the branchlets. Core of axis strongly eccentric . . . *Riisea* Duchassaing and Michelotti
  - B. Branching lateral or asymmetrically dichotomous, the terminal branchlets developing many polyps; calicles hemispherical, not tubular, equal to the terminal branches in diameter or smaller. Core of axis about central
    - 1. The calicles contain numerous spindles that are conspicuously longer than the dumb-bells . . . *Nicella* Gray
    - 2. The calicles contain only spicules like those of the rind, no long spindles . . . *Verrucella* Milne Edwards and Haime

The material now before us contains three records of the genus *Ellisella* from Baja California. One of these was collected by Heinz A. Lowenstam of the California Institute of Technology, and another by the late Conrad Limbaugh of Scripps Institution of Oceanography, to both of whom we are most grateful. The third was collected by the steamer "Albatross" many years ago. The collections of the U. S. National Museum also contain specimens of a *Nicella* labeled "Gulf of California," possibly in error, which are mentioned so that investigators now active along the Pacific coast may be on the alert for new records to confirm this doubtful find.

Genus *Ellisella* Gray

Ellisella Gray 1858, Proc. Zool. Soc. London 1857 (vol. 25): 287. (Type species, *Gorgonia elongata* Pallas, by subsequent designation: Nutting 1910: 31.)

Diagnosis: Simple or sparingly branched colonies with long terminal branches not arising in a regular lyrate plan. Cortical spiculation consisting of short double heads and somewhat longer double rods or spindles, the latter most heavily concentrated in the calicular part of the polyps. Pharyngeal walls containing slender rods with usually two belts of angular warts.

The discrimination of species in this genus is a vexing matter. The characters usually employed are: (1) form of colony, including manner and extent of branching; (2) arrangement and size of calicles; (3) shape and relative size of the calicular rods in comparison with the spicules of the general cortex; and (4) the type of double-head spicules predominating in the cortex, i.e., the double sphere or "dumb-bell" type, which has two uniformly warted spheroidal heads connected by a constricted neck; or the "capstan" type, which has two whorls or transverse girdles of rather irregular tubercles, and terminal clusters, separated by a rather wide neck. These characters are without exception difficult both to evaluate and to express in words and keys and, to complicate matters, are also subject to variation.

The specimens before us share so many characters that we are convinced we are dealing with a single species. Although we are unable at the present time to reconcile it with any species of *Ellisella* heretofore described, a thorough revision of the genus may show it to be identical with one of the Indo-west-Pacific species already known.

Ellisella limbaughi, new species

(Figs. 1–2)

Material examined: (Holotype) Baja California: southwest of Holcombe Point at entrance of San Ignacio Lagoon, Pacific coast. Depth, 28 fathoms. Heinz Lowenstam, May 1950. (Mus. Comp. Zool. cat. no. 3939.)

(Paratype) Baja California: south of Cape San Lázaro, Pacific coast, 24° 38′ 00″ N, 112° 17′ 30″ W. Depth, 51 fathoms. U. S. Fish Commission steamer "Albatross" station 2833, 2 May 1888. (One specimen in alcohol, U.S.N.M. cat. no. 51577.)

(Additional specimen) Baja California: Cape San Lucas Canyon. Depth, 100–200 feet; taken by diving. Conrad Limbaugh and J. Stewart, March 1959. (One specimen dry, U.S.N.M. cat. no. 51576.)

Diagnosis: Colonies sparingly branched, with long, slender terminal branches. Polyps in two lateral bands, set in strongly oblique rows of 3–6, except near the branch tips where there may be only 2 (i.e., in alternating double rows). Calicular rods rather blunt, 0.08–0.1 mm long, not much larger than the double heads, which measure at most 0.06–0.08 mm; double heads including many of the capstan type as well as double spheres. Color, dull orange; calicles and rind identically colored.

Descriptive remarks: The three colonies are similar in their rather small size and sparse branching. The polyps are separated by two naked bands into two lateral tracts in which they are arranged diagonally in rows of 3–5, except near the base where there may be 6 polyps in the diagonal rows, and near the branch tips where there may be as few as two. In the two colonies in which the base is preserved, there are no polyps on the proximal part of the main trunk. The calicles are preserved differently in each of the three specimens. In U.S.N.M. no. 51577, preserved in alcohol, they are up-turned but prominent and the tentacles are extended (Fig. 1 a). In one of the dry specimens (the holotype), M.C.Z. no. 3939, they are appressed upward in a scale-like manner (Fig. 1 c), as if the colony had been stimulated to the fullest degree of contraction before it was dried, whereas in the third specimen, U.S.N.M. no. 51576, they are in an intermediate condition (Fig. 1 b). In this genus, the prominence of the calicles in preserved specimens is not a reliable character because it depends so much upon the methods of preservation used, the condition of the colony, and the reaction of individual polyps, as occasionally can be seen even in a single colony.

The holotype, M.C.Z. no. 3939, is a once forked branch 28 cm in length, lacking both main trunk and branch tips. At the lowest part it has a diameter of 2.5 mm, in the uppermost part 1.5 mm. The contracted calicles, which are depressed into pits in the cortical surface, are oval, scale-like, somewhat bilobed above, and measure roughly 0.5–0.7 mm across. The calicular rods (Fig. 1 e) are conspicuously constricted at the waist, tapered, but not acute. They are at most about 0.08 mm long and thus not much longer than the largest double heads, which measure 0.06 mm. The double heads include capstans with conspicuous terminal clusters, and smaller dumb-bells in which the warts show little or no tendency to separate into transverse girdles and terminal tufts (Fig. 1 f). The axial sheath contains capstans up to 0.06 mm in length, not so strongly sculptured as those of the outer rind (Fig. 2 a). The pharyngeal walls contain slender rods with two transverse belts of tubercles (Fig. 1 d, left), about as long as the calicular rods but much slimmer. The tentacles contain irregularly sculptured rods (Fig. 1 d, right two) that grade quickly into the typical spicules of the calicular walls proximad. The spicules are pale amber yellow except those of the axial sheath, tentacles, and pharynx, and some of the calicular rods, which are nearly or quite colorless.

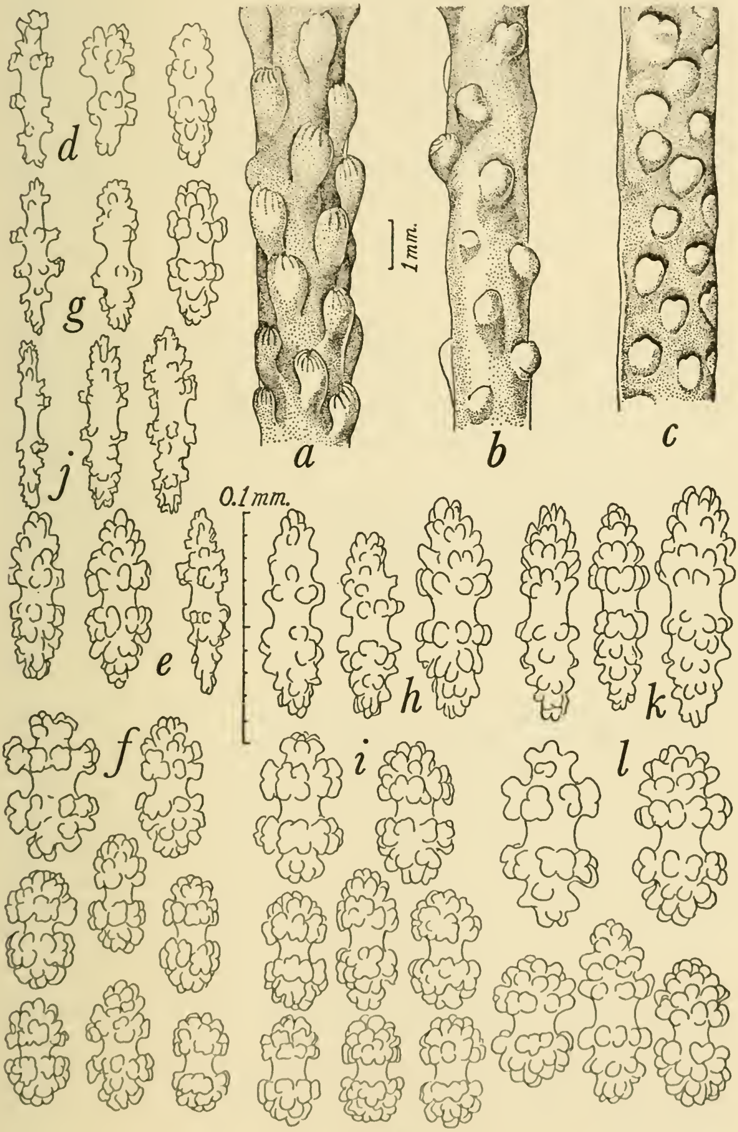

FIG. 1

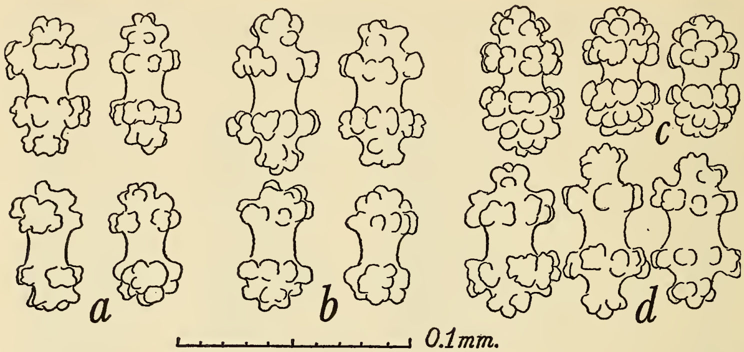

FIG. 2

The paratype, U.S.N.M. no. 51577, is a forked colony 18 cm tall, with its basal disk but lacking the uppermost parts, which are eroded away. Just above the base, the main stem has a diameter of 3 mm; the uppermost branch measures 2.5 mm in diameter. The main branch was terminally eroded during the life of the colony, and the lower branch and its secondary branch are entirely decorticated. The calicles are upturned, not much contracted, somewhat more than 1 mm tall with tentacles extended; they are arranged in oblique rows of 3–5, which form two lateral bands as in the holotype. The spicules are very similar in form to those of the holotype, but are slightly larger. The calicular rods (Fig. 1 h) reach a length of 0.1 mm and the double heads (Fig. 1 i) 0.065 mm. The pharyngeal and tentacular rods (Fig. 1 g), and the capstans of the axial sheath (Fig. 2 b) are practically identical with those of the holotype.

A third specimen, U.S.N.M. no. 51576, is similar to the types in most respects. It is a slender, weakly branched colony with long, ascending terminal branches. Complete with base and all but a small tip of the uppermost branch, it has a height of 38.5 cm. The main stem forks three times unilaterally in rapid succession to produce four closely placed terminals. The main trunk measures 2.5 mm in diameter; in the middle of the colony the diameter is about 2 mm, tapering to 1 mm near the branch tips. The polyps are low, upturned and somewhat clavate, not so fully contracted as in the holotype. They are placed on the branches in lateral bands composed of 2–5 individuals in oblique rows (Fig. 1 b). The spicules are practically identical in form with those of the types but are consistently larger. The longest calicular rods measure slightly more than 0.1 mm (Fig. 1 k). The largest double heads measure 0.08 mm and the smaller dumb-bells are commonly 0.06 mm in length (Fig. 1 l, 2 c). The capstans of the axial sheath (Fig. 2 d) may be 0.07 mm in length, a few slightly larger.

Ellisella limbaughi clearly belongs to the *elongata* group of species as indicated by its colonial form and by the relatively small size of its calicular rods. However, its colonies are much more delicate than those of either *E. elongata* (Pallas) or *E. grandis* (Verrill), both of which are huge species, and its spicules include many dumb-bells in which there is no differentiation of terminal clusters of tubercles. *Ellisella limbaughi* most closely approaches certain of the colonies included by Simpson (1910: 339) under *Scirpearia furcata* from the Indian Ocean, a species that was removed to *Ellisella* (= *Toeplitzella* Deichmann) by Toeplitz because it seems to lack the special calicular rods of *Scirpearia.* It may eventually prove that *E. limbaughi* is identical with one of them, but this would give it an exceptionally wide distribution for a shallow-water gorgonian.

This species is named in memory of Conrad Limbaugh, who recently lost his life in a diving accident.

Genus *Nicella* Gray

Nicella Gray 1870, Cat. Lithophytes Brit. Mus.: 40. (Type species, *Nicella mauritiana* Gray 1870 = *Scirpearia dichotoma* Gray 1859, by monotypy.)

Nicella, Deichmann 1936, Mem. Mus. Comp. Zool. 53: 216.

Diagnosis: See Deichmann 1936: 216.

Nicella guadalupensis (Duchassaing and Michelotti)

Verrucella guadalupensis Duchassaing and Michelotti 1860, Mém. Corall. Antill.: 33, pl. 4, Figs. 5–6. (Guadeloupe.)

Nicella guadalupensis, Deichmann 1936, Mem. Mus. Comp. Zool. 53: 218, pl. 36. (Various localities from Dry Tortugas to Barbados.)

Material examined: Two large dried specimens (one of them broken into three pieces) labeled "Gulf of California," collected by W. J. Fisher and received from R. E. C. Stearns (U.S.N.M. cat. no. 8972). Although other gorgonians in the Fisher collection are typical Panamic species, some of the material received from Stearns came from diverse localities, suggesting that an error of labeling may have occurred.

Remarks: The two specimens from the "Gulf of California" differ conspicuously in spiculation but they both fall well within the remarkable range of variation observed in West Indian *Nicella guadalupensis.* One of the specimens has long, acute calicular rods, as in U.S.N.M. 7617 from Havana, Cuba; the other has short, blunt rods, as in U.S.N.M. 44134 from Barbados. Both colonies are dull yellow with nearly white calicles, a color pattern commonly found in *N. guadalupensis.*

Gorgonians and the Zoogeography of the American Pacific Coast

Although the discovery of Ellisellidae on the coast of Baja California removes one important item of evidence from Ekman's contention that the eastern Pacific shelf-fauna is not so closely related to the western Pacific as is the Caribbean, this is offset by the fact that *Psammogorgia* and *Heterogorgia* are endemic to the west American shelf-fauna and do not occur also in the western Pacific as Ekman had been led to believe by the literature. The gorgonians of both Atlantic and Pacific coasts of tropical America show a marked degree of endemism and are closely related, as is clearly indicated by the preponderance of gorgoniids and plexaurids. However, at somewhat greater depths—down to 100 fathoms—there are other gorgonians whose distribution supports the opinion of Ekman, among them the genera *Bebryce, Villogorgia, Placogorgia,* and *Eunicella,* which actually are not known to occur along the Pacific coast. All that can be said is that the Atlantic and Pacific American gorgonian faunas form a closely related unit with conspicuous amphi-American elements, and the Atlantic component bears somewhat closer ties with the Indo-west-Pacific fauna than does the Pacific component, as suggested by Ekman.

Explanation of Figures

Fig. 1. *Ellisella limbaughi* sp. nov.: a.—Part of branch of paratype, U.S.N.M. 51577. b.—Part of branch of U.S.N.M. 51576. c.—Part of branch of holotype, M.C.Z. 3939. d–f.—Spicules of holotype (d, rod from pharynx and two intermediate forms from tentacles; e, calicular rods; f, cortical capstans and double heads). g–i.—Spicules of paratype (g, rod from pharynx and two intermediate forms from tentacles; h, calicular rods; i, cortical capstans and double heads). j–l.—Spicules of U.S.N.M. 51576 (j, rod from pharynx and two intermediate forms from tentacles; k, calicular rods; l, cortical capstans and double heads).

Fig. 2. *Ellisella limbaughi* sp. nov.: a.—Capstans from inner layer, holotype. b.—Capstans from inner layer, paratype. c.—Outer cortical double heads, U.S.N.M. 51576. d.—Capstans from inner layer, U.S.N.M. 51576.

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PROCEEDINGS

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THE DISCOVERY OF A FRESHWATER OPISTHOBRANCHIATE MOLLUSK, *ACOCHLIDIUM AMBOINENSE* STRUBELL, IN THE PALAU ISLANDS

By Frederick M. Bayer and H. Adair Fehlmann

U. S. National Museum, Smithsonian Institution; George Vanderbilt Foundation, Stanford University

Two peculiar shell-less opisthobranchs obtained by A. Strubell in a stream in Amboina were briefly described by the collector and named *Acochlidium amboinense* and *A. paradoxum* (Strubell, 1892: 62). Prof. Max Weber collected some animals similar to the first of these in the mouth of a river in Flores, which were described by Bergh as *Hedyle weberi* (Bergh, 1895: 4). Strubell's deficient description of *Acochlidium amboinense* was supplemented by Bücking's study of the original specimens, making it clear that *A. amboinense* and *H. weberi* are distinct species of one genus (Bücking, 1933: 549–582).

The latter, properly called *Acochlidium weberi* (Bergh), has recently been reported from Sumba by van Benthem Jutting (1955: 55) but *A. amboinense* has not been seen again. Some animals very similar to it in general appearance were discovered by one of us (Fehlmann) during the course of a detailed ecological survey of a stream on the southwest coast of Babelthuap, the largest of the Palau Islands, in September of 1957. When these proved to be of unusual interest, additional specimens were collected during a subsequent visit in October, 1958, and color photographs were made of the living animals. We were then able to confirm the identification as *Acochlidium amboinense* Strubell.

It is not our purpose to give a history of these remarkable freshwater opisthobranchs, which already has been done by

Bücking (1933) and Odhner (1937, 1938), but to report the occurrence of the genus in a stream in the Palau Islands, nearly a thousand miles from the original locality in Amboina, and separated by 500 miles of the Pacific Ocean from other large islands where it reasonably might be expected.

We are indebted to Harold W. Harry, who undertook the preliminary dissections of the first lot of specimens obtained and who made tentative determination of their taxonomic position. We are grateful also to W. S. S. van Benthem Jutting van der Feen of the Zoological Society of Amsterdam, who called our attention to her paper on freshwater mollusks from Sumba and showed one of us (Bayer) the specimens of *Acochlidium weberi* reported therein, and to Harald A. Rehder of the Smithsonian Institution, who gave freely of his time to help us in the search for literature and to read the manuscript. The field work that provided our specimens was aided by contract NR 160 321 between the Office of Naval Research, Department of the Navy, and the National Academy of Sciences—National Research Council, under the auspices of the Pacific Science Board, and by contract AT (04-3)-102 between the United States Atomic Energy Commission and Stanford University. Logistic aid and permission to conduct field work in the Palau Islands were provided by the Trust Territory of The Pacific Islands, United States Department of the Interior. We are, as always, grateful for the encouragement and support of the George Vanderbilt Foundation of Stanford University, and of the Smithsonian Institution, Washington, D. C.

Genus *Acochlidium* Strubell

Acochlidium Strubell 1892, Verhandl. naturh. Ver. preuss. Rheinlande, 49. Jg., Sitzung der niederrheinischen Ges. 13. Juni 1892: 62.
Hedyle Bergh 1895, Verhandl. zool. bot. Ges. Wien 45: 4.
not *Hedyle* Guénée 1857; not *Hedyle* Malmgren 1865.
Acochlidium, Odhner 1937, Zool. Anz. 120: 52, 64.
Acochlidium, Odhner 1938, Basteria 3: 5–11 (passim).

Hedyle, the generic name applied to these naked snails by Bergh in 1895 is not only a junior subjective synonym of *Acochlidium* Strubell, but is also twice preoccupied. In view of the fact that Strubell did provide some morphological information about his animals, and since a name is not nude unless it is devoid of all descriptive matter, the names he proposed are not nomina nuda. We must therefore disagree with Odhner in attributing authorship to Bücking.

The external morphology of the specimens from the Palau Islands is very close to that of *Acochlidium amboinense* as redescribed by Bücking, and gross dissections demonstrate that anatomical characters, notably the radula, the penial armature, and the calcareous spicules, are also in close agreement. The discrepancies are so small as to be of little consequence, particularly in view of the fact that they may well be the result of different artistic representation of the features in question.

Acochlidium amboinense Strubell

(Figs. 1 and 2)

Acochlidium amboinense Strubell 1892, Verhandl. naturh. Ver. preuss. Rheinlande, 49. Jg., Sitzung der niederrheinischen Ges. 13. Juni 1892: 62.

Hedyle amboinensis, Bücking 1933, Zool. Jahrb. Syst. 64: 552, Figs. 1–27; pl. 2.

Acochlidium amboinense, Odhner 1937, Zool. Anz. 120: 52, 64.

Acochlidium amboinense, Odhner 1938, Basteria 3: 5–11, passim.

Material examined: Three lots of specimens, all from the same locality in the Palau Islands: south fork of Arakitaoch stream, Airai Municipality, Babelthuap Island; cascade zone 150–190 feet above sea level; collected by H. A. Fehlmann and Sumang Yachad, 12 September 1957 (5 specimens), 16 September 1957 (4 specimens), and 2 October 1958 (10 specimens).

Descriptive remarks: The living animals measure about 2.5 cm in length when extended and crawling (Fig. 1, a–c). They resemble the drawing of the living animal made by Strubell and published by Bücking (1933: pl. 2, Fig. 1; copied by Odhner, 1938: Fig. 5), with the exception of the attitude in which the tentacles are held, and the shape of the visceral sack ("Eingeweidesack"). Our drawings are ink stipple renderings traced from color photographs of actively crawling specimens, and therefore accurately represent the outline of the living animal including the shape of the visceral sack and the usual position of the tentacles.

Strubell's original sketch gives the impression that (1) the visceral sack is more or less auriculate anteriorly and thus shaped somewhat like a cordate leaf, and (2) the hepatic diverticula are visible as a rather distinct system of veins marking the surface of the visceral sack. Neither is the case in the specimens from Palau. The visceral sack has the shape shown in Figure 1, a–c, and has a perfectly smooth surface. There are no auriculate expansions at the anterior margin of the sack.

In life, the Palauan specimens were deep olive green, rather blotchy in the visceral sack, which is also flecked with white. The head and anterior part of the body in front of the attachment of the visceral sack are somewhat paler and streaked in the manner shown in Strubell's sketch. An oval, darker green area at the anterior end of the visceral

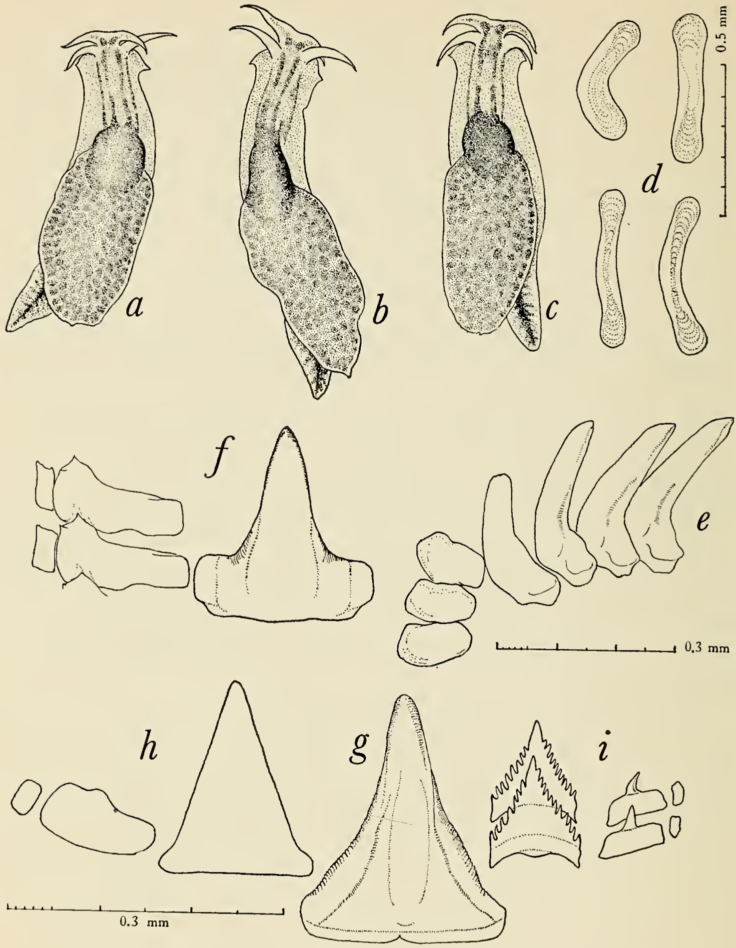

FIG. 1

sack indicates the position of the visceral mass. To judge by Strubell's figure, his specimens were a paler, brighter green than were the animals collected in Arakitaoch stream.

Measurements were not taken of the living specimens, due to pressure of time, and the preserved animals are so contracted and distorted that detailed measurements are not especially informative. However, the dimensions of some of the conspicuous features in topographic anatomy are given below in tabular form. The measurements of specimens collected in 1957 differ somewhat from the figures given for material taken in 1958 owing to the fact that the latter were anesthetized by various means prior to fixation in formalin and have therefore retained more nearly normal shape.

Measurements (in mm) of *Acochlidium amboinense*

	TOTAL LENGTH	LENGTH OF VISCERAL SACK	WIDTH OF VISCERAL SACK	LENGTH OF FOOT	WIDTH OF FOOT
12 Sept. 1957	9	–	6	–	4
	9	–	6	–	4
	9	–	6	–	4
	9.5	–	7	–	4
	10	–	8	7	4.5
16 Sept. 1957	6	–	6	–	3.5
	8	–	5	–	4
	8	–	7.5	–	–
	10	–	5	6	4
2 Oct. 1958	11	–	8	–	4
	12	7	6	9	4
	12	9	6	10	4
	13	8	6	11	4
	14	10	9	10	4
	15	9	7.5	11	4.5
	16	12	7	7.5	4
	16	11	8	11	4.5
	–	9	8	12.5	–
	–	–	–	–	–

(Blanks indicate that the character was not measured because of distortion.)

Radula: According to Bücking's observations (1933: 558 et seq, Figs. 2a, 3, 4 and 5) the radula is bent around the lingual muscle and assumes the shape of the letter U lying on its side. It consists of five longitudinal rows: a middle row of teeth, on either side of which are two lateral rows of plates of chitinous material, which extend only along the ventral portion of the radula to the point where it bends back upon itself over the anterior end of the lingual muscle. In face view, the rachidian tooth is in the shape of an acute isosceles triangle 0.2 mm (200 micra) high and 0.15 mm (150 micra) wide. The thick, slightly curved cusp bends sharply backward from the base of the tooth, which is somewhat expanded laterally. There are no processes or thorns on the margin of the tooth. The inner lateral plates are all of irregular quadrangular form with rounded angles, measuring 0.04 × 0.11 mm; at the middle of the upper (i.e., posterior) margin they have a short "nasenartigen" process. The plates of the outer row are thin, small (0.02 × 0.025 mm) and are practically square.

Bücking records 52 rachidian teeth (24 on the ventral part of the radula, 28 on the dorsal), 20 inner laterals in each row, and 10–15 outer laterals, a total of 112–122 teeth and plates in the complete radula.

Our observations upon the radulae of Palauan specimens agree in general with Bücking's description except as follows: the rachidian teeth measure about 0.27 mm in height instead of 0.2 mm; their sides are concave and finely serrated (Fig. 1 g), not straight and smooth, and when viewed in position on the radula the backward-bent cusp is much narrower than the base (Fig. 1 f). The wide, inner lateral plates bear a blunt process, with or without two or three denticles, toward the outer end, not the middle, of the upper margin; the lower edge of the following plate is recessed to accommodate this process. The small, squarish outer lateral plates often have a tiny denticle at the two upper corners (Fig. 1 f).

Contrary to Bücking's observations, inner lateral plates are present in all transverse rows, and the small outer lateral plates are present in all but the 10 youngest transverse rows where they have not yet been formed. In one of our preparations, the radula has 25 rachidian teeth with cusps completely worn off (those of the ventral part of the radula; see Fig. 1 e), 1 very much blunted by use, and 30 quite sharp and unworn (in the dorsal part of the radula), a total of 56; inner lateral plates are present in all 56 transverse rows, a total of 112; and outer laterals are completely formed in all but the 10 youngest rows (and even in these rows the outlines of the still incomplete plates can be seen), a total of 92 fully formed plates. The number of teeth and plates in the complete radula is therefore 260 (56 + 112 + 92).

It seems to us reasonably certain that these discrepancies are due to deficiencies in Bücking's observations rather than to any specific difference between our material and his. The outer rows of the radula are very delicate, especially toward the growing end, and the plates easily could have been overlooked if not completely torn off in the process of dissection. Moreover, Bücking's most detailed figures were drawn at such a low magnification that the marginal ornamentation of the rachidians was not noticed.

The radula of *Acochlidium weberi* as illustrated by Bergh shows a strong, triangular rachidian and two rows of lateral plates, as in *A. amboinense.* Aside from being smaller, the rachidian differs in having a conspicuously denticulated cusp, and the inner laterals bear a much stronger cusp situated in an approximately central position (Fig. 1 i). For the sake of comparison, Bergh's and Bücking's figures have been redrawn (Fig. 1, h and i) to the same scale as our own drawings (Fig. 1, f and g).

Spicules: A large number of spicules are situated in a ring around the esophagus and in the tissue of the foot, but not in the visceral sac. These bodies are transparent, cylindrical rods up to 0.5 mm in length, more or less bent and usually somewhat enlarged at the ends (Fig. 1 d). They are almost crystal clear, with only a slight milkiness, but a distinct core and evidence of concentric lamination can be seen in most of them. In polarized light they show very slight birefringence. Spicules cannot be found in specimens preserved in formalin but they are conspicuous in alcoholic material, from which they can be dissected without difficulty. Although unaffected by alcohol, they dissolve readily and rapidly (in a matter of minutes) in ordinary tap water. They also suffer changes when mounted in balsam, but not uniformly. In a single preparation, some spicules may show signs of disintegration, whereas others remain unchanged. Further studies should be made to determine the nature and composition of these bodies.

Measurements of radular teeth and plates of *Acochlidium* (in mm)

	A. weberi°		*A. amboinense*†		*A. amboinense* (Palau)	
	Height	Max. width	Height	Max. width	Height	Max. width
Rachidian	0.11–0.12	0.09–0.1	0.2	0.15	0.24–0.27	0.22
Inner lateral	–	0.075	0.04	0.11	0.09	0.12
Outer lateral	–	0.02	0.025	0.02	0.055	0.03

° Measurements from Bergh.

† Measurements from Strubell, converted from micra.

Genital armature: According to Bücking's observations, the margin of the glans penis is furnished with a ring of about 15 hooks and thorns of a chitinous substance. His figure 7a shows 9 large thorns and 9 smaller hooks forming an incomplete ring around the glans. Our specimens, all of which are more or less contracted, show a semicircle of 14 large thorns in two rows around one side and 8 (in one specimen the base of a 9th, which seems to have been broken off, is clearly visible) smaller, slender hooks in a cluster on the opposite side. Terminal and lateral views of the most fully expanded preparation we were able to obtain are shown in Figure 2. Whether or not the double row of thorns and the cluster of hooks would spread out and form a single row during full expansion we are unable to say.

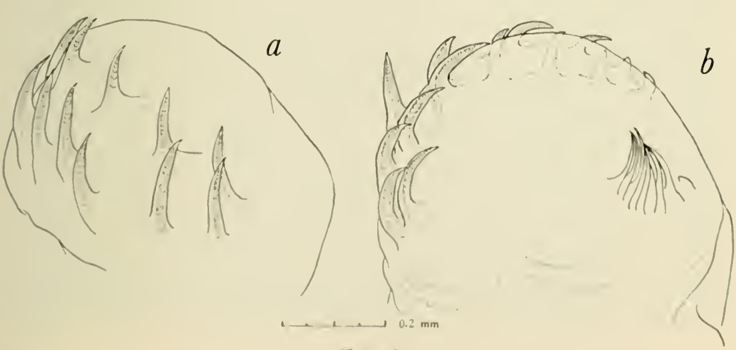

FIG. 2

Bücking does not describe the thorns and hooks in detail, saying only that the latter resemble shark's teeth in form and have the base drawn out into four hook-like processes. We have been unable to discern four basal processes, but the large thorns are joined to the integument by a pair of diverging roots. Bücking does not mention that each of the thorns is invested in a sheath of tissue from which a small part of the very sharp tip protrudes, as is the case in our material.

The structure of the hooks and thorns is similar to that described by Bergh (1895) for *Hedyle weberi,* although the thorns in that species, too, have three or four simple or branched roots. Both hooks and thorns are hollow, with a distinctly chambered core. In specimens of *H. weberi* 3 cm in length, the penis was from 3 to 8 mm long, with 15–20 hooks (corresponding to the thorns in Bücking's description) in a single row, and many smaller, more thorn-like hooks in two (here and there 3 or 4) rows. In Bücking's specimens of *Acochlidium amboinense,* as in ours, this organ was of somewhat more modest proportions.

Habitat and ecology: All specimens here reported were collected in the south fork of Arakitaoch stream in Airai Municipality on the lower west coast of Babelthuap, the largest island of the Palaus. The habitat is restricted to a very short "cascade zone" where the stream flows across exposed basaltic bedrock at an elevation of 150–190 feet above sea level (Fig. 3). The water was fresh (NaCl 17 parts per million) and had a temperature of 79°F at the time the specimens were collected.

Fig. 3

The specimens invariably were found on the few loose rocks that were lying in the shady stream bottom, covered by 1–12 inches of water; they were not found under the rocks or on the solid rock of the stream bed.

Of particular interest is the fact that *Acochlidium* were not found in the corresponding situation in the north fork of Arakitaoch stream, which, to all appearances, was ecologically identical. Neither were these snails found in the lower graded reaches of the stream or in the upper mangrove zone where the water becomes brackish, although these sections of the stream were collected and inspected with great care.

The fauna associated with *Acochlidium amboinense* in the cascade zone of Arakitaoch stream includes nine species of fishes (identified by H. A. Fehlmann), as follows (the most abundant are indicated by an asterisk):

Anguillidae: *Anguilla marmorata* Q. & G.
Gobiidae: *Stigmatogobius romeri* (M. Weber)*
Sicyopterus micrurus (Blkr.)
Stiphodon elegans (Steind.)*
Sicyopus zosterophorum (Blkr.)
Sicyopus n. sp.*
Eleotridae: *Eleotris fusca* (Bl. Schn.)*
Ophiocara aporos (Blkr.)
Bunaka gyrinoides (Blkr.)

Other animals associated with *Acochlidium* are the water striders *Microvelia notophora* Esaki, endemic in the Palau Islands, and a species of *Limnometra* (both determined by Jon L. Herring). Crickets of the genus *Tremellia* (family Gryllidae) also were abundant in the cascade zone, although they must have hidden themselves along the banks of the stream for they were rarely seen except after poisoning with rotenone when the crickets were dying and hopping around like pop corn. Aquatic lepidopteran larvae of the family Pyraustidae must also be common in the cascade zone, for they were found in large numbers in the stomachs of the common mountain goby (*Sicyopus* n. sp.), but they were not observed in the stream. A few nymphs of Ephemeroptera and Odonata were found under stones in the pools of the cascade zone.

Several species of shrimps (identified by L. B. Holthuis) were collected in the pools with *Acochlidium*, of which the most abundant were *Macrobrachium lar* (Fabricius) and *Atya pilipes* Newport. Present but scarce were *Macrobrachium placidulum* (de Man), *Atya spinipes* Newport, *Caridina typus* H. Milne Edwards, and *Caridina weberi* De Man, for which optimum conditions are probably located elsewhere in the stream. The grapsoid crab *Varuna litterata* (Fabricius) was also present (identified by Fenner A. Chace).

Other gastropods present were *Neritina pulligera* Lamarck and *N. cornea* Linnaeus, and unidentified species of *Stenomelania* and *Thiara*. The Neritinas were breeding freely and their egg cases bedecked their own shells and were found in patches all over the bedrock bottom of the stream. Egg cases and young snails were found only in this zone.

Zoogeographical remarks: The discovery of this distinctive freshwater opisthobranch on a high island well out in the Pacific Ocean, hundreds of miles from the type locality and considerably removed from other high islands where it conceivably could occur, is noteworthy in itself. When the biology of the animal has been thoroughly investigated, the zoogeographic implications of its distribution may assume considerable significance. A study of its life history, to determine whether or not there is a free-swimming marine larval stage to account for its distribution in fresh water on widely separated high islands obviously would be of the utmost importance. It will also be necessary to test the physiological tolerances of the adult animals to evaluate the possibility of chance dispersal through natural or artificial means, although the delicate body form and the ecologically restricted distribution do not speak for the exceptional lability and hardiness that such means of transport certainly would require.

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Explanation of Figures

Fig. 1. a–h, *Acochilidium amboinense* Strubell: a–c.—Animals extended and crawling; drawn from photographs. Actual length about 2.5 cm. d.—Spicules (enlarged according to adjacent 0.5 mm scale). e.—Rachidian teeth of portion of radula in region of active use; side view (enlarged according to 0.3 mm scale below). f.—Rachidian tooth and plates of one side of the radula; in situ (enlarged according to 0.3 mm scale below h). g.—Rachidian tooth dissected from radula; full face view (enlarged according to 0.3 mm scale below h). h.—Rachidian tooth and plates of one side of the radula (redrawn from Bücking to the same scale as Figs. f and g). i.—*Acochlidium weberi* (Bergh). Rachidian teeth and plates of one side of the radula (redrawn from Bergh to the same scale as Figs. f, g and h).

Fig. 2. *Acochlidium amboinense* Strubell. Retracted glans penis showing armature: a.—in lateral view. b.—in subterminal view.

Fig. 3. Arakitaoch Stream, Airai Municipality, Babelthuap, Palau Islands: cascade zone in south fork of stream, habitat of *Acochlidium amboinense* Strubell. Photo by H. A. Fehlmann, 12 Sept. 1957.

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SAEDELEERIA, NEW GENUS OF THE FAMILY ALLOGROMIIDAE (FORAMINIFERA)

By Alfred R. Loeblich, Jr. and Helen Tappan

California Research Corporation, La Habra, California and University of California at Los Angeles

The genus *Diplogromia* was described by Rhumbler (1904: 214) as differing from *Gromia* Dujardin in the character of the pseudopodia, and in having a double walled shell. Included in *Diplogromia* were the species *Gromia brunneri* Blanc, 1886, and *Gromia gemma* Penard, 1889. No type was originally cited for the genus, and Cushman (1928: 60) selected *Gromia brunneri* Blanc as type by subsequent designation.

De Saedeleer (1932: 67) emended *Diplogromia*, apparently overlooking Cushman's earlier type designation, and restricted *Diplogromia* to include only *Gromia gemma*. He proposed the new genus *Allelogromia*, with *Gromia brunneri* Blanc as type species. Thus *Allelogromia* is a junior objective (isogenotypic) synonym of *Diplogromia* Rhumbler, 1904.

In recent publications *Diplogromia* has been included as a synonym of *Gromia* by some authors (Jírovec, 1953: 329; Kudo, 1954: 472), but both *Diplogromia* and *Allelogromia* were recognized by Deflandre (1953: 140), with *Gromia gemma* included in *Diplogromia*, and *Gromia brunneri* in *Allelogromia*. No comment was made as to the type species of *Diplogromia* or *Allelogromia* however.

Inasmuch as *Gromia brunneri* had been fixed as the type of *Diplogromia* in 1928 (Cushman) and *Allelogromia* De Saedeleer, 1932, is thus a junior synonym, the generic taxon including *Gromia gemma* is left nameless, and *Saedeleeria* Loeblich and Tappan, new genus, is hereby proposed for it.

Diplogromia Rhumbler, 1904, type species *Gromia brunneri*

Blanc, fixed by subsequent designation by Cushman (1928: 60) contains the additional species *Gromia squamosa* Penard, 1888, and *G. nigricans* Penard, 1902.

Gromia linearis Penard, originally included in *Allelogromia* by De Saedeleer, was made the type species of *Penardogromia* Deflandre (1953: 140).

Saedeleeria Loeblich and Tappan, new genus

Diplogromia Rhumbler of DE SAEDELEER, 1934 (not *Diplogromia* Rhumbler, 1904), Mus. Roy. d'Hist. Nat. Belgique, Mém. 60: 67.

Type species: Gromia gemma Penard, 1889. Monotypic.

Granulo-reticulose pseudopodia, asymmetrically developed as a pseudopodial "peduncle" in the apertural region; single chambered test with thick double-layered wall, outer layer with granular inclusions, inner layer homogeneous and hyaline; aperture rounded, with asymmetrical inverted neck.

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A NEW CONIFER FEEDING APHID FROM WASHINGTON

By F. C. Hottes

I wish to thank Dr. George Knowlton for sending me this species to determine.

Cinara wahsugae, n. sp.

Apterous viviparous female: Length 2.4 mm. Length of hind femora 1.42 mm. Length of hind tibiae 1.92 mm. Length of hind tarsal segments .105–.12 and .31 mm. Color not recorded, but cleared specimens have the head, thorax and abdomen brownish with the cornicles dark dusky brown. Antennal segments three, four and five pale except for light brown at the apex. Sixth segment brown. Femora pale at base, shading to dusky brown at apex. Hind tibiae pale tan to mid region, shading to dark brown on distal half. Pro- and mesothoracic tibiae pale except for short region near apex.

Length of antennal segments as follows: III .49 mm, IV .18 mm, V .22 mm, VI .13 + .05 mm. Third antennal segment without sensoria. Fourth antennal segment with primary sensorium. Fifth antennal segment with one secondary sensorium and the primary. Hair on antennae fine, sparse, varying from .05–.75 mm in length, set at angle of about forty-five degrees. Hairs on vertex of head about two times the length of the hairs on the antennae. Median transverse suture very dark. Ocular tubercles small. Hairs on metathoracic tibiae almost sparse, spaced for the most part not closer than their length on the outer margin and only slightly closer on the inner margin. The hairs are fine, set at an angle of about forty-five degrees and about .05 mm in length. Cornicles with outer margin very irregular. Cauda triangular in shape with numerous long hairs.

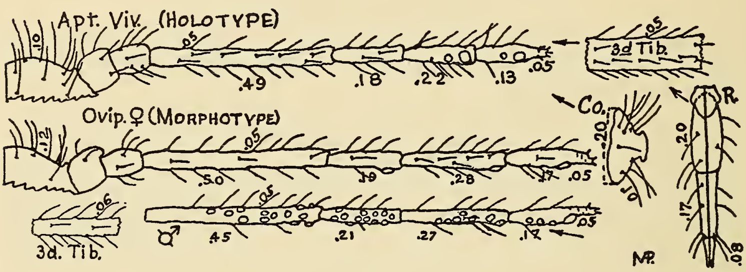
Oviparous female: This form is very similar to the viviparous female in form. The sensoria on the metathoracic tibiae are few, limited to the basal third of segment which is hardly swollen.

Alate male: The male of this species is poorly represented. Palmer has reconstructed the very much shriveled antenna.

Holotype: Apterous viviparous female. Morphotype: oviparous female. Allotype: alate male. All types mounted on the same slide, which has been deposited in the United States National Museum. Collected by

W. W. Baker on "Hemlock" (*Pseudotsuga*) Victor Falls, Washington, 19 August 1936.

Remarks: This species may be easily differentiated from other known species from this host by the character of the hairs on the metathoracic tibiae, they not being spine-like as in *taxifoliae* (S), and fewer and more widely spaced than in *pseudotsugae* (W) and *pseudotaxifoliae* Palmer. In the oviparous female of this species the sensoria do not extend to the apex of the metathoracic tibiae.



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NOTES ON AND A KEY TO THE SPECIES OF *CINARA* (FAMILY APHIDAE) LIVING ON *PINUS EDULIS*

By F. C. Hottes

In 1919 Wilson gave notice that he had under preparation a Monograph of the *Lachninae* of North America, a group to which the genus *Cinara* belongs, but at that time looked upon as a synonym of *Lachnus.* We now know that Wilson's projected Monograph was already moribund, but for years his announcement kept alive the hope of its ultimate publication, and perhaps prevented others from undertaking the project. Since that time many new species have been described within the genus *Cinara* and it is felt that something less pretentious than a Monograph will serve a useful purpose until such a time when one can be undertaken.

Because species of the genus *Cinara* have either specific or closely allied species of *Coniferae* as hosts, it has seemed logical to use the host species as media to divide the species of the genus into more workable groups, hence this section of species which have *Pinus edulis* and *Pinus monophylla* for their host plants.

The genus *Cinara* was erected by Curtis in 1835. It has *Aphis pini Linnaeus* as type, by action of the International Commission on Zoological Nomenclature. (Opinion number 399, 1956.) For various reasons the name *Cinara* was not used by systematists for almost a hundred years, species being placed in the genus *Lachnus* erected by Burmeister in 1835. Lack of space here prevents full discussion concerning the use of these two generic names, and their type species in the past and present, but those desiring to pursue the subject further may find the articles by Hottes as published in the Bulletin of Zoological Nomenclature, 9(6): 166–182, 1954 and the rulings of the Commission as published in the same Journal in 1956 useful.

More recently Börner has proposed a number of genera which aphidologists in America would normally place in the genus *Cinara.* At the present I do not accept or reject the genera which Börner coined from the genus *Cinara* as used in America, but it would seem that most if not all of these genera would serve a more useful purpose if viewed as subgenera.

A Key to Apterous Viviparous Females of the Genus *Cinara* Which Have *Pinus edulis* and *Pinus monophylla* as Hosts

1. Fourth segment of the rostrum .30 mm or more in length 2
   Fourth segment of the rostrum less than .25 mm in length 3
2. Fourth segment of the rostrum longer than the third antennal segment .... *C. puerca* Hottes
   Fourth segment of the rostrum shorter than the third antennal segment .... *C. tanneri* (Knowlton)
3. Hairs on ventral surface of first metatarsal segment longer than width of segment 4
   Hairs on ventral surface of first metatarsal segment shorter than width of segment 5
4. Cornicles with base varying from .27–.37 mm .... *C. atra* (Gillette and Palmer)
   Cornicles with base varying from .18–.21 mm .... *C. poketa* Hottes
5. Width of base of cornicles .25 mm or less 6
   Width of base of cornicles .27 mm or more 7
6. Metathoracic tibiae with extensive pale area .... *C. caliente* Hottes
   Metathoracic tibiae without pale area .... *C. poketa* Hottes
7. Hairs on outer surface of metathoracic tibiae varying from more than 45 degrees to 90 degrees 8
   Hairs on outer surface of metathoracic tibiae set at angle of 45 degrees or less 13
8. Fourth antennal segment without sensoria .... *C. nitidula* Hottes
   Fourth antennal segment with at least one sensorium 9
9. Hairs on metathoracic tibiae fine 10
   Hairs on metathoracic tibiae coarse 11
10. Hairs on metathoracic tibiae almost at right angles, hairs on tibiae and antennae not numerous .... *C. rustica* Hottes
    Hairs on metathoracic tibiae not almost at right angles, hairs on tibiae and antennae numerous .... *C. pinata* Hottes
11. Third antennal segment not over .33 mm in length .... *C. nitidula* Hottes
    Third antennal segment over .35 mm in length 12
12. Dorsum of abdomen, anterior to transverse pigmented areas, free from pigmented spots .... *C. terminalis* (Gillette and Palmer)

Dorsum of abdomen, anterior to transverse pigmented areas, with irregular pigmented areas .... *C. wahtolca* Hottes

13. Hairs on metathoracic tibiae not over .04 mm in length 14
    Hairs on metathoracic tibiae over .04 mm in length 15
14. Hairs on metathoracic tibiae blunt at end, hairs on dorsum of abdomen extremely short and blunt .... *C. atra* (Gillette and Palmer)
    Hairs on metathoracic tibiae sharp pointed, hairs on dorsum of abdomen not extremely short, sharp pointed .... *C. apacheca* Hottes and Butler
15. Hairs on vertex of head blunt, extremely short .... *C. atra* (Gillette and Palmer)
    Hairs on vertex of head not extremely short 16
16. Cornicles with base measuring up to .60 mm .... *C. edulis* (Wilson)
    Cornicles with base measuring less than .40 mm 17
17. Pale area on metathoracic tibiae measuring about .45 mm, pigmented areas anterior to transverse pigmented areas large and block-like .... *C. pinona* Hottes
    Pale area on metathoracic tibiae .60 mm or more, pigmented areas anterior to transverse pigmented areas absent or fragmented .... *C. metalica* Hottes

Cinara apacheca Hottes and Butler

Cinara apacheca Hottes and Butler 1955. Proc. Biol. Soc. Washington, 68: 65–66. Original descriptions of alate and apterous viviparous females.

Hottes, 1955. Proc. Biol. Soc. Washington, 68: 70 and figs.

Holotype and morphotype in the United States National Museum.

Size range apterous viviparous females 2.93–3.00 mm.

This species, known only from the first collection, may be easily identified in the mounted state. The short, heavy, strongly curved hairs on the metathoracic tibiae are spaced so close as to be almost fur-like. The cornicles have a very irregular margin which is much closer to the orifice in the posterior region than elsewhere. Hairs on the cornicles are scarce. The hairs on the anterior margin of the metathoracic tibiae are spine-like. Specimens of this species may be taken on the twigs among the needles of young vigorous trees. Repeated trips have been made to the type locality for more material without success.

Cinara atra (Gillette and Palmer)

Lachus ater (Gillette and Palmer), 1924. Ann. Ent. Soc. America, 17: 37–39, figs., plates XII and XIII. Original description of all forms.

Type in United States National Museum.

Size range apterous viviparous females 2.00–3.00 mm.

This black or dark brown species is free from all powder. Apterous specimens of this species have the thorax rather long and narrow, distinctly neck-like. Body hairs are very sparse and extremely short and squarely cut at the end. Hairs on the tibiae and tarsal segments are subject to much variation as to length and condition at the end, being squarely cut at the end if short or sharp pointed if long. Hairs on the outer margin of the tibiae often differ from those on the inner margin as to length and condition at apex. When in good view and not worn, the hairs on the ventral surface of the first metatarsal segment are longer than the width of segment with the terminal hairs strongly bent or hooked.

Specimens of this species seem to show a preference for young, vigorous trees where they feed on the smooth bark of small branches. The colonies are never large.

Cinara caliente Hottes

Cinara caliente Hottes, 1955. Proc. Biol. Soc. Washington, 68: 197–199, figs. Original description of all forms.

Holotype, morphotypes and allotype in the United States National Museum.

Size range apterous viviparous females 2.02–2.17 mm.

This trim little species is probably more widely distributed than collection records indicate. Because of its small size and protective coloration which is exactly the same color as the needle-free color of the bark of twigs upon which it feeds, this species is extremely difficult to detect. It is one of the most easily determined species of the group feeding on *Pinus edulis* and *Pinus monophylla.* It has extensive pale areas on the metathoracic tibiae and femora, and the third antennal segment is mostly pale. The cornicles are small and almost hair free, with the outer margin very irregular. In Colorado, I have only taken it in the type locality north of Delta. In September 1959, I took it near Springerville, Arizona; these specimens were almost black. R. C. Dickson has sent me material from California taken on *Pinus monophylla.* The California material for the most part lacks the wart-like pigmented areas on the dorsum of the abdomen. This material is slightly larger than the Colorado material, has the outer margin of the cornicles more regular and a few more hairs on the cornicles.

Cinara edulis (Wilson)

Lachniella edulis (Wilson), 1919. The Canadian Entomologist, 51: 44–45. Original description apterous and alate viviparous females.

Lachnus edulis (Wilson). Palmer, Ann. Ent. Soc. America, 19: 314–317, pls. XXVII and XXVIII. Descriptions of all forms.

Cotypes, Granovsky and Colorado Agricultural Experimental Station Collections.

Size range apterous viviparous females 3.00–4.00 mm.

This species, the first to be described from *Pinus edulis,* has also been recorded from *Pinus monophylla.* It is widely distributed. I am not sure that all records for this species apply to it. Some colonies of this species

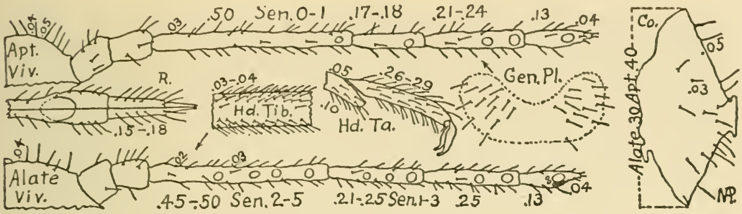

FIG. 1

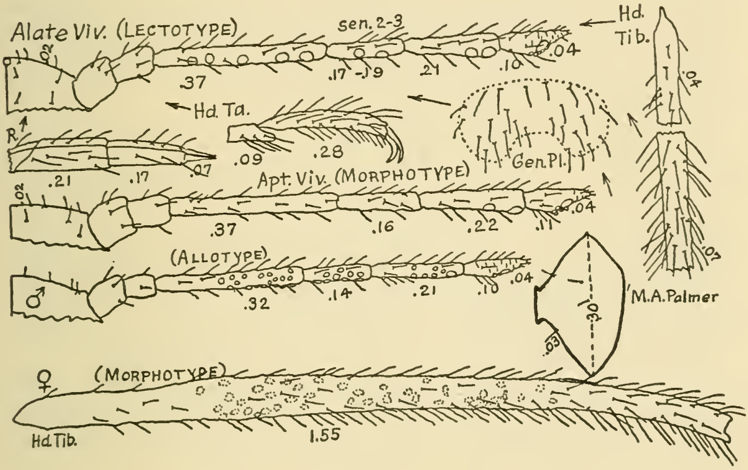

FIG. 2

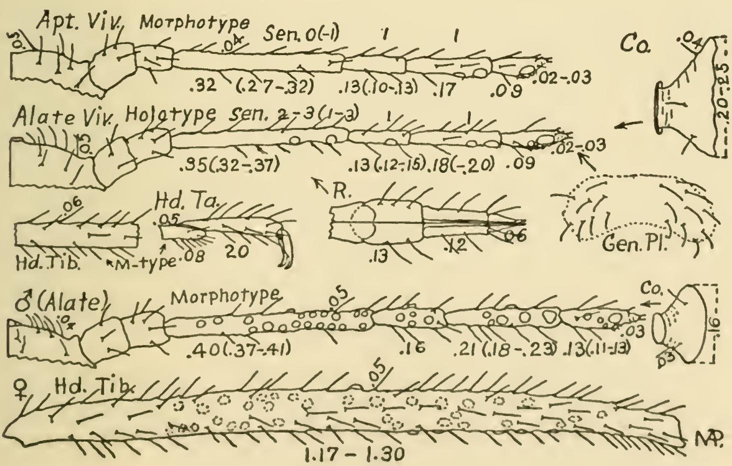

FIG. 3

are jet black, shining, with a well-marked median line of powder. Some are jet black without the median line; such have coarse hairs on the dorsum of the abdomen. Other colonies are more of a gun-metal color with an indistinct median line of powder. I am aware of other color variations. The relative length of the fourth and fifth antennal segments of *edulis* as now determined are also confusing, as well as the character of the hairs on the tibiae. Perhaps we are dealing with several emergent species.

Palmer (1926) indicates powder anterior to the cornicles of the apterous viviparous female in her figure, but makes no mention of these patches in her text—in fact, ruling them out. In 1952 Palmer gives the common name "The Black and White Spotted Pinyon Pine Aphid" to this species. It is hardly suitable.

When in good view the mesosternal tubercle is very well developed, being almost as wide as long with the apex truncate.

This species is as a rule found in large colonies. It seems to show a preference for the needle-free bark of older branches or the trunks of young trees.

Cinara metalica Hottes

Cinara metalica Hottes, 1956. Proc. Biol. Soc. Washington, 69: 85–87. Original description of oviparous female and alate male.
Hottes, 1956. Proc. Biol. Soc. Washington, 69: 222, figs.

Holotype and allotype in the United States National Museum.

Apterous viviparous female: Similar in size to oviparous female. Head and thorax lightly pruinose, abdomen to region of cornicles irregularly pruinose. Cornicles brownish bronze more or less two toned, with the constricted area darker. Dorsum of abdomen posterior to cornicles bronze and highly polished. Antennal segments with the following lengths: III .28–.42 mm (as a rule .39 mm or less), IV .15–.18, V .18–.21, VI .09 + .04 mm. Sensoria distributed as follows: II none, IV none or with one, V one. Mesosternal tubercle well developed; not truncate, but more or less nipple-like. Hair on antennal segments rather sparse, set at an angle of about 45 degrees or slightly more; not much if any longer than width of segment. Length of hind tibiae about 2.55 mm. Hairs on hind tibiae numerous, set at an angle of less than 45 degrees and shorter than width of segment (longest about .045 mm to almost .06 mm). Metathoracic tarsal segments .09 and .18–.21 mm. Cornicles two toned about .30–.32 mm with the outer rim very irregular; as a rule with one or more clear areas, provided with few hairs. Transverse pigmented areas anterior to cauda provided with a single row of hairs along the posterior margin. Pigmented areas anterior to transverse pigmented areas as a rule absent; when present, fragmented and small.

Morphotype: Apterous viviparous female taken at Springerville, Arizona, the type locality, but reared at Grand Junction, Colorado, 26 September 1956. Deposited in the United States National Museum.

Size range apterous viviparous females 3.37–3.60 mm.

This species may be easily identified in the field. No other species on

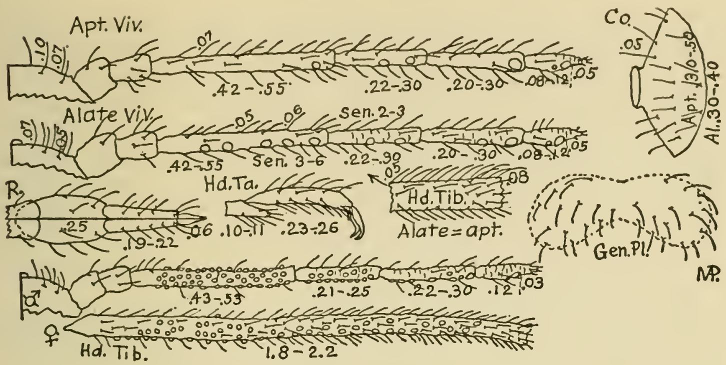

FIG. 4

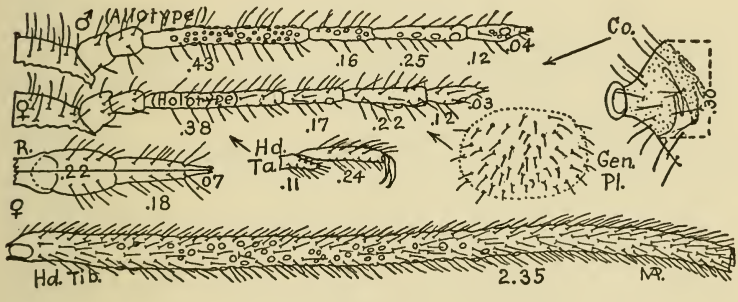

FIG. 5

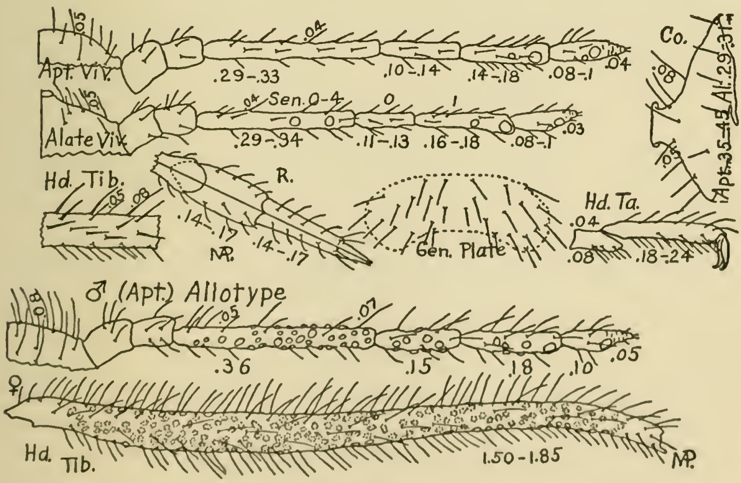

FIG. 6

Pinus edulis has the abdomen so mottled with pruinose and the cornicles and tip of abdomen with such a metallic luster. The mesosternal tubercle is well developed. The male of this species was described as alate although the wings were vestigial. Since the first male was taken, two other males have been reared in Grand Junction from material taken in Arizona. They also have vestigial wings. The mesothoracic wings are flap-like and about .15 mm in length with the basal portion thickly clothed with hairs. The metathoracic wings are slightly longer but finger-like and free from hairs. The sensoria on the antennae of the males of this species are more tuberculate and fewer in number, as well as smaller than the sensoria of the males of *C. pinona.*

Specimens of this species seem to prefer the young, vigorous trees with greenish bark. Here they live on the younger branches among the needles. Colonies of this species are often mixed with *C. rustica* Hottes.

Cinara nitidula Hottes

Cinara nitidula Hottes, 1954. Proc. Biol. Soc. Washington, 67: 256–258. Original description alate and apterous viviparous females.

Hottes, 1956. Proc. Biol. Soc. Washington, 69: 91–92. Description of apterous male and oviparous female.

Hottes, 1956. Proc. Biol. Soc. Washington, 68: 72, figs.

Hottes, 1956. Proc. Biol. Soc. Washington, 69: 223, figs.

All types in the United States National Museum.

Size range apterous viviparous females 2.02–2.29 mm.

This rather small species varies from various shades of brown to almost if not quite black; both the thorax and the abdomen are highly polished, only the sides of the thorax being provided with powder. The fourth antennal segment lacks sensoria in both the apterous and alate viviparous females; sensoria are also lacking on the third segment of the apterous viviparous females. The hind tibiae have a rather extensive pale area, and the hairs are rather coarse and upstanding. From near the base to well beyond the middle of the tibiae the hairs are spaced nearly as far apart as their length. This species appears to be allied to *C. terminalis* but differs from that species in color, smaller size, more extensive cornicles which are also much darker, and from most *terminalis* in having shorter hairs on the tibiae.

This species seems to be very specific in its host requirements. It can only be taken on older terminal branches of mature trees which have a yellow bark and large scales among which they may be taken.

Cinara pinata Hottes

Cinara pinata Hottes, 1955. Proc. Biol. Soc. Washington, 68: 199–202, figs. Original description of all forms.

Holotype and other types in the United States National Museum.

Size range apterous viviparous females 2.97–3.36 mm.

The most outstanding feature of this species is the abundance of hairs on the antennal segments, on the third segment averaging about 45, and the short, thick, stubby sixth antennal segment which is provided with numerous hairs.

This species is rather common in its type locality where it lives in large colonies on the smaller terminal branches among the needles. I have only taken it on older trees where the branches have a yellowish bark and large scales, and when these qualifications are met, it may be easily reared.

Cinara pinona Hottes

Cinara pinona Hottes, 1953. Proc. Biol. Soc. Washington, 66: 153–155. Original description of apterous and alate viviparous females.

Hottes, 1954. Proc. Biol. Soc. Washington, 67: 90–91. Description of alate male and oviparous female.

Hottes, 1955. Proc. Biol. Soc. Washington, 68: 104 figs. of all forms.

Holotype and other types in the United States National Museum.

Size range apterous viviparous females 3.14–3.26 mm.

This dark brown species has been seen frequently in its type locality since being described; it has also been taken in Mesa Verde National Park. Specimens of this species seem to prefer older trees whose bark is brownish, and whose twigs are more or less yellowish with large yellow scales, but they may also be taken on younger trees. The specimens live in large colonies on the twigs among the needles. Living specimens may be easily separated from *C. metalica* because of the high polish and color and lack of metallic luster on the cornicles and apex of abdomen. Mounted specimens are more difficult to differentiate. The males of *pinona* are alate; the males of *metalica* have the wings vestigial so far as known. I suspect that this species has been confused with *C. edulis* in collections. It may be easily separated from *edulis* by the smaller size, smaller cornicles and much smaller mesosternal tubercle, as well as shorter antennal segments. The tibiae have the same color pattern but are not so dark.

Cinara poketa Hottes

Cinara poketa Hottes, 1956. Proc. Biol. Soc. Washington, 69: 220–221 figs. Original description of apterous viviparous female.

Holotype in the United States National Museum.

Size of apterous viviparous female 2.60 mm.

Since this species was described I have made several trips to the type locality in Arizona for more material, all unsuccessful, until the fall of 1959 when I collected what I have determined as this species a mile or so north of Grand Canyon National Park. The specimens were brought to Colorado alive and from them oviparous females have been reared. This species as indicated in the original description is allied to *C. atra* and shows the same variations as *atra* as to hair length on the tibiae and character of the hairs at the apex. *C. poketa* has the cornicles much smaller and the hairs on the vertex much finer than shown by these structures in *atra*. Like *atra*, *poketa* has a narrow thorax.

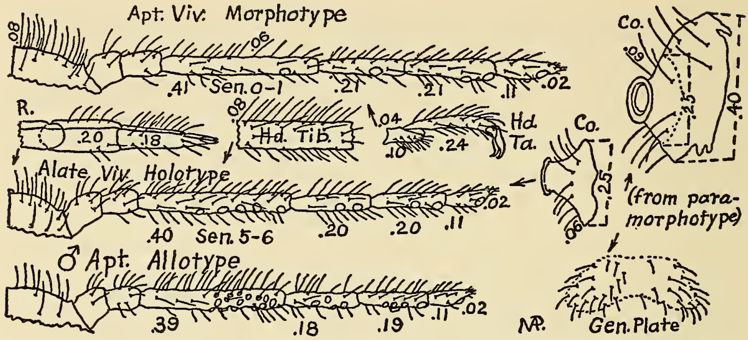

Fig. 7

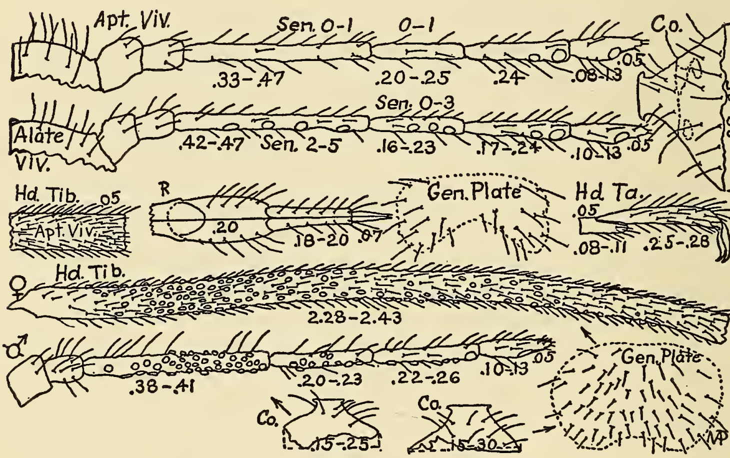

Fig. 8

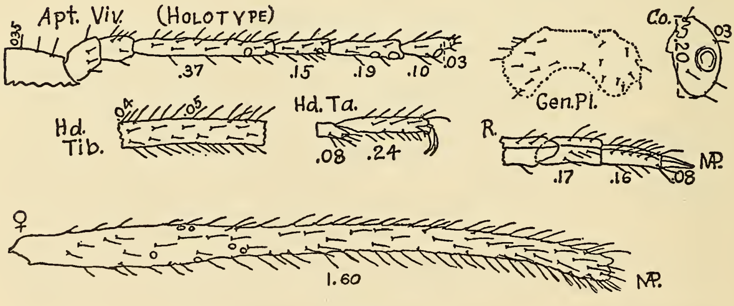

Fig. 9

Oviparous female: Females of this form are much like the apterous viviparous females. The metathoracic tibiae are rather swollen on the basal half, the sensoria are extremely difficult to differentiate and one has the feeling that there are more present than the four or five which may be seen with difficulty. Palmer shows the sensoria much more numerous and extending almost to the end in *C. atra*.

Morphotype: Oviparous female reared from specimens taken in Arizona in September on *Pinus edulis* taken at Grand Junction, Colorado, 20 October 1959. Deposited in the United States National Museum.

Cinara puerca Hottes

Cinara puerca Hottes, 1954. Proc. Biol. Soc. Washington, 67: 251–253. Original description of apterous viviparous female.

Hottes, 1955. Proc. Biol. Soc. Washington, 68: 69–73, figs. Description of alate viviparous female.

Holotype and morphotype in the United States National Museum.

Size range apterous viviparous female 3.00–4.36 mm.

This species is closely allied to *C. tanneri* (Knowlton) and differs from that species in having the fourth segment of the rostrum longer than the third antennal segment, a shorter third antennal segment, and the cornicles not fragmented, and with more hairs. *C. puerca* lives in sheds of either soil or fragmented bark, constructed by ants, or beneath loose scales of bark, or within deep fissures between large scales of bark on the trunks. I have collected this species in Arizona just outside Grand Canyon National Park.

Cinara rustica Hottes

Cinara rustica Hottes, 1956. Proc. Biol. Soc. Washington, 69: 83–85. Original description oviparous and apterous viviparous females.

Hottes, 1956. Proc. Biol. Soc. Washington, 69: 222, figs.

Hottes, 1957. Proc. Biol. Soc. Washington, 70: 14, figs. Description alate viviparous female.

Holotype and morphotypes in the United States National Museum. Allotype apterous male described herewith deposited in the United States National Museum.

Apterous male: Color of body uniform gray due to light pruinescence. Length from vertex of head to end of cauda varying from 2.35–2.40 mm. Lengths of antennal segments as follows: III .38 mm, IV .15 mm, V .23 mm, VI .10 + .03 mm. Sensoria distributed as follows: III 12–18 plus primary, IV 4–7 plus primary, V 5–8 plus primary, VI one secondary. All sensoria are small and slightly tuberculate. Width of base of cornicles .33 mm. Length of metathoracic tibiae 1.46 mm. Specimen taken on *Pinus edulis*, Grand Junction, Colorado, 20 October 1959, reared from material taken at Springerville, Arizona, the type locality, early in September.

Range in size of apterous viviparous females 3.22–3.37 mm.

C. rustica is a very distinct species. Specimens are very easily identified in the field or mounted. Live specimens have the head and thorax and abdomen to just posterior to the cornicles gray due to a light but uniform amount of powder. The region just posterior to the cornicles is a dull chocolate brown. Mounted specimens may be determined by their comparatively short, not numerous, hairs on the metathoracic tibiae which are upstanding. The hairs on the antennae and tibiae are fine

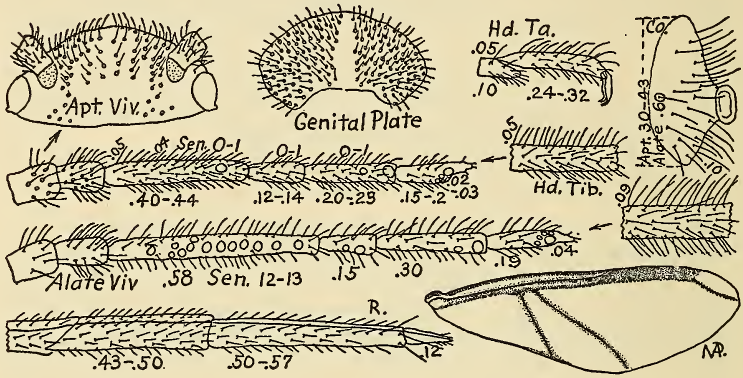

FIG. 10

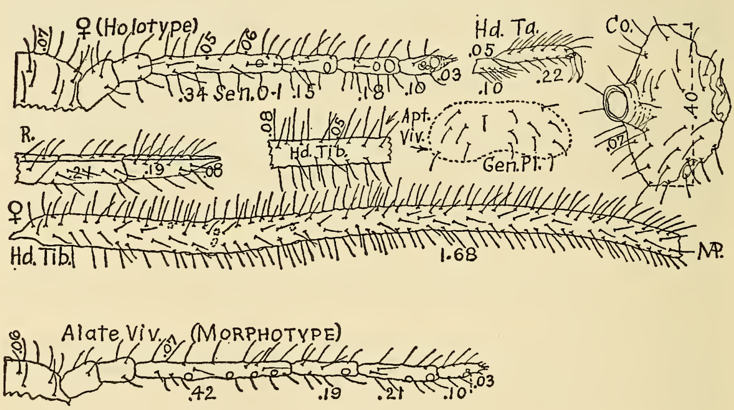

FIG. 11

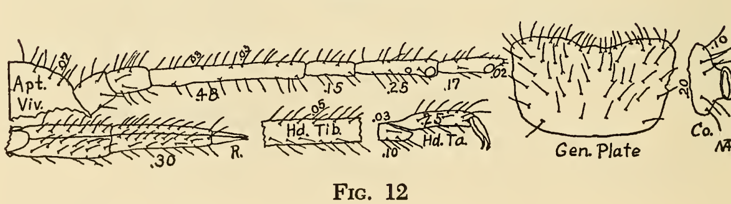

FIG. 12

and rather widely spaced. Colonies of this species are never large, they show a preference for young, vigorous trees where they live on the needle free of more mature twigs, or on the trunks of young trees.

Cinara tanneri (Knowlton)

Lachnus edulis tanneri Knowlton, 1930. The Canadian Entomologist, 62: 155–156, figs. Original description apterous viviparous female. Description of alate not of this species.

Palmer, 1952. Aphids of the Rocky Mountain Region, p. 49. Description of apterous viviparous female.

Hottes, 1954. Proc. Biol. Soc. Washington, 67: 253.

Hottes, 1955. Proc. Biol. Soc. Washington, 68: 68, figs.

Lectotype selected by Hottes, but indicated by Knowlton. In Knowlton collection.

Size of apterous viivparous female 4.00 mm.

The material from which Knowlton described this species consists of a mixture of *tanneri* as restricted by Palmer in 1952 and *edulis*. The cornicles of *tanneri* often consist of two distinct parts: a restricted portion as shown by Palmer in the figure published by Hottes which may exist alone, or a restricted portion separate from, but associated with a fragmented basal portion made up of one or more parts which together make up from one fourth to one half of what would be the normal base. The hairs on the cornicles of this species are sparse; those on the antennae and tibiae comparatively so. The fourth segment of the rostrum varies in length from .30–.37 mm but is always shorter than the third antennal segment. Tanner took his material on *Pinus monophylla*. Knowlton has taken it on *Pinus edulis* under loose bark.

Cinara terminalis (Gillette and Palmer)

Lachnus terminalis (Gillette and Palmer), 1924. Ann. Ent. Soc. America, 17: 19–21, figs. Original description all forms.

All types in the United States National Museum.*

Body length of apterous viviparous female 2.25 mm.

This is the only *Cinara* species now known to feed on the young, tender terminal twigs of *Pinus edulis*, specimens being found in this location before the needles have fully developed. I am not sure we are dealing with only one species, because some apterous viviparous females are a pale pea green, while others are a light cinnamon brown. The hairs on the antennae and metathoracic tibiae also show two forms as to length, quality and angle. Palmer (1952) shows the hairs on the metathoracic tibiae longer than the hairs on the metathoracic tibiae of the apterous. I have seen such, and also the reverse. In each case the hairs are quite upstanding.

She has selected as the lectotype the alate viviparous female taken on *Pinus edulis*, Owl Canyon, 5 October 1922 (the only alate taken on this

* Note from Prof. Palmer.

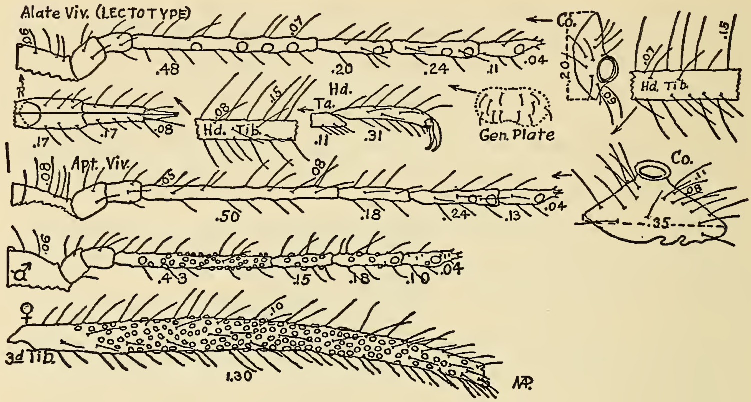
Alate Viv. (LECTOTYPE)
Co.
Hd. Tib.
Hd. Ta.
Gen. Plate
Apt. Viv.
3d Tib.
MP.

Fig. 13

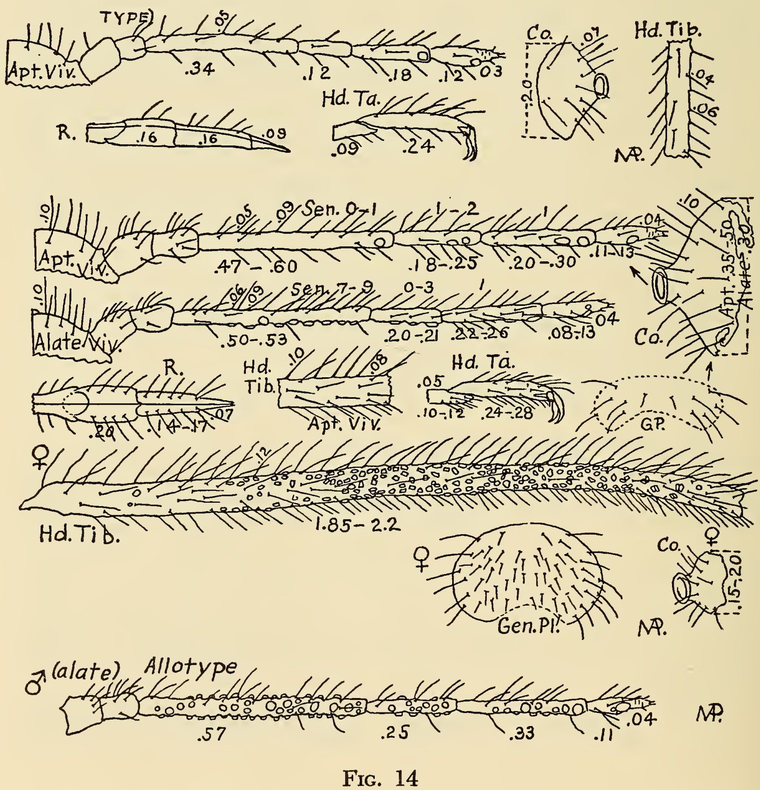
TYPE
Apt. Viv.
Co.
Hd. Tib.
R.
Hd. Ta.
MP.
Sen. 0-1
Apt. Viv.
Sen. 7-9
Alate Viv.
Co.
Hd. Tib.
Hd. Ta.
Apt. Viv.
G.P.
Hd. Tib.
Gen. Pl.
MP.
♂ (alate) Allotype
MP.

Fig. 14

date). "The only fundatrix listed in original description is a nymph, so there is no morphotype of this form. The only summer vivipara mentioned in original description are short haired 'so have to be ruled out till we know otherwise.' The male listed is long haired and I designated as allotype the one of Oct. 18, 1922. Specimen taken in 1923 (in original description is erroneous). The oviparous female mentioned in description Oct. 18, 1922 I seem to have picked for morphotype. The one of Oct. 27, 1921 is recorded as the one drawn from in original publication, but slide is so poor and specimen so faded that it seems inadvisable to use it."

Cinara wahtolca Hottes

Cinara wahtolca Hottes, 1953. Proc. Biol. Soc. Washington, 66: 155–157. Original description of alate and apterous viviparous females.

Hottes, 1954. Proc. Biol. Soc. Washington, 67: 90. Description of oviparous female.

Hottes, 1956. Proc. Biol. Soc. Washington, 69: 91. Description of alate male.

Hottes, 1955. Proc. Biol. Soc. Washington, 68: 104, figs.

Hottes, 1956. Proc. Biol. Soc. Washington, 69: 223, fig. of male antenna.

Holotype and other types in the United States National Museum.

Range in size of apterous viviparous females 2.86–2.36 mm.

There is no need to confuse this species with any other species living on *Pinus edulis* or *Pinus monophylla,* yet I have seen slides determined as *edulis* or *terminalis.* Living specimens may have the body quite powdery so that it presents a distinctly gray appearance. At other times specimens are quite free from powder and when such are dark gray. Mounted specimens show the tibial hairs distinctly longer than the tibial hairs of *edulis,* more upstanding, and distinctly spine-like. The tibial hairs in the apterous form are as a rule longer than the tibial hairs of *terminalis* in like form and less upstanding. Neither *edulis* nor *terminalis* have the pigmented spots on the posterior dorsum of the abdomen.

Specimens of this species show a decided preference for young, vigorous trees whose bark is gray or green. On such trees they live on the trunk and the needle-free limbs and small branches. In Arizona, the colonies are large. I have observed *Pinus monophylla* in Nevada heavily infested; Dickson has taken this species in California on the same host.

Explanation of Figures

Plate I: Fig. 1.—*Cinara apacheca* Hottes and Butler. Fig. 2.—*Cinara atra* (Gillette and Palmer). Fig. 3.—*Cinara caliente* Hottes.

Plate II: Fig. 4.—*Cinara edulis* (Wilson). Fig. 5.—*Cinara metalica* Hottes. Fig. 6.—*Cinara nitidula* Hottes.

Plate III: Fig. 7.—*Cinara pinata* Hottes. Fig. 8.—*Cinara pinona* Hottes. Fig. 9.—*Cinara poketa* Hottes.

Plate IV: Fig. 10.—*Cinara puerca* Hottes. Fig. 11.—*Cinara rustica* Hottes. Fig. 12.—*Cinara tanneri* (Knowlton).

Plate V: Fig. 13.—*Cinara terminalis* (Gillette and Palmer). Fig. 14.—*Cinara wahtolca* Hottes.

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PROCEEDINGS

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THE RACES OF THE CITRINE CANARY FLYCATCHER, *CULICICAPA HELIANTHEA*

By Kenneth C. Parkes

Carnegie Museum, Pittsburgh, Pa.

The flycatcher genus *Culicicapa* consists of two closely related species, *ceylonensis* and *helianthea,* of somewhat uncertain affinities within the family Muscicapidae (Vaurie, 1953: 532). The gray-headed species *ceylonensis* has a fairly wide distribution in southeast Asia, while *helianthea* is confined to the Philippines and Celebes. The two species are sympatric on the island of Paláwan.

The Citrine Canary Flycatcher, *C. helianthea,* is a small bird (wing 53–62 mm), yellow below and greenish above, with a yellow rump-patch and narrow yellow eye-ring. Although it has been collected on at least nine islands of the Philippines, its distribution within that archipelago is spotty, and it is apparently rather uncommon on most of the islands from which it has been recorded. Three subspecies are currently recognized: *C. h. helianthea* (Wallace) from Celebes; *C. h. panayensis* (Sharpe) from the Philippines in general; and *C. h. mayri* Deignan from Tawitawi and Bongao in the Sulu chain. The material I have assembled indicates the presence in this species of geographic variation not adequately expressed by the present division into three subspecies.

Color has been the principal criterion employed in the present study. There is definite variation in size, but there is also sexual dimorphism, males averaging larger than females. The sex ratios within the small available samples of this uncommon species are unbalanced to the extent that comparisons are difficult. Of six specimens from Tawitawi, for example, all are sexed as females, while only one of thirteen from northern Luzón is so sexed. It is therefore possible only to mention apparent trends in size when characterizing the subspecies.

Specimens for this study were borrowed from the American Museum of Natural History, United States National Museum, Academy of Natural Sciences of Philadelphia, and Chicago Natural History Museum. I am indebted to the respective authorities of those institutions; and to Robert W. Storer, who compared selected specimens with the type of *panayensis,* now at the Museum of Zoology, University of Michigan. After this paper had been essentially completed, additional specimens were examined at the Peabody Museum of Natural History, Yale University. With the exception of a single specimen from Mt. Santo Tomás, Luzón, the Yale specimens were neither measured nor listed among the "Specimens Examined" beyond.

A. L. Rand, who had studied this species several years ago, kindly gave me the benefit of a summary of his conclusions, which proved to be almost exactly those I had reached independently.

Culicicapa helianthea helianthea (Wallace)

Muscicapa helianthea Wallace, 1865. Proc. Zool. Soc. London, p. 476 (Menado, Celebes).

Characters: See comparison with other races, beyond.

Range: Celebes.

Specimens examined: Celebes (various localities), 5. A larger series was used for initial comparisons in New York, but these five were taken to Carnegie Museum for detailed comparisons.

Measurements: ♂ wing (flat) 61, 63; tail 51, 51. ♀ wing 58.5, 59, 60; tail 48, 48, 50.

Culicicapa helianthea panayensis (Sharpe)

Xantholestes panayensis Sharpe, 1877. Trans. Linn. Soc. London, 2nd ser., Zoology, 1: 327 (Panay).

Characters: Although this is the subspecies of longest standing, it is the least well differentiated. I have seen no Panay specimens. These comparisons are based on specimens from Negros, Mindanao, and Paláwan, among which there are no appreciable differences in color (Paláwan specimens average slightly larger than the others). Storer's remarks on the type specimen are quoted beyond. This race is close to *helianthea,* but averages slightly richer yellow below, especially on the throat; the yellow rump-patch averages slightly more extensive; the eye-ring is somewhat duller, contrasting less with the sides of the head, which are less intensively yellow than in *helianthea*; averages slightly smaller in size.

The supposed difference between *helianthea* and *panayensis* in bill and foot color mentioned by Peters (1939: 114) is invalid; collectors' notes on labels indicate that both in Celebes and in the Philippines, bills may be either black or sepia, and feet from yellow to dark brown. Material at hand is insufficient to determine whether this variation in soft-part colors may be related to age, sex or season.

A single male from Leyte in the American Museum of Natural History is somewhat less golden yellow, especially on the rump, than any of the series of *panayensis*, and is also slightly smaller than any of the males of that race examined (wing 56, tail 44). More strikingly different from the rest of the series is a single unsexed specimen, now in Carnegie Museum, collected by Bourns and Worcester at Toledo, Cebú, 13 June 1892. It has the rump-patch virtually obsolete (this may in part be an artifact, as some of the feathers of this area may be missing); it is darker, less yellow dorsally, and paler below, especially on the throat and face. It is within the size range of *panayensis* (wing 59.5, tail 49). I have seen no other Cebú specimens, and McGregor (1909: 472) lists only Bourns and Worcester as having collected the species on that island. It is possible that this specimen represents an extinct Cebú endemic subspecies, as Rabor (1959: 40) looked for the species on Cebú in vain.

Storer (letter of 15 April 1960) describes the type of *panayensis* as "a pretty miserable specimen, lacking the tail and most of one wing (other wing 57 mm) and with the feathers of the face matted and useless for comparison . . . [It] is intermediate in back color between the Cebu and Negros birds but nearer the Negros bird. Its throat is more like that of the Cebu bird. My opinion, for what it is worth, is that the difference in the throat could be one of age." In view of the sparsity of material, and of the poor condition of the single Panay and Cebú specimens, it would appear that the best treatment at present would be to use the name *panayensis* for the populations of all of the islands listed below.

Range: Panay, Negros, Mindanao, Paláwan, ?Leyte, ?Cebú. Bourns and Worcester (1894: 41) also list *panayensis* from Tablas, Romblón, Sibuyán, Guimarás, Masbate, and Siquijor, but I have been unable to determine the basis for these supposed records. These islands are not listed by McGregor (*loc. cit.*).

Specimens examined: NEGROS: Lake Balinsasáyao, 4; Cuernos de Negros, 4; Canlaón Volcano, 1; Bais, 1. MINDANAO: Lake Lanao, 4; Ayala, 2; Sumilao, 2; Mt. Apo, 1; Pantar, 1. PALÁWAN: Puerto Princesa, 5; Taguso, 1; Aborlán, 1; unspecified, 1. CEBÚ: Toledo, 1. LEYTE: "Mts. of north Leyte," 1.

Measurements: (Cebú and Leyte specimens omitted; Paláwan measurements italicized): ♂ wing 57, 57, 57, 58, 58.5, 59, 59.5, 60, *60*, *60.5*, *61.5*; tail 45, 47, 47, 47, 47.5, 47.5, 48.5, *49*, 49.5, 50, *51*, *51.5*. ♀ wing 53, 55, 55, 55.5, 56, 56.5, 57.5, *57.5*, 58, *58*, *58.5*, 59, *59*; tail 45, 45.5, 46, 46, 47, *47*, 47.5, *48*, *48*, 48.5, 48.5, 50, *50*. Type of *panayensis* (measured by R. W. Storer), ♂ wing 57.

Culicicapa helianthea mayri Deignan

Culicicapa helianthea mayri Deignan, 1947. Proc. Biol. Soc. Washington, 60: 61 (Tataán, Tawitawi Island, Sulu Archipelago).

Characters: Less richly yellow than *panayensis* on rump and underparts; paler and grayer on throat; green of crown and back less suffused with golden yellow; cheeks relatively paler, contrasting more with crown; averages smaller than *panayensis,* especially in tail length. This description is based on topotypes from Tawitawi; the two Bongao specimens seen are somewhat larger and generally darker in color. I tentatively follow Deignan in assigning them to *mayri,* but additional material from Bongao might well support separation of an additional subspecies from that tiny island, unlikely as this may seem. There is precedent in the species *Parus elegans,* in which the subspecies *bongaoensis* is remarkably different from the subspecies *suluensis* found on Tawitawi (Parkes, 1958: 105).

Range: Known only from Tawitawi Island in the Sulus; birds from adjacent Bongao Island tentatively placed here.

Specimens examined: TAWITAWI: Tataán, 6. BONGAO, 2.

Measurements: Tawitawi ♀ wing 54.5, 55, 55, 56, 56, 57; tail 42, 44, 44, 44.5, 45, 46 [no males seen]. Bongao ♂ wing 58, tail 48; ♀ wing 59.5, tail 47.

Culicicapa helianthea septentrionalis, new subspecies

Type: U.S.N.M. no. 200638, adult ♂, Mount Santo Tomás (7000 feet), Benguet, Mountain Province, Luzón, Philippine Islands; collected 10 December 1905, by E. A. Mearns (original no. 13810).

Characters: Much less brightly golden yellow below than either *helianthea* or *panayensis*; ventral color deeper than *mayri*; anterior underparts with dusky appearance due at least in part to more extensive and darker gray bases of yellow feathers; lores dark, the color of the crown, rather than yellow as in the southern races; back and crown with less golden yellow wash than *panayensis,* much darker than *mayri,* with a more sharply defined rump-patch; size as in *panayensis.*

Range: Known from two areas in the highlands of the western half of northern Luzón, Philippine Islands.

Specimens examined (all localities on Luzón): Mountain Province (Benguet subprovince): Mt. Santo Tomás, 3; Irisán, 3; Baguío, 1; Haight's-in-the-Oaks, 1; 3 miles above Twin Peaks, 1; "Benguet, 6000 feet," 2. Ilocos Norte Province: Mt. Simminublán (Mt. Sicapo-o), 2.

Measurements: ♂ wing 55, 55.5, 57, 57, 58, 58, 58.5, 59, 60; tail 47, 47, 47.5, 48, 48, 48.5, 48.5, 49, 49. ♀ wing 57, tail 48.

Culicicapa helianthea zimmeri, new subspecies

Type: A.M.N.H. no. 296129, adult ♂, Mount San Cristóbal, Laguna Province, Luzón, Philippine Islands; collected 21 November 1915, by J. T. Zimmer (original no. 1306).

Characters: Similar in dark dorsal color to *septentrionalis,* but rump-patch slightly more golden, less greenish yellow; edges of rectrices deeper, richer yellow than in any other race, having almost an orange cast; the darkest race ventrally, the underparts being a rich, deep yellow, shaded with citrine anteriorly; axillars bright yellow, contrasting sharply with dark sides of breast; smallest of the races in average size.

Range: Known only from the mountains of southeastern Laguna Province, on the Laguna-Tayabas provincial border, south-central Luzón, Philippine Islands.

Specimens examined (all localities on Luzón): Laguna Province: Mt. Banahao, 3; Mt. San Cristóbal, 1. The latter specimen was inadvertently listed by Zimmer (1918: 226) as being from Mt. Banahao, an error of little moment as these two mountains are immediately adjacent to one another.

Measurements: ♂ wing 55, 55, 56; tail 45, 46, 48. ♀ wing 54.5, tail 46.

Remarks: The fame of the late John T. Zimmer as an authority on South American birds has tended to eclipse his contributions to our knowledge of Philippine birds, which remain unknown to many. His collection of meticulously labelled Philippine specimens, now at the American Museum of Natural History, has been of immense help to me in my studies. It is a pleasure for me to name this distinctive subspecies, which he alone appears to have collected, in his memory.

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PROCEEDINGS

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NOTES ON AND A KEY TO SPECIES OF *CINARA* (FAMILY APHIDAE) WHICH HAVE *ABIES* SP. AS HOST

By F. C. Hottes

It is a pleasure to acknowledge the assistance of Louis Gentner, Carl Johansen and Joe Schuh who are fortunate to live in a region where *Abies* sp. are abundant, and who have supplied me with much of the material treated in this section.

Cinara abieticola (Cholodkovsky)

Lachnus abieticola L, 1899. Zool. Anz. 22: 470–471, fig. Original description apterous viviparous female.
Lachnus vanduzei Swain, 1919. A Synopsis of the Aphididae of California, pp. 50–51, fig. Pl. V.
Lachnus piceae (Walker), 1921. Swain Ent. News, 32: 225–227.
C. abieticola (C) Hottes and Essig, 1954. Proc. Biol. Soc. Washington, 67: 95–96, figs. p. 97.

Location of type not known.

Size range apterous viviparous females up to 5.75 mm.

I have seen slide material of this species from Europe and from our Eastern and Western Coasts, but have never taken it alive. It is reported to spend the summers on the roots of *Abies* sp. This species is very close to *C. lasiocarpae* (G & P). It differs from that species in having the hairs on the cornicles contrasting sharply in texture, in having the second tarsal segment shorter and the hairs on the tibiae much longer, and more upstanding.

This species is not confined to one species of *Abies* but has also been taken on *Picea* and *Cedrus*.

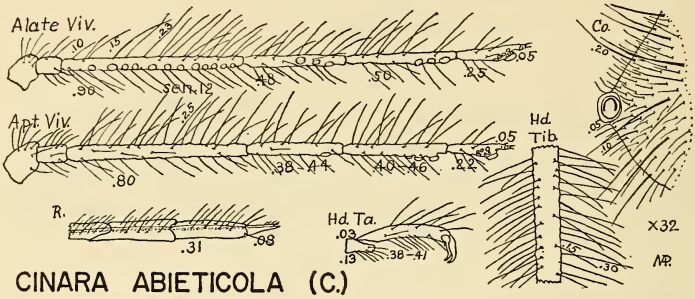
Cinara alacra Hottes and Essig

Cinara alacra Hottes and Essig, 1953. Proc. Biol. Soc. Washington, 66: 205–206, figs. p. 210. Original description apterous viviparous female.

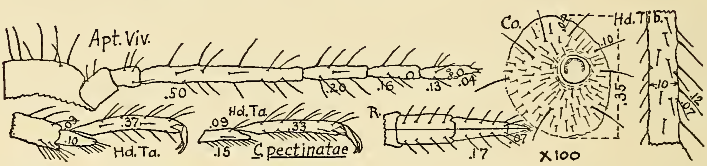
Holotype in collection of E. O. Essig.

Size apterous viviparous female 4.57 mm.

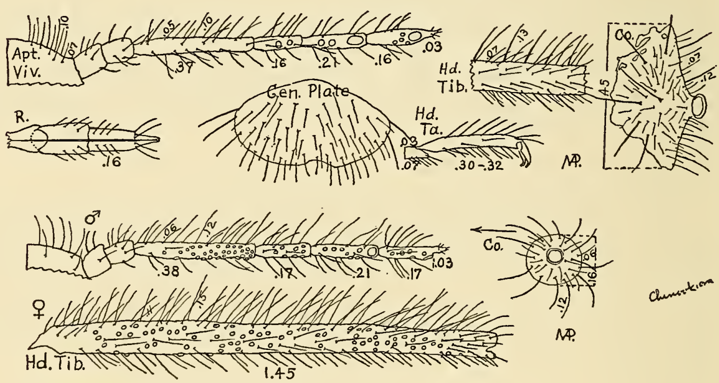
This species is known only from the apterous viviparous female. The features which characterize this species are the cornicles with two types of hair, the course spine-like hairs on the tibiae and the numerous coarse



CINARA ABIETICOLA (C.)



CINARA ALACRA H.&E.



CINARA CHINOOKIANA H.

hairs on the dorsum of the abdomen, some of which arise from pigmented areas of various sizes. The type locality of this species is Santa Rosa Mountain, near Paradise, Nevada. Dickson has taken this species on Santa Rosa Peak, San Jacinto Mountains in southern California. So far as known *Abies concolor* is the only host.

Cinara chinookiana Hottes

Cinara chinookiana Hottes, 1955. Proc. Biol. Soc. Washington, 68: 67–69, figs. p. 68. Original description apterous viviparous female.

Hottes, 1957. Proc. Biol. Soc. Washington, 70: 12–13, description apterous male and oviparous female, figs. p. 15.

Holotype and other types in the United States National Museum.

Size range apterous viviparous female 3.29–3.50 mm.

The alate viviparous female of this species has not been taken.

The transverse pigmented spots of this species are very irregular and have tooth-like projections on the margins. The cornicles extend further forward from the oriface than posterior, and the restricted portion is not as dark as the outer margin. The outer hairs on the metathoracic tibiae are much coarser than the hairs on the inner margin, quite upstanding and considerably longer than the width of the tibiae. This species is known from Washington and Oregon. This species is known only from *Abies lasiocarpa.*

Cinara curtihirsuta Hottes and Essig

Cinara curtihirsuta Hottes and Essig, 1954. Proc. Biol. Soc. Washington, 67: 275–276. Original description alate viviparous female.

Hottes, 1957. Proc. Biol. Soc. Washington, 70: 15–16, description apterous viviparous female, figs.

Holotype in collection of E. O. Essig. Morphotype in the collection of the United States National Museum.

Size range apterous viviparous female 3.67 mm.

This species is probably more widely distributed than published records indicate. I have taken it in Oregon and in Arizona, always on *Abies concolor,* the host on which the first material was taken. In life, this species is outstandingly conspicuous; the head is a dull pinkish red and the body gray, slightly pruinose. Arizona specimens were just as conspicuous as the specimens taken in Oregon but were of one color, being a light amber and almost translucent.

Alate specimens have the sensoria on the third antennal segment numbering up to ten. They are arranged in a straight row and are very large. The hairs on the antennae are about .03 mm long in the apterous form and slightly longer in the alate. The metathoracic tibiae have the hairs varying from .03–.04 mm. The hairs on the cornicles are almost confined to the restricted portion of the cornicle.

Specimens of this species feed on the terminal branches among the needles and on the upper portion of the trunks of young trees.

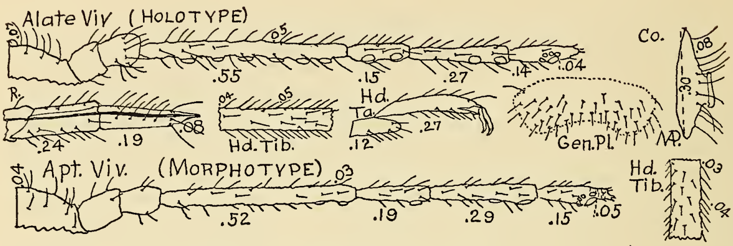
Cinara curvipes (Patch)

Lachnus curvipes (Patch), 1912. Maine Agric. Exper. Sta. Bull., No. 202, pp. 161–163. Original description of all forms; figures. Types in the collection of the Maine Agricultural Experiment Station; so far as known lectotype not indicated.

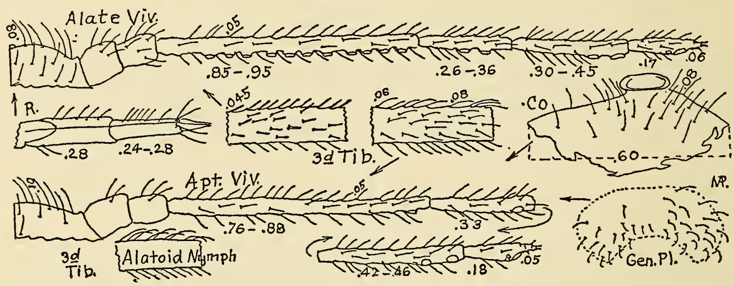
Cinara utahensis Knowlton and Smith, 1938. Ent. News, 49: 66–68, figs. Synonym.

Size range of apterous viviparous females up to .05 mm.

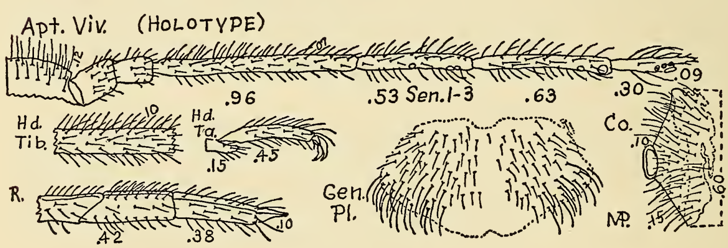
This species is widely distributed in the United States and probably occurs wherever *Abies* sp. grow. I have taken it on *Abies concolor, Abies*



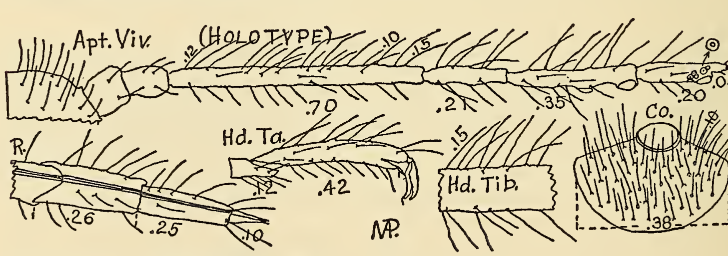
CINARA CURTIHIRSUTA H.&E.



CINARA CURVIPES (P.)



CINARA GENTNERI H.



CINARA GRANDE H.

lasiocarpa, Abies grandis. Palmer records it from *Picea engelmanni,* and Essig has taken it on *Cedrus deodora.*

The hairs on the antennal segments and tibiae of this species may differ as to type. Sometimes the hairs on these structures are short and blunt at the end; at other times the hairs are longer with the apical half very fine and drawn out to a fine, droopy point. The hairs on the tibiae, regardless of type, are always shorter than the width of the tibiae. The hairs on the cornicles are confined largely to the restricted portion. Specimens of this species live on the bark of young branches and on the trunks of young trees. The hind tibiae are given to much variation as to length but are always more or less bent, a eondition shared by many species of this genus.

Cinara gentneri Hottes

Cinara gentneri Hottes, 1957. Proc. Biol. Soc. Washington, 70: 1–3, figs. p. 8. Original description apterous viviparous and oviparous females.

Holotype and morphotype in the United States National Museum.

Size range apterous viviparous female 5.55–5.77 mm.

The alate viviparous female and the male of this species have yet to be described. The genital plate of this species is the most characteristic feature of this rather large species; it is large and one-half as deep as it is wide; it is provided with numerous hairs.

This species is known only from Oregon and *Abies grandis* is its only known host.

Cinara grande Hottes

Cinara grande Hottes, 1956. Proc. Biol. Soc. Washington, 69: 219–220, figs. p. 223. Original description apterous viviparous female.

Holotype in the United States National Museum.

Size range apterous viviparous females 4.80–5.10 mm.

This species, known from only one collection, has defied repeated efforts to add additional forms to our knowledge. So effectively has it eluded me that I suspect that it migrates to the roots, and that my collecting trips were not eorrectly timed. Specimens of this species have no pigmented spots on the dorsum of the abdomen. The cornieles have numerous hairs, all of one type. The hairs on the metathoracic tibiae are longer than the width of the tibiae and quite upstanding.

Known from *Abies concolor* on which it was taken from the trunk of a young tree.

Cinara hirta Hottes and Essig

Cinara hirta Hottes and Essig, 1953. Proc. Biol. Soc. Washington, 66: 209–210, figs. p. 210. Original description apterous viviparous female.

Holotype in collection of E. O. Essig.

Size range apterous viviparous females 3.43–4.00 mm.

Despite repeated efforts to eollect additional forms of this species, it is known only from the apterous viviparous form. I have taken this species on *Abies concolor* in the Santa Catalina Mountains near Tucson. They were located on the twigs among the needles and were taken solitary. The specimens were a light uniform buff. The body hairs of this species are very abundant, so that the body appears to be covered with fur, the hairs overlapping one another. At the apex the hairs suggest the apex of a nail. The anterior and posterior margins of the cornicles lie within the lateral pigmented areas, so that the extent of the cornicles in these directions is difficult to determine.

Cinara kiusa Hottes

Cinara kiusa Hottes, 1957. Proc. Biol. Soc. Washington, 70: 3–4, figs. p. 8. Original description apterous viviparous female.

Holotype in the United States National Museum.

Range in size apterous viviparous females 3.25–3.67 mm.

This species is known only from the original collection of apterous viviparous females, taken at Bly, Oregon, on *Abies concolor.* The antennal segments of this species have numerous rather short, fine hairs for the most part not longer, or but little longer, than the width of third segment. The unguis is finger-like. The hairs on the tibiae are numerous, fine and shorter than the width of tibiae.

To locate *Abies concolor* near Bly one must continue on the highway east of Bly for ten or twelve miles and turn left on a forestry road, just as the highway turns downhill to the right. This area has given us four little known species of *Cinara.*

Cinara lasiocarpae (Gillette and Palmer)

Lachnus lasiocarpae Gillette and Palmer, 1930. Ann. Ent. Soc. America, 23: 543–544, figs. pp. 550–551. Original description apterous viviparous female.

C. lasiocarpae (Gillette and Palmer), Hottes, 1954. Proc. Biol. Soc. Washington, 67: 259–260. Description alate viviparous female.

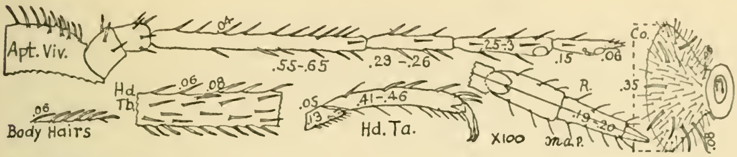
C. lasiocarpae (Gillette and Palmer), Hottes, 1955. Proc. Biol. Soc. Washington, 68: 73–75, fig. p. 68. Description alate male.

Type in the United States National Museum.

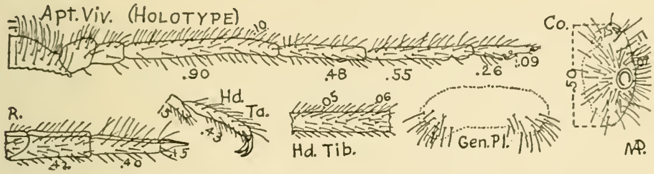
Size range apterous viviparous female 4.00–5.00 mm.

This species so far as known is confined to *Abies lasiocarpa.* It seems to be confined to the Rocky Mountain region. It is closely allied to *C. abieticola* (Cholodkovsky) and differs from that species in having shorter hairs on the tibiae which are also less upstanding, shorter second tarsal segments, and the two types of hairs on the cornicles less strongly differentiated.

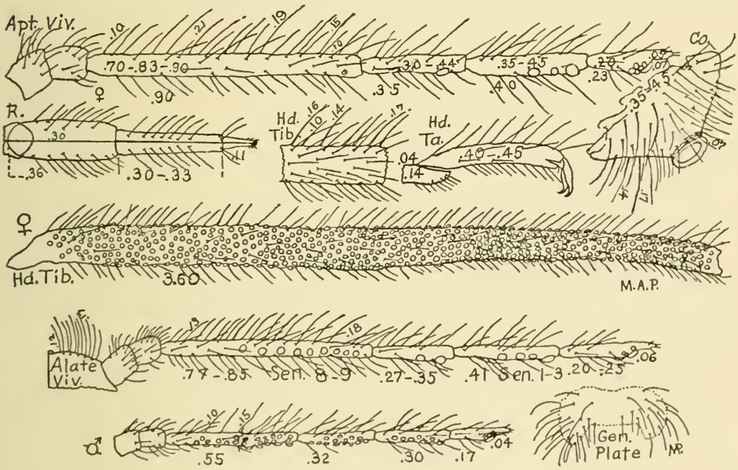
Specimens of this species are to be found on the trunks of small trees in the spring and fall, perhaps they migrate to the roots in the summer.



CINARA HIRTA H.&E.



CINARA KIUSA H.



CINARA LASIOCARPAE (G.&P.)

Cinara minuta Hottes and Knowlton

Cinara minuta Hottes and Knowlton, 1954. The Great Basin Nat., 14: 11, figs. p. 12. Original description oviparous female.

Holotype in the United States National Museum.

Size range oviparous females 2.28–2.36 mm.

Although this species is known only from the oviparous form, apterous viviparous females are not expected to differ greatly. The small size of this species, its comparatively small cornicles and short hairs separate it at once from other species taken on *Abies lasiocarpa*.

Cinara occidentalis (Davidson)

Lachnus occidentalis Davidson, 1909. Jour. Econ. Ent., 2: 300. Original description apterous viviparous female.
Lachnus occidentalis Davidson, Wilson, 1912. The Canadian Ent., 44: 193–194. Description of all forms.
Lachnus occidentalis Davidson, Palmer, 1926. Ann. Ent. Soc. America, 19: 308–311. Life history and description and figures of all forms.

Palmer lists the type as possibly in the United States National Museum.
Size range 2.5–3 mm.

The long, numerous upstanding hairs on the comparatively short tibiae, and the long second tarsal segments distinguish this species.

I have seen material of this species from California and Washington, and have taken it in Colorado, Arizona, Nevada and Oregon. Specimens of this species live in small colonies at the ends of twigs. Specimens are quite flocculent, so that the colonies present a distinctly bluish white appearance. The flocculent material holds small globules of honey dew.

Cinara osborni Knowlton

Cinara osborni Knowlton, 1942. Great Basin Nat., 3: 7, figs. p. 6. Original description apterous viviparous female.
Cinara alticola Hottes and Essig, 1953. Proc. Biol. Soc. Washington, 66: 151–152, figs. p. 154.

Type in Knowlton collection.
Size range of apterous viviparous females 3.5–4.00 mm.

Only the apterous viviparous female of this form is known. It is allied to *C. hirta* and differs from that species in the hairs on the dorsum of the abdomen being longer and tapering to a sharp point. The hairs on the abdomen are less numerous than in *hirta.*

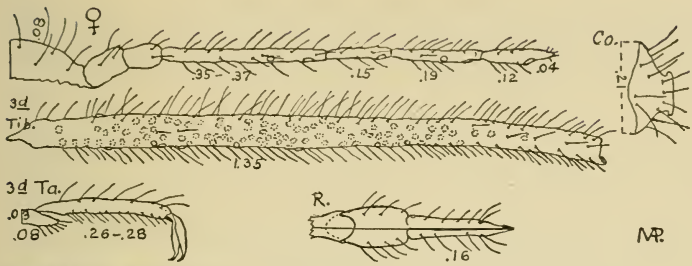
I have taken this species in Arizona and Nevada, and have seen specimens from California. I have taken it on both *Abies concolor,* a new host, and *Abies lasiocarpa.* It varies considerably in color but is never a pale tan. In the region of the Grand Canyon the thorax has four black spots and the abdomen is gray, lightly covered with pruinose. Specimens of this species live solitary on the twigs.

Cinara pacifica (Wilson)

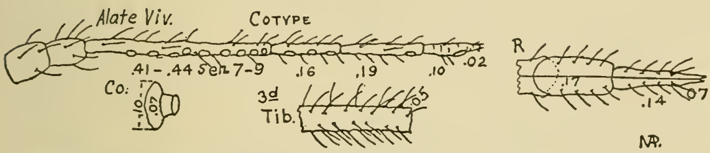
Lachniella pacifica Wilson, 1919. The Canadian Ent., 51: 21. Original description of alate viviparous female.
Cinara pacifica (Wilson), Palmer, 1945. Ann. Ent. Soc. America, 38: 451. Description and figs.

Type possibly in the United States National Museum.
Size range alate viviparous females given by Palmer as 1.86 (?).

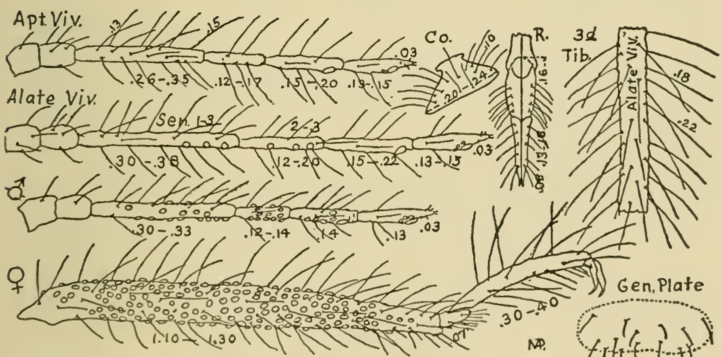
This species is known only from the original material taken by A. D. Hopkins and Theo. Pergande in 1903 at Eureka, California. I looked for this species in northern California in 1958, and made a special trip



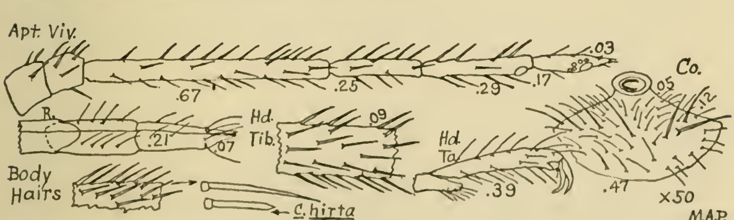
CINARA MINUTA (H.& K.)



CINARA PACIFICA (W.)



CINARA OCCIDENTALIS (D.)



CINARA OSBORNI K.

to Eureka which must have changed greatly since 1903. I would expect the apterous viviparous females to have cornicles and hairs quite similar to those of the alate form and have keyed the species on the character of the unique cornicles.

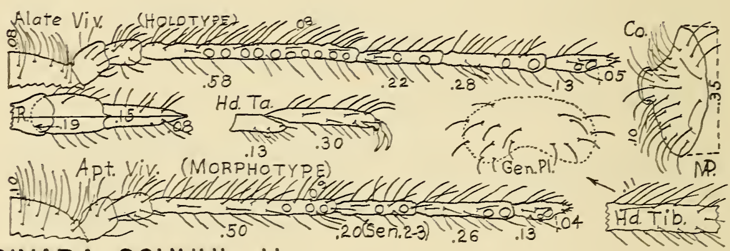
Cinara schuhi Hottes

Cinara schuhi Hottes, 1957. Proc. Biol. Soc. Washington, 70: 4–6, figs. p. 8. Original description alate and apterous viviparous females.

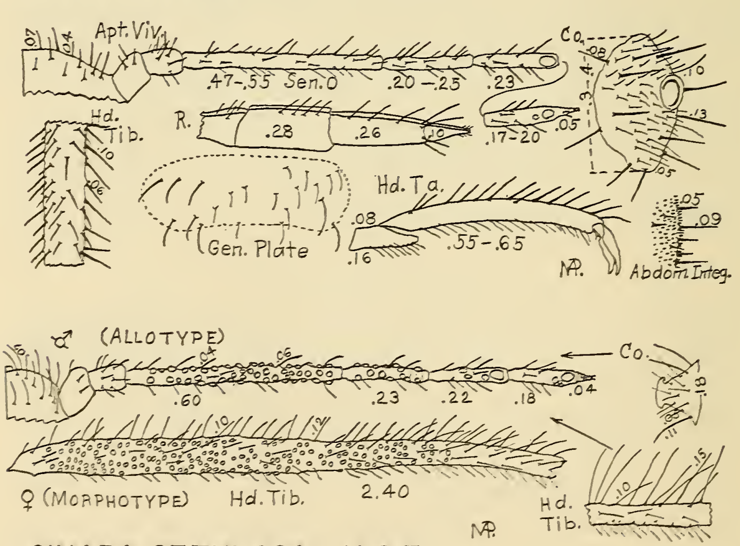
Holotype and morphotype in the United States National Museum.

Size range apterous viviparous females 2.55–2.85 mm.

No species now known from *Abies concolor* has the hair on the tibiae similar to the hairs on the tibiae of this species. Apterous viviparous females may have up to five large round sensoria arranged in a straight row, more than any other species on this host.



CINARA SCHUHI H.



CINARA SETULOSA H.&E.

Cinara setulosa Hottes and Essig

Cinara setulosa Hottes and Essig, 1955. Proc. Biol. Soc. Washington, 68: 61–62. Original description apterous viviparous female.

Hottes, 1955. Proc. Biol. Soc. Washington, 68: 70, figs.

Hottes, 1957. Proc. Biol. Soc. Washington, 70: 11–12, figs. p. 16. Description of alate male and oviparous female.

Holotype in collection of E. O. Essig.

Size range 4.50–5.00 mm.

The extremely well-developed setulae on the dorsum of the abdomen separate this species at once from other species which have two types of hairs on the cornicles.

Cinara sonata Hottes

Cinara sonata Hottes, 1955. Proc. Biol. Soc. Washington, 68: 202–203, figs. p. 200. Original description apterous viviparous female.

Hottes, 1957. Proc. Biol. Soc. Washington, 70: 9–11, figs. p. 16. Description alate viviparous female and apterous oviparous female.

Holotype and morphotypes in the United States National Museum.

CINARA SONATA H.

Size range 5.27–7.00 mm.

The cornicles of this species have a deep notch on the outer margin. This feature separates it at once from its closely related species *C. abieticola.*

A KEY TO APTEROUS VIVIPAROUS FEMALES OF THE GENUS *CINARA* (FAMILY APHIDAE) WHICH HAVE *ABIES* SP. FOR HOST

1. Cornicles with a diameter of less than .25 mm 2
   Cornicles with a diameter of more than .30 mm 4
2. Cornicles with a diameter of .10 mm .... *C. pacifica* (Wilson)
   Cornicles with a diameter of about .20 mm 3
3. Hair on metathoracic tibiae shorter than width of segment; second metatarsal segment about one-fifth the length of hind tibiae .... *C. minuta* Hottes and Knowlton
   Hair on metathoracic tibiae longer than width of segment; second metatarsal segment about one-third length of hind tibiae .... *C. occidentalis* (Davidson)
4. Cornicles provided with coarse and fine hairs 5
   Cornicles with only one type of hair 12
5. Dorsum of abdomen with well-developed setulae, transverse pigmented spot not divided or only partially so .... *C. setulosa* Hottes and Essig
   Dorsum of abdomen without or with poorly developed setulae, transverse pigmented spot divided 6
6. Hairs on metathoracic tibiae shorter than or about equal to width of tibiae 7
   Hairs on metathoracic tibiae longer than width of tibiae 9
7. Cornicles incorporated within lateral pigmented areas 8
   Cornicles not incorporated within lateral pigmented areas .... *C. alacra* Hottes and Essig
8. Hairs on dorsum of abdomen with apex similar to apex of a nail, not tapering to a sharp point .... *C. hirta* Hottes and Essig
   Hairs on dorsum of abdomen tapering to a sharp point .... *C. osborni* Knowlton
9. Size not much over 3.5 mm .... *C. chinookiana* Hottes
   Size 4.00–7.00 mm 10
10. Cornicles with deep notch .... *C. sonata* Hottes
    Cornicles without notch 11
11. Second tarsal segment .42–.50 mm; hairs on hind tibiae .12–.17 mm upstanding but not nearly at right angles; hairs on cornicles not sharply differentiated as to two types .... *C. lasiocarpae* Gillette and Palmer
    Second tarsal segment .38–.41 mm; hairs on hind tibiae .15–.30 mm almost at right angles; hairs on cornicles distinctly of two types .... *C. abieticola* (Cholodkovsky)
12. Metathoracic tibiae with blunt hairs .... *C. curvipes* (Patch)
    Metathoracic tibiae with sharp pointed hairs 13

13. Genital plate one-half as long as wide with many hairs .... *C. gentneri* Hottes
    Genital plate much less than one-half as long as wide, hairs largely confined to ends 14
14. Hairs on mid region of metathoracic tibiae longer than width of segment 15
    Hairs on mid region of metathoracic tibiae shorter than width of segment 16
15. Hairs on metathoracic tibiae .15 mm in length set at angle of more than 45 degrees; hairs on cornicles covering entire surface .... *C. grande* Hottes
    Hairs on metathoracic tibiae .10–.11 mm in length set at angle of 45 degrees; hairs on cornicles less numerous towards margin .... *C. schuhi* Hottes
16. Hairs on metathoracic tibiae set at angle of 45 degrees, not finer beyond middle, not strongly curved 17
    Hairs on metathoracic tibiae set at angle of less than 45 degrees, much finer beyond middle, strongly curved towards apex .... *C. curvipes* (Patch)
17. Hairs on metathoracic tibiae less than .03 mm; third antennal segment .51–.57 mm in length .... *C. curtihirsuta* Hottes and Essig
    Hairs on metathoracic tibiae .05–.075 mm in length; third antennal segment .82–.91 mm in length .... *C. kiusa* Hottes

Vol. 73, pp. 235–238 30 December 1960

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW SYNONYMIES AND GENERIC CHANGES IN THE LYGAEIDAE (HEMIPTERA-HETEROPTERA)

BY PETER D. ASHLOCK

Entomology Res. Div., Agricultural Res. Serv., U. S. Dept. Agriculture[*]

The following changes are published now so that they may be used in forthcoming publications in which nomenclatorial changes seem out of place, and so that they may be incorporated in a world catalogue of the Lygaeidae now in preparation by James A. Slater.

Kleidocerys virescens (Fabricius), new combination

Acanthia virescens Fabricius, 1794, Ent. Syst., 4:70.

Tingis (?) *virescens* (Fabr.), Fabricius, 1803, Syst. Rhyng., p. 127.

Ischnorhynchus championi Distant, 1882, Biol. Cent. Amer., Ins., Hemip.-Heterop., 1:193, Pl. 19, Fig. 3, new synonymy.

Kleidocerys championi (Dist.), Barber, 1947, Mem. Soc. Cubana Hist. Nat., 19:64; Barber, 1953, Proc. Ent. Soc. Washington, 55: 281.

Remarks: For nearly a century, authors, following Stål, have been treating *virescens* as a member of the Cymini, either in the genus *Cymodema* or in the genus *Cymus* (see synonymy of *Cymus breviceps* Stål below). Through the courtesy of S. L. Tuxen and C. J. Drake, I have examined the type of the species and find that it is the same as the species described by Distant as *Ischnorhynchus championi*.

Fabricius' description mentions the presence of two spots close together in the middle of the hemelytra and three spots on its posterior margin, while Stål's redescription has a note appended remarking on their absence. Spots in these positions are present in the Fabrician type I have seen, and are a common occurrence in species of *Kleidocerys*, but are present in no member of the Cymini. Apparently Stål did not have the type specimen of *virescens* before him when he redescribed the species.

When Tuxen sent a number of Fabrician types to Drake, he assured him that they were the true Fabrician specimens. The specimen here discussed is in fairly good condition, but has been pinned through the thorax with a rather large pin, and it lacks both antennae. There is

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a single label on the pin upon which is handwritten "virescens" on the upper surface, and "n. sp." on the lower surface. The first "s" on the upper surface and the "s" on the lower surface are of the old f-style. I have selected this specimen as lectotype, and have added to the specimen a label so stating.

Cymus breviceps Stål

Cymodema virescens (Fabr.), Stål, 1868, Svenska Vet.-Akad. Handl. (Hemip. Fabr. 1.), 7(11): 77, misidentification.

Cymus virescens (Fabr.), Stål, 1874, Svenska Vet.-Akad. Handl. (Enum. Hemip. 4.), 12(1):127, misidentification; Barber, 1923, Amer. Mus. Nov., 75:12, misidentification, makes *breviceps* Stål a synonym.

Cymus breviceps Stål, 1874, Svenska Vet.-Akad. Handl. (Enum. Hemip. 4.), 12(1):127; Van Duzee, 1909, Canadian Ent., 41:372, makes *exiguum* Horváth a synonym.

Cymodema exiguum Horváth, 1908, Ann. Mus. Nat. Hungarici, 6:559.

Remarks: Since *virescens* Fabr. has been found to belong to the genus *Kleidocerys,* another name must be found for *Cymus virescens* of authors, not Fabricius. Oddly enough, Stål himself described the species in his Enumeratio Hemipterorum as *Cymus breviceps,* and apparently did not recognize that it was the same as the one he redescribed as *Cymodema virescens* (Fabr.). Since *virescens* was originally described from the West Indies ("Americae meridionalis insulis") and *breviceps* from Texas and Carolina, possibly it did not occur to Stål that his two descriptions applied to the same species. *Cymodema exiguum* Horváth, described from Washington, D. C., is a later synonym. I have reviewed the specimens under the name *Cymus virescens* in the U. S. National Museum collection and can find no differences between West Indian specimens and those from continental North America. Therefore *Cymus breviceps* Stål becomes the correct name for the taxon *Cymus virescens* of authors, not Fabricius, and all references to *virescens* other than the two Fabrician ones should be transferred to *breviceps* Stål.

Ligyrocoris insititia (Distant), new combination

Erlacda (?) *insititia* Distant, 1893, Biol. Cent. Amer., Ins., Rhynch., Hemip.-Heterop., 1(suppl.):401, Pl. 35, Fig. 8.

Remarks: R. J. Izzard of the British Museum (Natural History) kindly confirmed my identification of this species. Since there is a stridulatory area, or "semi-lunate strigose vitta," on each side of the two basal abdominal segments, the species must be transferred to the genus *Ligyrocoris* Stål. It is most closely related to *L. nitidicollis* (Stål), though it is considerably larger.

Delochilocoris Bergroth

Dorachosa Distant, 1893, Biol. Cent. Amer., Ins., Rhynch., Hemip.-Heterop., 1(suppl.):409, preoccupied, Distant, 1892, Cicadidae.

Delochilocoris Bergroth, 1893, Rev. d'Ent., 12:154, new name for *Dorachosa* Distant, 1893.

Remarks: American authors have generally placed the North American species *D. illuminatus* Distant and *D. umbrosus* Distant in the old world genus *Aphanus* of authors, not Laporte, following Horváth, 1908 (Ann. Mus. Hungarici, 6:561) and Barber, 1919 (Jour. New York Ent. Soc., 26:61). China, 1943 (Generic Names of British Insects, Part 8, p. 242), however, pointed out that *Rhyparochromus* Hahn, 1826, must be used in place of *Aphanus* of authors, not Laporte, and American authors have followed this arrangement ever since.

In 1957 Scudder (Ent. Mon. Mag., 93:152–6) reclassified the subfamily Rhyparochrominae (now Megalonotinae, see Slater, 1957, Bull. Brooklyn Ent. Soc., 52:35–8) and placed *Rhyparochromus* Hahn in the subtribe Rhyparochromina (Megalonotina). The subtribe was characterized, among other characters, by the dorsal location of abdominal spiracles III and IV. I have examined the spiracles of *D. umbrosus* and find that only the spiracles of segment IV are dorsal; consequently, the species must belong to the subtribe Gonianotina, *sensu* Scudder. Therefore the North American species described by Distant cannot be placed in the old world genus *Rhyparochromus* Hahn, and Bergroth's *Delochilocoris* must be resurrected for the two American species.

Delochilocoris is very closely related to *Malezonotus* Barber. The most obvious difference is that the species of *Delochilocoris* have entirely black hemelytra while those of *Malezonotus* species are patterned. In addition, the species of *Delochilocoris* are subshining and nearly glabrous, even on the head, while those of *Malezonotus* are all dull, and have rather long pilosity on the body surface, or at least on the head, as in *M. angustatus* (Van Duzee).

Balboa Distant

Balboa Distant, 1893, Biol. Cent. Amer., Ins., Rhynch., Hemip.-Heterop., 1(suppl.):408, Pl. 35, Fig. 25.

Remarks: In 1918 Barber (Jour. New York Ent. Soc., 26:53) suggested that *Balboa* Distant might be a synonym of *Ozophora* Uhler, and in another paper in the same year (Psyche, 25:80) he included *Balboa* in his treatment of *Ozophora*. The monobasic type of the genus *Balboa*, *variabilis* Distant, differs from species of *Ozophora* in its foliaceously expanded rather than carinate, pronotal margins. Also unlike species of *Ozophora*, it possesses a stridulatory apparatus consisting of a striated coastal margin of the hemelytra and a plectrum on the hind femora. These characters would seem sufficient to establish *Balboa* as a valid genus. *Ozophora ampliata* Barber was found to be congeneric with *B. variabilis* and so is transferred to the genus *Balboa*. *Balboa ampliata* (Barber) is the new combination.

Prosomoeus brunneus Scott

Prosomoeus brunneus Scott, 1874, Ann. Mag. Nat. Hist. (4), 14:435–7.
Ligyrocoris terminalis Uhler, 1896, Proc. U. S. Nat. Mus., 19:262–3, new synonymy.

Izzard has checked a paratype of Uhler's species against the type of Scott's and pronounced them the same. Hence, *Ligyrocoris terminalis* Uhler must be regarded as a synonym of *Prosomoeus brunneus* Scott. Both were described from Japan.

Vol. 73, pp. 239–244 30 December 1960

PROCEEDINGS
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BIOLOGICAL SOCIETY OF WASHINGTON

FIVE NEW WESTERN GEOPHILID CHILOPODS

By Ralph V. Chamberlin
University of Utah

The types of the new geophilid chilopods diagnosed in the present paper are for the present retained in the author's extensive collection of chilopods from the western United States at the University of Utah.

DIGNATHODONTIDAE

Damothus new genus

Body narrowed both cephalad and caudad. Head small, lacking a frontal suture. Antennae short. Labrum with median piece very large as in *Linotaenia,* its free margin dentate throughout. First maxillae without lappets.

Prehensors lacking sclerotic lines; the claws when closed not attaining the anterior margin of the head; claws each armed at base with two stout teeth or serratures.

Ventral pores absent.

Last ventral plate wide. Coxal pores partly covered by this plate, few in number.

Anal pores present.

Telopodite of anal legs composed of six articles; claw normally developed.

Type species: Damothus montis new species.

Most readily distinguished from *Linotaenia* in having at the base of each claw of the prehensors two stout teeth in place of the single one present in the latter genus.

Damothus montis new species

Median piece of labrum very large, its free margin bearing close-set conical teeth throughout its length. First maxillae with the palpus large and biarticulate. Claws of the second maxillae large and smooth.

Prehensors small; claws slender, when closed not attaining front margin of head. Each tooth at base of claw accompanied by a stout seta in line with similar setae on the preceding articles.

Sternites lacking pores; clothed over entire surface with evenly spaced erect setae.

Last ventral plate trapeziform. Coxal pores in the holotype numbering five on each side, these mostly covered by the sternite.

Anal pores present, small.

Legs in the male evenly crassate, the articles between coxa and second tarsal nearly cylindrical in form; clothed throughout with long setae; ending in a well-developed claw.

Pairs of legs: 37 (39).

Length: 12 mm.

Locality: UTAH: Wahsatch Mountains at Brighton. Type taken 19 November 1939.

Zantaenia new genus

Body in general form like that of typical *Linotaenia,* with head proportionately small.

Head with frontal suture distinct. The median piece of the labrum bearing distinct serratures or teeth on its free margin, its ends resting directly on the fulcra, apparently with no intervening lateral pieces. Palpi of first maxillae biarticulate.

Prehensors lacking evident sclerotic lines; claws slender, neither they nor other articles with teeth.

Tergites not sulcate; last intertergite separated from the pleurite on each side by a distinct suture.

Last ventral plate narrow. Coxal pores on each side small and numerous, distributed over most of the surface.

Anal pores present.

Anal legs with claw present in the female but lacking in the male.

Type species: Zantaenia idahona new species.

Differing from *Agathothus,* which it resembles in the form of the prehensors, in having the free margin of the labrum bearing large serratures and teeth in place of a fringe of setae and in having the last ventral plate narrow and the coxal pores numerous and found over the entire surface instead of having this plate broad with the coxal pores few and aggregated near the margin of the sternite.

Zantaenia idahona new species

Clypeus with a transverse series of four stout setae such as usual in *Linotaenia.* Middle piece of labrum very wide with its ends abutting directly on the fulcra; median piece with large serratures laterally and dentiform processes over the middle portion, these close-set. First maxillae and their palpi, large, distally pointed, and biarticulate. Claws of second maxillae small, much surpassed in length by the adjacent setae which form a dense brush on the terminal article; fewer setae on the penult article; coxae fully coalesced.

Tergites smooth and glabrous, not sulcate. Last intertergite separated from the pleurites.

Spiracles all round, the first scarcely larger than the second.

Sternites with a median longitudinal sulcus which is widened and deepened at its middle.

Last ventral plate narrow and elongate, its sides converging caudad. Coxal pores small and numerous, opening over entire surface.

Anal pores large.

Last legs not exceeding the penult in length; claw present in female but absent in male.

Pairs of legs: 51 (♂), 55 (♀).

Length: 45 mm.

Locality: IDAHO: Wallace, 3 September 1949. S. Mulaik, collector.

PACHYMERINIDAE

Pachymerium idium new species

Two clypeal areas present but these not sharply defined in that their component polygonal units grade into the ordinary ones at their periphery, the two areas contiguous at middle line; a stout seta at middle of each area, with two setae in front of the combined areas and a transverse series of 3 or 4 setae on each side of them; farther back on clypeus another transverse series of setae.

Lateral pieces of labrum extending in front of middle piece but not meeting at middle; middle piece bearing a series of teeth, the lateral pieces bearing setae or pectinate. A large, distally acuminate lappet arising from coxosternum on each side.

Prehensors stout; the prosternum relatively long, without sclerotic lines; claws when closed much surpassing the anterior margin of head; unarmed with teeth.

Spiracles all circular. Sternites with no pores evident.

Last sternite very wide, trapeziform, its sides convex and the caudal margin moderately incurved. Coxal pores four on each side.

Anal pores large.

Anal legs not exceeding the penult in length, not specially thickened, bearing a well-developed claw.

Pairs of legs: 65.

Length: 25 mm.

Locality: CALIFORNIA: Marin Co., 1½ mi north of Dillon Beach.

The single type was taken 26 July 1960, "in the upper zone in a fissure in rock" kept moist by spray but not covered at high tide. The specimen was kindly transmitted by J. W. Hedgpeth, Director of the Pacific Marine Station.

SCHENDYLIDAE

Gosendyla new genus

Labrum in form of an obtuse, apically somewhat rounded reentrant angle, the middle portion bearing a series of numerous stout conical teeth. First maxillae without lappets. Coxae of second maxillae united at middle and without median sulcus; claw of palpus closely pectinate on both margins.

Ventral pores absent.

Coxal pores small and numerous.

Anal pores present.

Type species: Gosendyla socarnia new species.

Close to the Guatemalan *Sogolabis* in the presence of anal pores and the numerous coxal pores, but differing in having the claws of the second maxillae bipectinate instead of smooth.

Gosendyla socarnia new species

Head as wide as long, the sides convex, the anterior margin obtusely rounded and the caudal margin weakly convex. Antennae long, with the terminal article as long as, or a little longer than, the two preceding articles taken together.

Labrum forming an obtuse reentrant angle with the deeper middle portion strongly armed with teeth which in middle portion are conical but laterally become distally rounded and somewhat creniform; beyond the dentate series on each side the labral margin wholly smooth. Coxae of second maxillae broadly united at middle but anteriorly showing a pale median line; anterior margin of coxosternum showing a small reentrant angle at middle; claw of palpus long, closely pectinate on both margins.

Prehensors with claw and other parts wholly unarmed; claws when closed attaining anterior margin of head; no sclerotic lines evident.

Sternites with a median longitudinal sulcus; with no pores.

Last ventral plate somewhat shield-shaped, caudally widely rounded. Coxopleurae inflated making the last pediferous segment notably wider transversely than the preceding segment or two; pores small and numerous, subseriately arranged.

Anal pores present.

Last legs with telopodite six-jointed; in male strongly inflated; claw absent; clothed throughout with very short setae.

Pairs of legs: 49.

Length: 20 mm.

Locality: UTAH: Dry Canyon, near University of Utah campus.

Zygona new genus

Labrum nearly straight transversely, but noticeably incurved at middle; median portion dentate; lateral margins smooth. First maxillae with a specialized, distally somewhat fimbriate lappet from coxosternum on each side. Second maxilla with claw of palpus well developed and smooth.

Prehensors with prosternum and other articles lacking teeth; claws when closed surpassing anterior margin of head.

Tergites bisulcate.

Last sternite broad. Coxal glands composite, opening through two pores on each side.

Anal pores present.

Anal legs with telopodite composed of six articles; claw well developed.

Type species: Zygona duplex new species.

Distinguished especially by the composite coxal glands.

Zygona duplex new species

Body with dorsum showing a dark geminate stripe, this more distinct posteriorly than anteriorly.

Head much longer than wide (17:11). Antennae long, the last article much shorter than the two preceding taken together.

Prebasal plate exposed.

Clypeus bearing numerous well-spaced setae over entire surface. Labrum over middle portion bearing a nearly straight series of stout teeth, the lateral margins smooth. First maxillae with coxae fused; palpus thick, biarticulate, the terminal article rounded and bearing long setae, with similar setae at distal end of penult article; at base of palpus arising from coxa a peculiar lappet bearing at distal end a series of setae directed mesad, fimbriate. Second maxillae with claws entirely smooth; all joints bearing numerous long setae, the second bearing on its outer side toward distal end a stout spine.

Tergites smooth, bisulcate. Sternites with a median longitudinal sulcus, lacking pores. Spiracles all circular, the first scarcely enlarged.

Last ventral plate broadly trapeziform. Coxal glands composite, the simple glands aggregated into two groups and opening through two pores on each side.

Anal pores present.

Anal legs longer and thicker than the penult but not crassate.

Pairs of legs: 53.

Length: 33 mm.

Locality: ARIZONA: Santa Rita Mountains, Madison Canyon. Holotype taken 10 September 1941.

Vol. 73, pp. 245–260 30 December 1960

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

XYRIDACEAE FROM BRAZIL—II[1]

By Lyman B. Smith and Robert J. Downs
U. S. National Museum, Smithsonian Institution, and U. S. Department of Agriculture

Since our first paper in this series we have begun preparation of a comprehensive study of all the Xyridaceae of Brazil, but as completion is still distant it seems well to record certain novelties and discoveries now. Noting the strongly contrasting specific characters of the epidermis shown in a few cases by Malme in his monographic work,[2] we have made a concerted effort to examine and illustrate sections wherever possible. In assessing the value of cellular characters we have been greatly aided by Sherwin Carlquist, whose generic studies in the Xyridaceae[3] are a model which we would sometime like to attain. Abbreviations for herbaria are those of the fourth edition of the "Index Herbariorum," of Lanjouw and Stafleu.

Xyris (*Xyris*) *brevifolia* Michx. Fl. Bor. Am. 1:23. 1803; Malme, Arkiv Bot. 22A, no. 15:3. 1929.

Rio de Janeiro: Without further locality, St-Hilaire Catal. B[2] no. 121 (P). Pontal Beach, Araial do Cabo, Município de Cabo Frio, 3 June 1953, F. Segadas Vianna et al, no. Restinga—I 440 (R, US).

Malme indicated that he was quite dubious that this native species of southeastern United States could also be native in Brazil, and with the information then available his was a logical conclusion. However, with the discovery of new material it appears more likely that the species is native in Brazil, because Cabo Frio is remote from the centers where introductions would be likely. Also such parallel cases as *Arenaria*

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[1] The present study was based in part on material collected by the senior author under a grant from the National Science Foundation. Number one of this series was in the Jour. Washington Acad. Sci., 44(10): 311–313, 1 fig. October 1954.

[2] Malme, G. O. A:N. Xyris L., Untergattung Nematopus (Seubert). Entwurf einer Gliederung. Arkiv Bot. 13(3): 1–103, Figs. 1–5. 19 August 1913.

[3] Carlquist, Sherwin. Anatomy of Guayana Xyridaceae: Abolboda, Orectanthe, and Achlyphila. Mem. New York Bot. Gard. 10(2): 65–117, Figs. 1–129. 30 April 1960.

groenlandica (Retz) Spreng.,[4] *Hypericum gentianoides* (L.) B.S.P.,[5] and *Proserpinaca palustris* L.[6] add strength to the belief that this is a natural pre-Columbian distribution. Saint-Hilaire gave no locality, but he was at Cabo Frio; thus the two collections, although separated by more than a century, may be from the same locality.

Xyris (Nematopus) archeri Smith and Downs, new species

Fig. 1

Caespitosa, subcaulescens sed bulbosa; rhizomate brevi; radicibus tenuibus; foliis manifeste distichis, ad 10 cm longis, ensiformi-linearibus, glabris vel margine minutissime ciliatis; vaginis ca. 25 mm longis, minutissime rugosis, hyalino-marginatis, superne quam laminis paulo angustioribus, apice ligula acuta aucta, basi dilatatis et atro-castaneis, laevibus; laminis ad 1.5 mm latis, apice asymmetrice acutis, nervatis, nervis submarginalibus incrassatis; cuticula utrinque tenuissima, vix manifesta; cellulis epidermalibus in sectione transversa suborbicularibus, 20–25 μ diametro, parietibus exterioribus 3–10 μ crassis, alteris distincte tenuioribus, cellularum parte intima persistente; scapis terminalibus et lateralibus, vix distincte tortis, gracillimis, 16–31 cm altis, teretibus, laevibus vel obscure costatis; vagina scaporum distincte laminata, quam foliis paulo breviore; spica ovoidea vel ellipsoidea dein floribus patentibus subglobosa, 8–9 mm longa, ca. 10-flora; bracteis arcte imbricatis, infimis valde reductis, obovatis, uninerviis, florigeris late ellipticis, apice late rotundatis cuspidatisque, quam sepalis paulo brevioribus, integris, late convexis, glabris, opacis, minute rugosis, atro-brunneis, area dorsali carentibus; sepalis lateralibus ca. ½ connatis, inaequaliteralibus, lanceolatis, acutis, 6 mm longis, carina basi glabra, alibi dense ferrugineo-pilosa; limbo petalorum obovato, 4.5 mm longo; antheris oblongis, 1.5–2 mm longis; staminodiis penicillatis; ovario ellipsoideo; placentis basalibus; seminibus obovoideis, apiculatis.

Type in the U. S. National Herbarium, No. 2,121,775, collected in campo, Serra do Cipó at kilometer 119, Município de Santa Luzia, State of Minas Gerais, Brazil, 6 August 1936, by W. A. Archer and Mello Barreto (No. 4977).

Paratype: Brazil: Minas Gerais: Município Conceição: Campo, Estrada de Conceição, 7 August 1933, Mello Barreto 4353 (US).

In its general habit, *Xyris archeri* appears to be a very slender variety of *X. obtusiuscula* Alb. Nilsson, and it also resembles it in its floral bracts and connate sepals. However, the essentially eciliate leaves and exserted sepals distinguish *X. archeri* sufficiently to warrant specific designation.

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[4] Smith, L. B., and Downs, R. J. Resumo preliminar das Cariofiláceas de Santa Catarina. Sellowia, No. 12: 123. 1960.

[5] Smith, L. B. Notes on South American Phanerogams—II. Jour. Washington Acad. Sci. 48: 313. 1958.

[6] Reitz, P. R. As Halorrhagaceae de Santa Catarina. Sellowia, No. 6: 239. 1954.

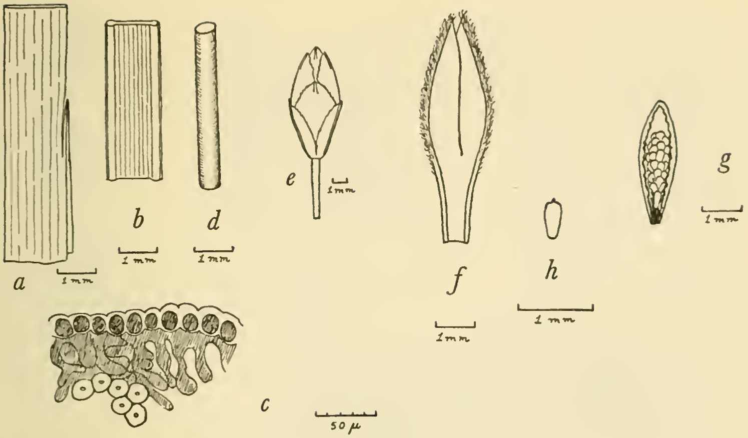

FIG. 1

Xyris (Nematopus?) egleri Smith and Downs, new species
Fig. 2

Caespitosa, acaulis; radicibus tenuibus; foliis spiraliter ordinatis, vix manifeste distichis, ensiformi-linearibus, ad 16 cm longis, omnino glabris; vaginis ca. tertiam partem folii occupantibus, superne quam laminis haud latioribus, eligulatis, basi paulo dilatatis et haud vel vix atrioribus; laminis ad 4 mm latis, apice asymmetrice lateque acutis, viridibus, ex sicco plus minusve nervatis, nervis submarginalibus incrassatis; cuticula utrinque tenuissima, vix manifesta; cellulis epidermalibus in sectione transversa fere aequalibus sed marginalibus paulo prominentibus, subquadratis, 50–60 μ altis, parietibus exterioribus 5–10 μ crassis, alteris multo tenuioribus, cellularum parte intima persistente; scapis terminalibus, spiraliter tortis, ad 56 cm altis, superne bialatis, 2–2.5 mm latis, minutissime punctulatis; vagina scaporum folias subaequante, in apiculum foliaceum excurrente, viridi; spica permultiflora, semiglobosa, 12–14 mm diametro; bracteis patentibus, basilaribus inflorescentiam involucrantibus, duabus infimis linearibus, reliquas aequantibus vel paulo superantibus, fertilibus anguste obovatis, acutis, apice carinatis et late tenuiterque brunneo-marginatis, sepala multo superantibus, area dorsali carentibus, glabris; sepalis lateralibus liberis, subaequilateris, ellipticis, obtusis, basi attenuatis, ala carinali angusta, ad apicem versus minute ciliata; limbo petalorum obovato, 3 mm longo; antheris oblongis, ca. 1 mm longis; staminodiis bibrachiatis, penicillatis; in ovariis perjuvenilibus placentis haud exacte visis.

Type in the U. S. National Herbarium, No. 2,283,916, collected in swampy campo, Missão Velha, Rio Cururú, Alto Tapajós, State of Pará, Brazil, 19 July 1959, by W. A. Egler (No. 953) and Raimundo. Isotype in the Museu Paraense "Emilio Goeldi" (No. 23.766).

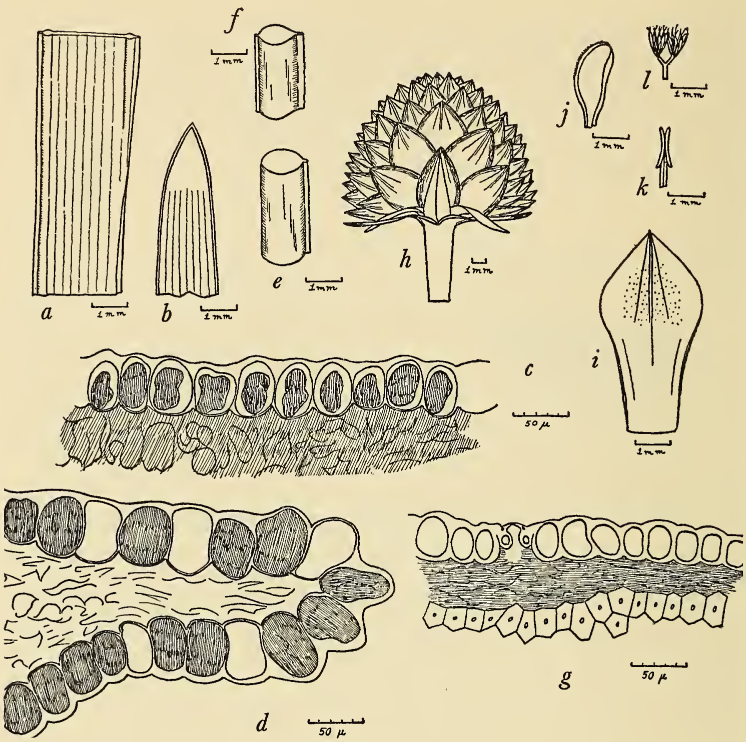

FIG. 2

At first glance this plant appears to be a variety of *Xyris involucrata* Nees, with a short involucre and undoubtedly it is a close relative. However, the glabrous leaves and scape and the markedly different floral bracts (cf Idrobo, Caldasia, 6(29): 212, Fig. 12e, 1954) indicate that *Xyris egleri* is a distinct species.

Xyris (Nematopus) hatschbachii Smith and Downs, new species

Fig. 3

Subbulbosa; radicibus tenuibus; foliis spiraliter ordinatis, vix manifeste distichis, ensiformi-linearibus, ad 20 cm longis, glabris; vaginis 4–8 cm longis, superne quam laminis haud latioribus, eligulatis, basi valde dilatatis et aterrimo-castaneis; laminis spiraliter tortis, haud 1.5 mm latis, acuminatis, viridibus, transverse rugulosis, ex sicco plus minusve nervatis, nervis submarginalibus haud incrassatis; cuticula utrinque tenuissima, vix manifesta; cellulis epidermalibus lateralibus in sectione transversa subaequalibus, suborbicularibus, 35–40 μ altis, parietibus exterioribus 10–15 μ crassis, alteris multo tenuioribus, cellularum parte

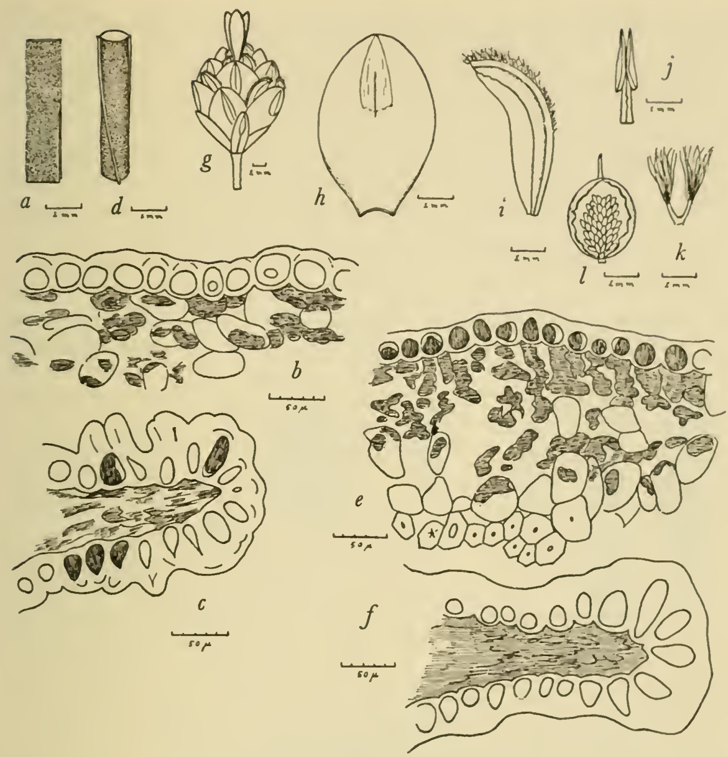

FIG. 3

intima non persistente, cellulis marginalibus irregulariter prominentibus incrassatisque; scapis terminalibus, spiraliter tortis, ad 33 cm altis, 1 mm diametro, minute rugulosis, bicostatis; cellulis epidermalibus in sectione transversa earum foliorum valde similibus sed parte intima persistente, eis costarum prominentibus et cum parte intima non persistente; vagina scaporum quam foliis subduplo brevioribus, breviter laminatis; spica submultiflora, subglobosa, 8–9 mm longa; bracteis imbricatis, infimis valde reductis, florigeris late ellipticis rotundatisque, sepala subaequantibus, integris, fragilibus sed vix scarioso-marginatis, ex sicco aureo-brunneis, sublucidis, late convexis, area dorsali lanceolata cinereo-viridi 2.3 mm longa praeditis, plus minusve uninervatis, glabris; sepalis lateralibus liberis, valde inaequilateralis, falcato-oblongis, acutis, 4.7 mm longis, ala carinali angusta, supra medium dense rufo-fimbriata; limbo petalorum obovato-elliptico, 4 mm longo; antheris oblongis, valde retusis, ca. 2 mm longis; staminodiis bibrachiatis, penicillatis; placentis basalibus.

Type in the Herbário Anchieta, No. 36.939, collected in sandy campo, Serra São Luis de Purunã, Município de Campo Largo, State of Paraná, Brazil, altitude 1150 m, 6 January 1948, by G. Hatschbach (No. 828). Negative No. 5457 in the U. S. National Herbarium.

The lateral sepals of *Xyris hatschbachii* are densely rufous-fimbriate on the upper half of the keel but not tufted at the apex. This character and others would relate it to *X. organensis* Malme, from which it differs in its rugulose leaves and scape and in its much smaller sepals. Its leaves are like those of *X. graminosa* Pohl ex Mart. only narrower, but its lateral sepals are no longer than the bracts and not white-tufted at apex.

Xyris (Nematopus) mima Smith and Downs, new species

Fig. 4

Caespitosa, acaulis; radicibus gracillimis; foliis manifeste distichis, ad 7 cm longis, ensiformi-linearibus, transverse rugulosis, subconcoloribus,

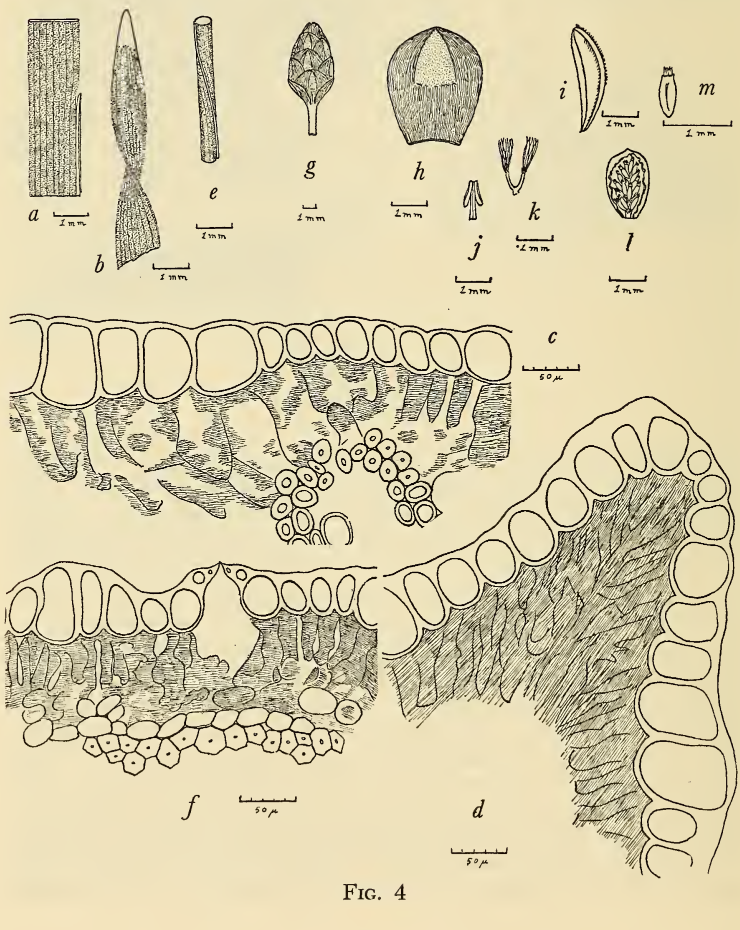

Fig. 4

eciliatis sed margine tuberculatis; vaginis obscuris, ca. tertiam partem folii occupantibus, superne quam laminis haud latioribus, apice ligula parva acuta auctis, basi rubescentibus et vix dilatatis; laminis spiraliter tortis, ad 2 mm latis, acuminatis et apice asymmetrice acutis vel subobtusis, leviter nervatis, nervis submarginalibus haud vel vix incrassatis; cuticula utrinque tenuissima, vix manifesta; cellulis epidermalibus lateralibus in sectione transversa valde inaequalibus, 35–85 μ altis, oblongis vel suborbicularibus, parietibus subaequalibus, ca. 5 μ crassis, cellulis marginalibus extus haud vel valde incrassatis; scapis terminalibus, plus minusve tortis, gracilibus, ad 17 cm altis, subteretibus, rugosis, bicostatis; cellulis epidermalibus in sectione transversa valde inaequalibus; vagina scaporum brevissime laminata, quam foliis subduplo breviore; spica ellipsoidea, 9 mm longa, 15–20 flora; bracteis arcte imbricatis, infimis valde reductis, florigeris late ellipticis, apice late rotundatis, sepala superantibus, integris, late convexis, glabris, ex sicco aureis, area dorsali lanceolata cinereo-viridi 1.5 mm longa praeditis; sepalis lateralibus liberis, subaequilateralis, navicularibus, obtusis, 3 mm longis, carina brevissime setoso-ciliata; limbo petalorum late elliptico, 2 mm longo; antheris oblongis, 0.8 mm longis; staminodiis bibrachiatis, penicillatis; ovario crasse ellipsoideo; placentis basalibus; seminibus ellipsoideis, 0.5–0.7 mm longis, apice coma paleacea pallida coronatis.

Type in the U. S. National Herbarium, No. 2,283,911, collected on artificial sandy field, Missão Nova, Rio Cururú, region of the upper Rio Tapajós, State of Pará, Brazil, 12 July 1959, by W. A. Egler (No. 791) and Raimundo. Isotype in Museu Paraense "Emilio Goeldi" (No. 23.767).

In general habit, *Xyris mima* is practically indistinguishable from *X. paraensis* Poepp. ex Kunth and its staminodes are penicillate also, but its leaves are finely rugose like those of typical *X. savanensis* Miq. The seeds of *X. mima,* however, have an apical coma of scales, while the seeds of the other two species are biapiculate and without any scales. Thus *X. mima* can scarcely be considered an intermediate as it would seem at first glance.

Xyris (Nematopus) moraesii Smith and Downs, new species

Fig. 5

Caespitosa, acaulis; radicibus tenuissimis; foliis spiraliter ordinatis, vix manifeste distichis, ensiformi-linearibus, ad 30 cm longis, concoloribus; vaginis inconspicuis, angustis, superne quam laminis haud latioribus, eligulatis, basi vix dilatatis, juvenilibus molliter albido-ciliatis; laminis 1.5 mm latis, acuminatis, glabris, nervatis, nervis submarginalibus haud incrassatis; cuticula utrinque tenuissima, vix manifesta; cellulis epidermalibus in sectione transversa oblongis, ca. 70 μ altis, 30–40 μ latis, parietibus subaequalibus vel exterioribus paulo incrassatis, marginalibus extus valde incrassatis; scapis spiraliter tortis, ad 50 cm altis, subteretibus, pluricostatis, costis majoribus dense minuteque ciliatis, alibi laevibus; cellulis epidermalibus in sectione transversa oblongis cum luminibus globosis, 35–45 μ altis, parietibus exterioribus ca. 15 μ crassis, alteris multo tenuioribus, eis costarum et subcostarum majoribus, extus valde incrassatis; vagina scaporum sine lamina, ad 10 cm longa; spica subglobosa, 7–8 mm diametro, pluriflora; bracteis laceratis, infimis valde reductis, florigeris suborbicularibus, sepala superantibus, opacis, ex sicco aureo-brunneis, minute granulosis, area dorsali parva angusta viridi praeditis; sepalis lateralibus liberis, subaequilateris, lanceolatis, acutis, 5 mm longis, carina lata, obscure sparseque denticulata; placentis basalibus; seminibus ellipsoideis, biapiculatis, 0.3 mm longis.

Type in the U. S. National Herbarium, No. 2,325,427, collected on flat sandy shores, State of Paraíba, Brazil, 30 August 1959, by Jayme Coêlho de Moraes (No. 2224).

In most of its diagnostic characters, *Xyris moraesii* appears related to *X. nilssonii* Malme, but differs in its eciliate evenly nerved leaf-blades, subglobose spikes, and dark-margined bracts. No locality within Paraíba is given, although probably the collection was made in the vicinity of the Escola de Agronomía do Nordeste, Areia, where the late Professor Moraes taught.

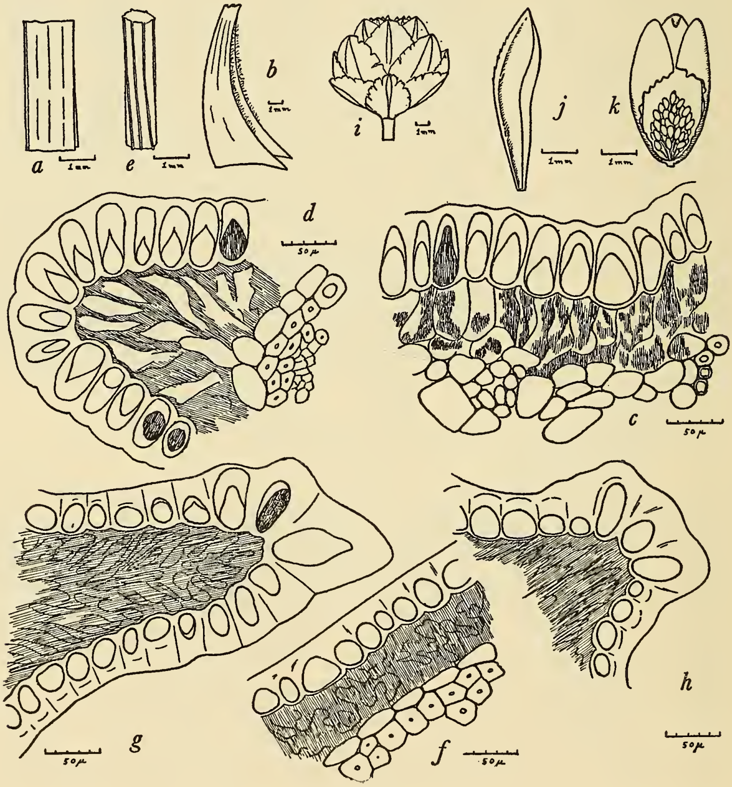

FIG. 5

Xyris (Nematopus?) piresiana Smith and Downs, new species
Fig. 6

Caespitosa, acaulis; radicibus tenuibus; foliis manifeste distichis, ensiformi-linearibus, ad 25 cm longis sed nonnullis sine laminis; vaginis angustissime triangularibus, ad 35 mm longis, superne quam laminis latioribus, atro-castaneis, anguste pallido-marginatis, glabris, lucidis, basi levissime auriculatis, apice ligula acuta 3 mm longa praeditis; laminis ad 2.5 mm latis, margine pallidis valde incrassatisque, latere plus minusve granulosis, margine interiore basi minute pubescente, alibi glabris, per aetate rubescentibus; cuticula utrinque tenuissima, vix manifesta; cellulis epidermalibus lateralibus in sectione transversa uniseriatis, oblongis, 60–100 μ altis, luminibus sat magnis, parietibus exterioribus ca. 20 μ crassis, alteris multo tenuioribus, cellulis marginalibus multiseriatis, ab eis lateralibus abrupte distinctis, polygonatis cum luminibus minimis, 20–60 μ diametro; scapis spiraliter tortis, ad 34 cm altis, superne complanatis sed haud costatis, minute granulosis; cellulis epidermalibus in sectione trans-

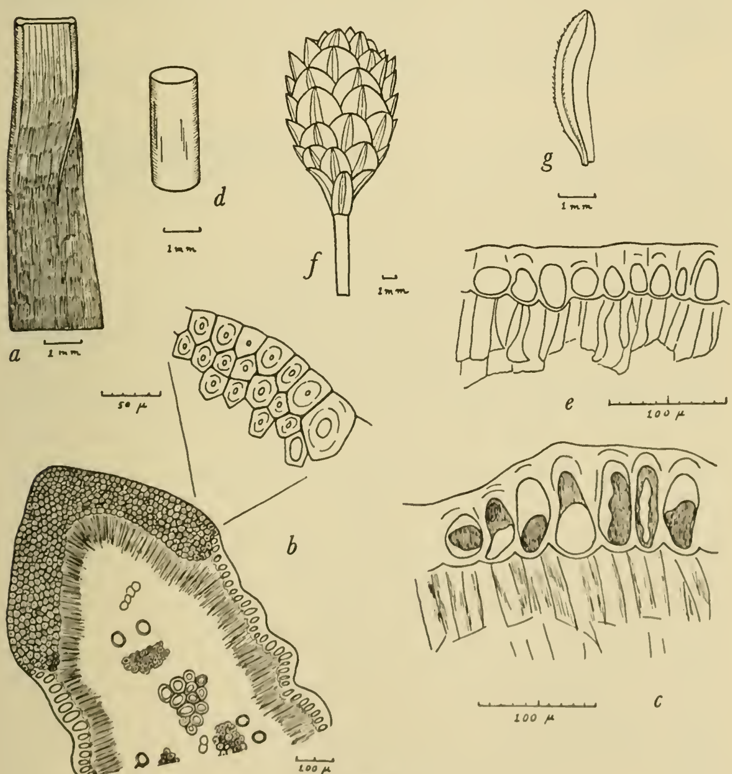

Fig. 6

versa oblongis, 40–50 μ altis, parietibus exterioribus 15–20 μ crassis, alteris tenuibus; vagina scaporum breviter laminata, eas foliorum duplo vel triplo superante; spica ellipsoidea, 10–12 mm longa, multiflora; bracteis arcte imbricatis, infimis valde reductis, ellipticis, area dorsali longa praeditis, florigeris late ellipticis, apice late rotundatis et macula rubra praeditis, sepala superantibus, integris, area dorsali oblonga 2–3 mm longa praeditis, haud carinatis, brunneis, glabris; sepalis lateralibus liberis, inaequilateris, suboblongis, apice late rotundatis, ala carinali angusta, minute ciliata; limbo petalorum elliptico, 2 mm longo; antheris oblongis.

Type in the New York Botanical Garden, collected at the airport, Serra do Cachimbo, State of Pará, Brazil, altitude 425 m, 18 December 1956, by J. M. Pires, G. A. Black, J. J. Wurdack, and N. T. Silva (No. 6457).

Paratypes: Brazil: Pará: Rio Cururú, upper Rio Tapajós Basin: Wet sand, Creputiá, Egler and Raimundo 1226 (MG, US); 1250 (MG, US). Missão Velha, Egler and Raimundo 1284 (MG, US).

The broad leaf-sheaths of *Xyris piresiana* place it with south Brazilian species like *X. lucida* Malme, but the rounded short-ciliate sepals distinguish it from this group. The paratypes are more slender plants with narrower leaves but do not differ in any essential character.

Xyris (Nematopus) ramboi Smith and Downs, new species

Fig. 7

Caespitosa, subbulbosa sed subcaulescens; rhizomate crasso, brevi, verticali; radicibus tenuibus; foliis manifeste distichis, ensiformi-linearibus, valde applanatis, ad 11 cm longis; vaginis ca. dimidiam partem folii occupantibus, opacis, superne quam laminis haud latioribus, eligulatis, basi valde dilatatis et atris, valde tuberculatis; laminis 4–6 mm latis, sursum angustatis, apice asymmetrice rotundatis vel late acutis, in sicco paulo striatis, utroque latere basi valde tuberculatis sed sursum gradatim decrescentibus, aciebus minute denseque ciliatis, nervis submarginalibus haud vel vix incrassatis; cuticula utrinque tenuissima, vix manifesta; cellulis epidermalibus lateralibus in sectione transversa subaequalibus, 70–90 μ altis, parietibus exterioribus ca. 10 μ crassis, alteris etiam tenuioribus, cellulis marginalibus altioribus, parietibus exterioribus ad 40 μ crassis; scapis terminalibus et lateralibus, vix spiraliter tortis, ad apicem versus bicostatis, 8–20 cm altis, costis dense ciliatis exclusis fere 1 mm diametro, alibi glabris, ad basin versus minutissime tuberculatis; cellulis epidermalibus in sectione transversa 50 μ altis, parietibus exterioribus ad 20 μ crassis, alteris multo tenuioribus; vagina scaporum quam foliis breviore, in apiculum foliaceum brevem excurrente, brunnea; spica submultiflora, ellipsoidea, 10–13 mm longa; bracteis vetustis solum cognitis, patentibus, ellipticis, late rotundatis, ad 5 mm longis, sepala subaequantibus, coriaceis, integerrimis vel apice per aetatem minute erosis, ecarinatis, uninervatis, pallide brunneis, opacis, area dorsali carentibus, laevibus, glabris, infimis reductis; sepalis lateralibus liberis, lineari-oblanceolatis, acutis, ca. 5 mm longis, subaequilateris, apice incurvata, ala carinali angusta, apice minute ciliata; placentis basalibus.

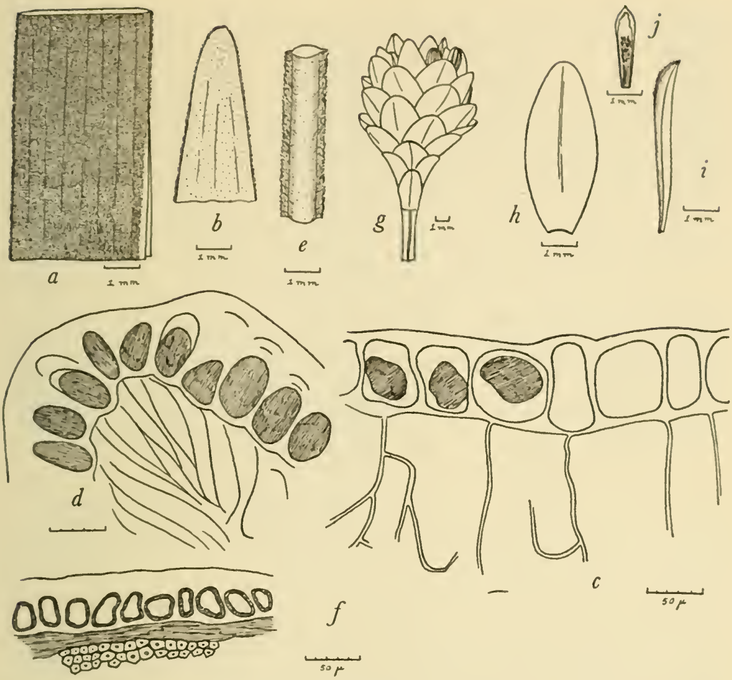

FIG. 7

Type in the Herbário Anchieta, No. 3486, collected on the airport, Caravelas, State of Bahia, Brazil, 12 January 1940, by B. Rambo. Negative No. 5472 in the U. S. National Herbarium.

The broad flat leaf-blades of *Xyris ramboi* quickly distinguish it from the nearly related *X. bahiana* Malme, but in most other characters they are very similar.

Xyris (Nematopus) reitzii Smith and Downs, new species

Fig. 8

Densissime caespitosa; radicibus ad 1 mm diametro; foliis ultra 50 cm longis, glabris; vaginis superne quam laminis multo latioribus, late ligulatis, omnino atro-castaneis, sublucidis vel opacis, 9–13 cm longis, basi valde dilatatis; laminis subteretibus, paulo ultra 1 mm diametro, fascis fibro-vascularibus 7 praeditis, ad basin versus plus minusve rugulosis; cuticula utrinque tenuissima, vix manifesta; cellulis epidermalibus in sectione transversa uniformibus, oblongis cum lumine parva globosa vacua, 40 μ altis, parietibus exterioribus 20 μ crassis, alteris multo tenuioribus; scapis terminalibus, ad 80 cm altis vel ultra, subteretibus, ecostatis, ex sicco minute nervatis; cellulis epidermalibus in sectione transversa eis

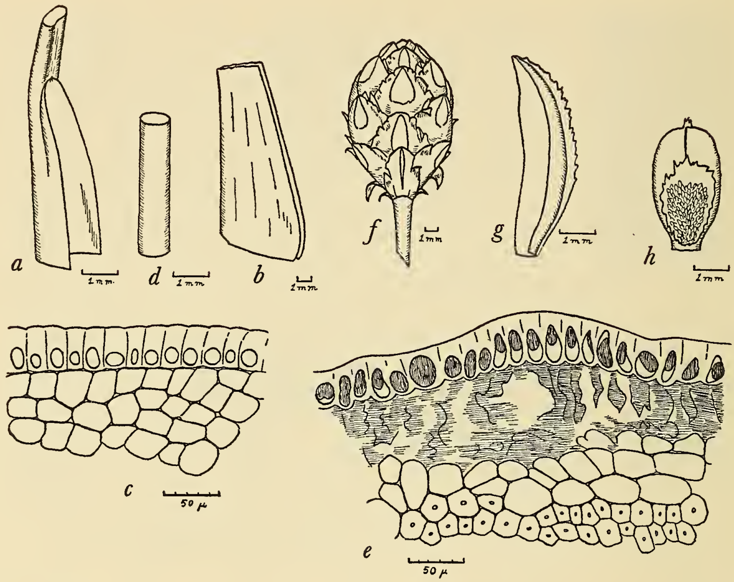

FIG. 8

foliorum similibus sed partibus interioribus praeditis; vagina scaporum 15–18 cm longa, breviter sed manifeste laminata; spica multiflora, crasse ellipsoidea, 12 mm longa; bracteis arcte imbricatis, infimis manifeste reductis, florigeris late ellipticis rotundatisque, sepala subaequantibus, margine tenuibus, mox laceratis, glabris, area dorsali ovata viridi prae-

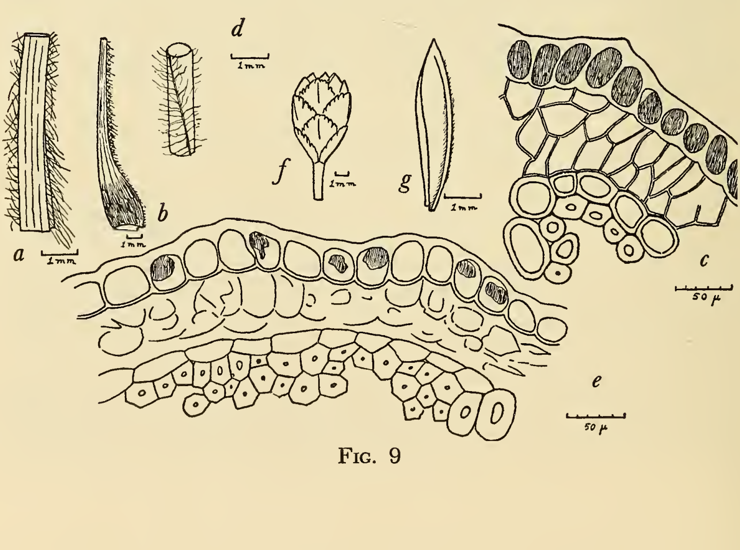

FIG. 9

ditis; sepalis lateralibus liberis, valde inaequilateris, semi-ellipticis, acutis, 6 mm longis, glabris, ala carinali supra medium dilatata et valde lacerata; placentis basalibus.

Type in the U. S. National Herbarium, No. 2,325,426, collected in bog, 5 kilometers east of Faxinal dos Guedes, Município de Xanxerê, State of Santa Catarina, Brazil, altitude 700–900 m, 3 January 1957, by L. B. Smith and Pe. R. Reitz (No. 9818). Isotypes in Herbário "Barbosa Rodrigues" and Museu Nacional, Rio de Janeiro.

Paratype: Brazil: Santa Catarina: Município Campo Alegre: Between Postema and Morro Iquererim, alt. 900–1000 m, 7 November 1956, L. B. Smith and R. Klein 7451 (HBR, R, US).

Xyris reitzii belongs to the difficult species complex of southern Brazil with broad dark leaf-sheaths and prominent dorsal areas. Its nearest relative is probably *X. vacillans* Malme, but it differs from all in its glabrous and broadly lacerate-carinate lateral sepals.

Xyris (Nematopus?) tomentosa Smith and Downs, new species

Fig. 9

Caespitosa, acaulis, bulbosa: radicibus tenuissimis; foliis heteromorphis, extimis ad vaginas parvas late ovatas atro-castaneas reductis; intimis paucis laminigeris, ad 23 cm longis; vaginis intimis elongatis, superne quam laminis haud latioribus, basi paulo dilatatis, eligulatis; laminis planis, 1 mm latis, ex sicco plus minusve nervatis, margine longe denseque albo-tomentosis; cuticula utrinque tenuissima, vix manifesta; cellulis epidermalibus in sectione transversa uniformibus, late oblongis, 40–50 μ altis, partibus interioribus persistentibus, parietibus subaequalibus, tenuibus; scapis spiraliter tortis, gracillimis, ad 37 cm altis, lineatim albo-tomentosis; cellulis epidermalibus in sectione transversa subquadratis, 40–50 μ altis, parietibus exterioribus ca. 10 μ crassis, alteris tenuioribus; vagina scaporum breviter laminata, quam foliis duplo vel triplo breviore; spica ellipsoidea, 6 mm longa, pauciflora; bracteis arcte imbricatis, infimis paulo reductis, floriferis late ellipticis, sepala superantibus, plus minusve uninervatis, ex sicco aureo-brunneis, tenuibus, sine area dorsali, valde laceratis, apice rubro-hyalino-marginatis; sepalis lateralibus liberis, inaequilateris, suboblongis, apice rotundatis, ca. 5 mm longis, ala carinali angusta, minute pubescenti; limbo petalorum elliptico, 3 mm longo; antheris oblongis, 1.5 mm longis; staminodiis penicillatis; in ovariis perjuvenilibus placentis haud exacte visis.

Type in the U. S. National Herbarium, No. 2,324,957, collected on wet sandy soil, Erereri, Rio Cururú, region of the upper Rio Tapajós, State of Pará, Brazil, 8 February 1960, by W. A. Egler (No. 1273) and Raimundo. Isotype in Museu Paraense "Emilio Goeldi" (No. 24.320).

The conspicuous indument on the scape of *Xyris tomentosa* is reminiscent of that in *X. lanuginosa* Seub., but in *X. lanuginosa* it is evenly distributed while in our species it is confined to two vertical lines.

Abolboda egleri Smith and Downs, new species
Fig. 10

Perennis; radicibus paucis, crassis; rhizomatibus brevissimis sed ramosis; foliis plurimis, densissime rosulatis; vaginis ellipticis, 5 mm longis, planis; laminis linearibus, ad 3 cm longis, 0.8 mm latis, planis, supra laevibus, subtus valde carinatis, margine incrassatis integrisque, apice seta pallida tenuissima 4 mm longa praeditis; cuticula utrinque tenuissima, vix manifesta; cellulis epidermalibus dorsalibus in sectione transversa subquadratis, 30–40 μ altis, vacuis, parietibus subaequalibus, tenuibus; cellulis ventralibus quadratis vel polygonatis, vix 20 μ diametro, luminibus minimis; cellulis marginalibus inter alias intermediis; scapo unico, ad 9 cm alto, 1 mm diametro; scapi vaginis 1-jugatis, suboppositis, submedianis, amplectantibus, lanceolatis, 9–11 mm longis, membranaceo-marginatis, apice seta brevissima praeditis; inflorescentia simplicissima, spicata, ellipsoidea, 9–10 mm longa, pauciflora; bracteis late ovatis,

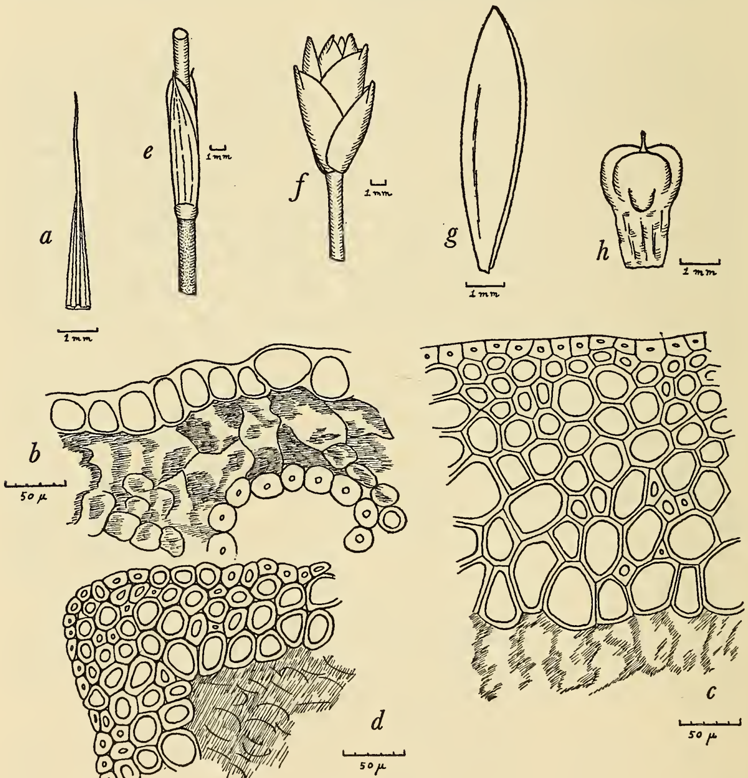

Fig. 10

breviter crasseque apiculatis, ad 7 mm longis, late convexis, induratis, apice late scarioso-marginatis, area dorsali viride carentibus, infimis fertilibus, ab alteris superatis; sepalis ellipticis, late acutis, 7 mm longis; petalis verisimiliter caeruleis.

Type in the U. S. National Herbarium, No. 2,324,956, collected on swampy ground, Erereri, Rio Cururú, region of the upper Rio Tapajós, State of Pará, Brazil, 8 February 1960, by W. A. Egler (No. 1271) and Raimundo. Isotype in Museu Paraense "Emilio Goeldi" (No. 24.318).

This *Abolboda egleri* combines the short basal bracts and long-setose leaf-apices of *A. pulchella* H. and B. with the narrow, very numerous leaves of *A. acicularis* Idrobo and Smith. It differs from both species in having the underside of the leaf-blade prominently carinate.

Explanation of Figures

Fig. 1.—*Xyris archeri*: *a*, apex of leaf-sheath; *b*, section of leaf-blade; *c*, section of leaf-epidermis; *d*, section of scape; *e*, spike; *f*, lateral sepals; *g*, ovary (opened); *h*, seed.

Fig. 2.—*Xyris egleri*: *a*, apex of leaf-sheath; *b*, apex of leaf-blade; *c*, section of leaf-epidermis, lateral; *d*, same, marginal; *e*, section of scape 7 cm from base; *f*, same, 7 cm from apex; *g*, section of scape-epidermis; *h*, spike; *i*, floral bract; *j*, lateral sepal; *k*, stamen; *l*, staminode.

Fig. 3.—*Xyris hatschbachii*: *a*, apex of leaf-sheath; *b*, section of leaf-epidermis, lateral; *c*, same, marginal; *d*, section of scape; *e*, section of scape-epidermis; *f*, same, of costa; *g*, spike; *h*, floral bract; *i*, lateral sepal; *j*, stamen; *k*, staminode; *l*, ovary (opened).

Fig. 4.—*Xyris mima*: *a*, apex of leaf-sheath; *b*, apex of leaf-blade; *c*, section of leaf-epidermis, lateral; *d*, same, marginal; *e*, section of scape; *f*, section of scape-epidermis; *g*, spike; *h*, floral bract; *i*, lateral sepal; *j*, stamen; *k*, staminode; *l*, ovary (opened); *m*, seed.

Fig. 5.—*Xyris moraesii*: *a*, apex of leaf-sheath; *b*, base of leaf-sheath; *c*, section of leaf-epidermis, lateral; *d*, same, marginal; *e*, section of scape; *f*, section of scape-epidermis; *g*, same of main costa; *h*, same of subcosta; *i*, spike; *j*, lateral sepal; *k*, ovary (opened).

Fig. 6.—*Xyris piresiana*: *a*, apex of leaf-sheath; *b*, section of leaf and marginal epidermis; *c*, same, lateral; *d*, section of scape; *e*, section of scape-epidermis; *f*, spike; *g*, lateral sepal.

Fig. 7.—*Xyris ramboi*: *a*, apex of leaf-sheath; *b*, apex of leaf-blade; *c*, section of leaf-epidermis, lateral; *d*, same, marginal; *e*, section of scape; *f*, section of scape-epidermis; *g*, spike; *h*, floral bract; *i*, lateral sepal; *j*, ovary (opened).

Fig. 8.—*Xyris reitzii*: *a*, apex of leaf-sheath; *b*, base of leaf-sheath; *c*, section of leaf-epidermis; *d*, section of scape; *e*, section of scape-epidermis; *f*, spike; *g*, lateral sepal; *h*, ovary (opened).

Fig. 9.—*Xyris tomentosa*: *a*, apex of leaf-sheath; *b*, base of leaf-sheath; *c*, section of leaf-epidermis; *d*, section of scape; *e*, section of scape-epidermis; *f*, spike; *g*, lateral sepal.

Fig. 10.—*Abolboda egleri*: *a*, apex of leaf-blade; *b*, section of leaf-epidermis, dorsal; *c*, same, ventral; *d*, same, marginal; *e*, section of scape with bracts; *f*, spike; *g*, lateral sepal; *h*, ovary.

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JAPYGIDAE OF NORTH AMERICA 7. A NEW GENUS IN THE PROVALLJAPYGINAE FROM MISSOURI

By Leslie M. Smith
University of California, Davis

In 1936, while conducting a survey of insects in the soil of peach orchards, W. F. Turner collected a single specimen of a species of japygid which presents so many unique features that it seems worth-while to record its existence. This specimen, which I shall call *Eojapyx pedis* has plumose body setae and other characters which place it in the subfamily Provalljapyginae. The characteristic of plumose body setae is found only in this subfamily and in the subfamily Evalljapyginae. No specimens of either subfamily have ever been found east of the Rocky Mountains, but are common along the Pacific Coast and in Mexico. The specimen of *E. pedis* was collected in Stoddard County, Missouri, at least a thousand miles east of its near relatives.

During the soil survey of peach orchards, several thousand specimens of *Parajapyx isabellae* (Gr.) as well as a few specimens of *Metajapyx subterraneus* (Packard) were taken. This points out the magnitude of the survey and the efficiency of collecting japygids. The capture of a single specimen of *E. pedis* therefore poses a question. It might be assumed that *E. pedis* represents a recent introduction from the Pacific Coast, especially since Stoddard County lies in the lowlands bordering the Mississippi River and therefore contiguous to marine commerce. However, anatomically, no counterparts of *E. pedis* have been found on the Pacific Coast.

The mandibles of *E. pedis* bear a resemblance to the mandibles of *P. isabellae* (Gr.) in that there are three major teeth with small secondary teeth between them. The setae in the male setose sac in the third sternite resemble those of some species of *Nanojapyx* but are more advanced in evolution. It is possible that each of the large brush-like setae is glandular and connected by a thin sclerotized duct to a glandular, secreting cell which lies farther back in the sac, and that the enlargement on the duct is a point of attachment. Some undescribed species of *Nanojapyx* in the writer's collection appear to indicate such a structure. The tarsi of *E. pedis* have two modified setae which arise ventrally, near the pretarsus and project between the tarsal claws. Somewhat similar setae are found on *Parajapyx* (*Grassjapyx*) *ambiguous* Pages, and they are reminiscent of setae on the tarsi of certain campodeids such as *Metriocampa* and *Campodea*. In recognition of this character the species is named pedis (foot) and the genus from eos (east) since it occurs far east of its nearest relatives.

Eojapyx, new genus

Type species: Eojapyx pedis L. Smith.

Small, under 0.4 mm long, body with many plumose setae, mandible with three large teeth bearing smaller accessory teeth or inner margin, antennae with 22 segments in type species, terminal segment of antenna with eight conspicuous placoid sensillae, legs relatively short, apical ventral setae on tarsi modified, tarsal claws equal, median claw prominent and curved, plumose setae in male sac large and with many pinnules (as illustrated) forceps nearly symmetrical, long, slender with a few basal teeth, pygidium rounded, prominent, all styli with two setae.

The genus *Eojapyx* is related to the genus *Nanojapyx* but is distinguished by the accessory teeth on the mandible, by the modified tarsal setae which project between the tarsal claws, by the smooth forceps with basal teeth only, by eight placoid sensillae on the terminal antennal segment (whereas *Nanojapyx* has only six), and by having two setae on each stylus (whereas *Nanojapyx* has only one on each).

Eojapyx pedis, new species

Male: Head: Antenna with 22 segments, trichobothria[1] typical, one-third longer than longest adjacent seta, ultimate segment slightly longer than wide, with eight placoid sensillae in an irregular whorl, each sensillum pear-shaped and recessed into a pocket, segment seven dorsal half with an irregular row of ten setae, ventrally two irregular rows of nine

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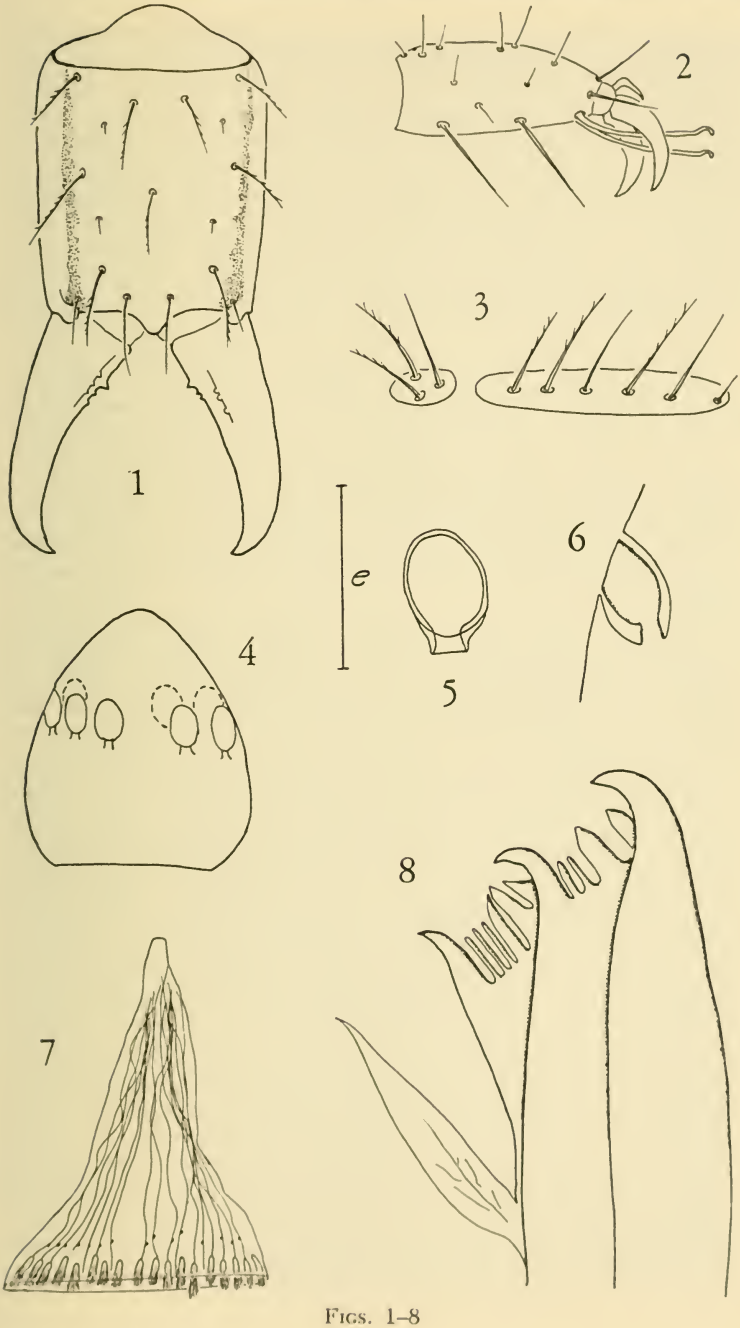
[1] Abbreviations and terms: M = plumose setae, generally large; m = simple setae, generally smaller; trichobothria = special sense-setae on antennal segments IV–VI; L_3 = metathoracic leg; pleuron composed of prepleurite situated anterior to the pleurite; carinae = laterad lines of sclerotization on dorsum of segment X; Acropygidium = mid-dorsal projection of segment X to the rear; apotome = anterior sclerite of an abdominal sternum.



Figs. 1–8

and eight setae each, segment twenty with two irregular whorls of 20 setae each, dorsum of head with four transverse rows of setae, about ten setae per row M alternating with m in the row, M with one or two pinnules, labrum with five hyaline sensory cones at tip, and 11 setae of which the median basal pair longer than the others, maxillary palpus three times as long as wide with seven setae near tip, thumb of galea with five projections, lacinia with four pectinate branches, the fifth or distal branch reduced to a slender rod, two-thirds as long as the adjacent branch, mandible with three prominent teeth, between the ventral and median teeth, four small accessory teeth; between the median tooth and dorsal tooth, six accessory teeth; thin membraneous prostheca present, labial palpi slightly clavate, three times as long as wide with two long apical setae and two shorter, subapical setae, protrusible pouches on labium typical.

Thorax: Pronotum with 7+7 M and 5+5 m, mesonotum and metanotum prescutum 1+1 M and no m, scutum with 10+10 M and 2+2 m, L_2 twice as long as greatest width of pronotum, dorsal apex of femur of all legs with a close row of three setae, of which anterior plumose, longest, the others simple, subequal, tibia L_3 with two stout, plumose setae (calcaria?) and 16 simple setae, tarsal claws subequal with median claw prominent, bent as a right angle, two long ventral setae with hooked ends project between tarsal claws, two large ventral setae per row on tarsus.

Abdomen: Tergite I prescutum 2M and no m, scutum 7+7 M with three to five coarse pinnules, and 6+6 m, sternite I with an irregular row of 9+9 small plumose setae anterior to subcoxal organs and within the limits of the styli; lateral subcoxal organs extending from near the styli to near the mid line, with one posterior row of 6+6 slender plumose sensory setae with large sockets, and one irregular row of glandular setae 13+15 half as long as sensory setae and anterior to sensory setae; median subcoxal organ absent, all styli with a slight secondary cone and two basal setae with laterad seta two and one-half times the length of mesad seta, and a basal pore between the setal sockets; tergite II with 17+17 plumose setae of various sizes with two to six pinnules 3+4 simple setae, pleuron II prepleurite with 2M and one large m, pleurite anterior to posterior 2M, m, M, m, and small m, sternum II apotome with a single row of 7+7 plumose setae alternating large and smaller, becoming smaller medially, sternite with 25+25 M with three to five stout pinnules, tergite III 24+24 plumose setae of various sizes and 4+4 simple setae, pleuron as in segment II, sternum III apotome as in segment II, sternite with opening of male setose sac surrounded by 22 short, stout plumose setae, plumose sac with 9+9 large brush-like plumose setae inside in a single row, each seta connected with a slender twisted rod with an enlargement near base of seta, segments IV to VII similar to segment II, postero-lateral angles of tergite VII not projected to rear, pleurae normal, segment VIII slightly carinate dorsally with 7+7 M and 5+5 m between carinae, sternum VIII with 9+2+9 M and 9+9 m, gential arifice oval surrounded by a ring of sixteen simple short setae, gential palpi absent, segment IX with

3+3 M dorsally, alternating with 3+3 simple setae half as long as the M, segment IX ventrally with 3+3 M alternating with 3+3 m, tergite X between carinae 4+1+4 M and four large simple setae along posterior edge, no setae in rectum, pygidium prominent, rounded, equal in length to stylus IV, segment X width 0.20 mm, length 0.25 mm, forceps nearly bilaterally symmetrical, slender, nearly straight, denticles biserial, located in basal fourth of forceps, left arm upper row three minute teeth lower row three slightly larger teeth, right arm upper row three minute denticles, lower row three slightly larger teeth, inner edge of both forceps straight, smooth, without crenulations, tips of forceps slightly curved; length of body including forceps 3.46 mm, length of forceps 0.17 mm, length of L_3 0.36 mm.

Female: Unknown.

Type: One male on a microslide with the label: Peach Orchard Survey, Stoddard County, Missouri, 25 September 1936. From W. F. Turner. T-1201, Lot 37-2482.

Type deposited in U. S. National Museum.

William F. Turner (personal communication) has supplied the following information: "Soil samples were collected from at least 10 different locations in an orchard. These samples were then thoroughly mixed before being introduced into the Berlese funnels. It was very seldom that any samples were taken at the very edge of an orchard. In any case, the samples in question were collected within 2 feet of the trunks of peach trees, and samples were not taken over 6 to 8 inches deep. The soil in the orchard was listed according to the U. S. Soil Surveys as Memphis silt loam. The top 10 to 12 inches was a brown silt (loess). This orchard was on the top of Crowley's ridge, which arises in southeast Missouri and runs south almost to the Louisiana line in Arkansas. The orchard had not been cultivated prior to harvest and the notes state that it was grown up in such weeds as *Solidago*, *Aster*, *Smilax*, *Eupatorium*, and blackberry, but that there was very little grass in the orchard. Under such circumstances the weed growth is, of course, much lighter under the trees than it is between trees. Nevertheless, there would be a considerable amount of such growth even to within 2 feet of the trunks of the trees. The soil was quite moist, it having rained just 2 days prior to the time when the soil collection was made."

In many specimens some setae may be missing. The types of missing seta, that is whether simple or plumose, can be inferred from the setal socket. Simple setae have simple, circular setal sockets whereas plumose setae have circular setal sockets with inner sclerotization leaving a U-shaped opening in which the seta may move backwards or forwards only. This generalization holds for body setae (but not setae on the head or appendages) in the Evalljapyginae as well as the Provalljapyginae.

The gut contents of the specimen are amorphous and show no insect or mite parts. The delicate structure of the mandibles may indicate that this species has abandoned the predatory habit completely. The absence of such specimens from all japygid collections which I have examined suggests that they normally occur at considerable depths in the soil.

Explanation of Figures

All figures are of *Eojapyx pedis* L. Smith from male specimen cleared, stained and mounted in balsam.

Fig. 1.—Dorsal view of tenth segment and forceps with all setae between carinae shown, and all other setae omitted, e = 0.15 mm..

Fig. 2.—Lateral view of metatarsus, e = 0.048 mm.

Fig. 3.—Lateral view of pleuron II showing prepleurite and pleurite, e = 0.084 mm.

Fig. 4.—Dorsal view of terminal antennal segment showing 8 placoid sensillae. All setae omitted, e = 0.028 mm.

Fig. 5.—Dorsal view of placoid sensilla, e = 0.001 mm.

Fig. 6.—Lateral view of placoid sensilla, e = 0.001 mm.

Fig. 7.—Ventral view of male setose sac, e = 0.053 mm.

Fig. 8.—Ventro-median view of left mandible with prostheca, e = 0.015 mm.

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A NEW SUBSPECIES OF THE CLIFF CHIPMUNK FROM CENTRAL CHIHUAHUA

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Recent collections made by field parties of the Museum of Vertebrate Zoology from numerous localities in Chihuahua have revealed that the cliff chipmunks (*Eutamias dorsalis*) inhabiting the relatively isolated Sierra del Nido have evolved to the point of subspecific distinctness. Numerous differences exist between the chipmunks of the Sierra del Nido and those representing all other nearby races of *E. dorsalis*. Furthermore, many of these differences are in seemingly unrelated characters so that considerable genetic divergence is indicated. This unique population of chipmunks is formally described below. Measurements were obtained only from individuals which had well-worn molariform teeth.

Eutamias dorsalis nidoensis, new subspecies

Type: Male, adult, skin, skull, and stained baculum; no. 124831, Mus. Vert. Zool., from 5 mi N Cerro Campana, 5600 ft, Chihuahua, Mexico; collected by W. Z. Lidicker, Jr., on 5 July 1959; original no. 1961.

Range: It is known to inhabit the Sierra del Nido complex of high country which includes the Sierra Santa Clara and Cerro Campana as well as the Sierra del Nido proper. Individuals have been collected or observed within an altitudinal range of from 5600 feet to over 8000 feet, although they are most common above 6000 feet. Although these mountains are relatively isolated by surrounding desert and grassy plains, *E. d. nidoensis* probably intergrades with the subspecies inhabiting the Sierra Madre de Occidental to the northwest in the vicinity of San Buenaventura. Its range is separated by about 250 miles from that of *E. d. carminis* in the Sierra del Carmen of Coahuila.

Diagnosis: A sample of 19 specimens from five localities in the Sierra del Nido area has the following diagnostic features. Body size large, averaging over 134 mm in length (total length minus tail length); tail very short and hind foot moderately short, averaging 92.4 and 34.3 mm in length respectively. Distinctive cranial features include a relatively long maxillary toothrow which averages 5.42 mm in crown length. The skull is relatively broad through the interorbital region, the least breadth measuring from 8.5 to 9.8 mm and averaging 9.09 mm. In contrast to this the breadth across the zygomatic arches is relatively narrow, averaging only 19.90 mm. Moreover, the nasal bones are relatively broad, particularly anteriorly. This is a difficult character to measure adequately, since it is determined in part by the area of the laterally curving portion of the nasals. Nevertheless, this difference was at least partially measured by determining the breadth across both nasals at the junction of the anteriormost process of the premaxillary and the nasals. Nasal breadth measured in this way averages 4.06 mm. See Table 1 for a fuller description of the statistical spread of these measurements.

These chipmunks are, in general, gray with a strong suffusion of whitish hairs, and a dull reddish under-fur color especially in the shoulder region. The dorsal stripes are indistinct. A median black dorsal stripe is always present but it is suffused with whitish hairs, even in summer pelage, so its over-all aspect is indistinct. The pair of brown stripes immediately lateral to the central stripe, often present in this species, is either not present or barely perceptible. Lateral to this area is an indistinct white stripe which is ordinarily visible but tends to blend into the background color. In a few individuals there is an additional brown stripe which is barely visible lateral to this last white stripe. The flanks are similar to the back but have a slight rusty tinge. The facial stripes are dark brown and distinct, and the ventral side of the tail and anal region are a dull rusty color. The winter and summer pelages differ relatively little, although the summer pelage is shorter, slightly less red, and has slightly more prominent dorsal stripes.

Comparisons: This population of chipmunks needs to be compared primarily with that of the Sierra Madre de Occidental, which is now included in the subspecies *dorsalis,* and with *E. d. carminis* Goldman from the Sierra del Carmen in Coahuila. It is these two populations with which *nidoensis* is likely to be closely related. Careful comparison reveals that it is more closely related to chipmunks of the Sierra Madre, than to those of the Sierra del Carmen.

In any discussion of color in chipmunks, it seems pertinent to consider whether or not the specimens being compared are in comparable molt stages. Fortunately the series from the Sierra del Nido consists of some individuals in winter pelage, some in summer, and some in mixed pelage. The various collections from the Sierra Madre also contain all three types of pelage. Color comparisons can thus be made between comparable individuals. The specimens from the Sierra del Carmen were all collected in April and hence are in winter pelage, but comparisons with other individuals in winter pelage seem appropriate.

E. d. nidoensis can be distinguished from *E. dorsalis* of the Sierra

TABLE 1.—Measurements of three populations of *Eutamias dorsalis*.

POPULATION		BODY LENGTH	TOTAL LENGTH	TAIL LENGTH	HIND FOOT LENGTH	EAR LENGTH	CRANIAL LENGTH	MASTOID BREADTH	INTER-ORBITAL BREADTH	ZYGO-MATIC BREADTH	NASAL WIDTH	CROWN LENGTH OF MAXILLARY TOOTHROW	WEIGHT* in grams	
													♂♂	♀♀
Sierra	n	18	16	16	18	18	16	16	18	18	16	18	10	5
del	max.	143	242	102	36	23	38.5	17.4	9.8	20.5	4.5	5.7	67.9	79.2
Nido	min.	122	214	76	31	18	35.9	16.5	8.5	19.5	3.8	5.1	58.3	69.2
	$\bar{x}$	134.2	227.4	92.4	34.25	20.0	37.28	16.83	9.09	19.90	4.06	5.42	62.6	75.4
	$SE_{\bar{x}}$	1.356	2.400	1.958	0.330	0.309	0.195	0.075	0.080	0.071	0.045	0.045	0.997	1.602
Sierra	n	25	23	23	25	25	28	27	28	26	28	28	11	13
Madre	max.	149	253	116	37	23	38.9	17.5	9.5	21.1	4.3	5.7	77.0	95.7
de	min.	109	220	87	34	19	35.5	16.3	8.3	19.3	3.7	4.8	60.0	61.0
Occidental	$\bar{x}$	130.0	233.1	102.7	35.80	21.2	37.02	16.84	8.91	20.14	3.95	5.25	67.6	75.4
	$SE_{\bar{x}}$	1.704	1.723	1.375	0.204	0.268	0.157	0.060	0.066	0.086	0.032	0.036	1.578	3.025
Sierra	n	10	10	10	11	11	11	11	7	11	6	7	1	4
del	max.	142	239	113	36	25	38.6	17.5	9.1	21.0	4.1	5.6	–	69.2
Carmen	min.	123	211	81	31	18	36.3	16.6	8.5	19.6	3.7	5.0	–	56.8
	$\bar{x}$	130.8	222.3	91.5	33.5	21.0	37.28	16.93	8.81	20.27	3.88	5.31	66.9	65.6
	$SE_{\bar{x}}$	2.038	3.073	2.886	0.455	0.714	0.193	0.117	0.112	0.380	0.073	0.084	–	2.950

* Includes all males, and females which are not pregnant or with embryos less than 10 mm in CR length.

Madre de Occidental by a number of skeletal and color features. Table 1 summarizes the information on the skeletal features studied for these two populations and for *E. d. carminis.* For those features which did not seem to show significant sexual dimorphism, values for males and females were combined. As can be seen from Tables 1 and 2, *nidoensis* has a

TABLE 2.—Comparison of populations from the Sierra del Nido and Sierra Madre de Occidental with respect to selected skeletal features.

CHARACTER	n	t-VALUE	LEVEL OF SIGNIFICANCE
Tail length	39	4.44	<.001
Hind foot length	43	4.21	<.001
Maxillary toothrow	46	2.93	.008
Body length	43	2.37	.024
Nasal width	44	2.09	.045
Zygomatic breadth	44	2.00	.053
Interorbital breadth	46	1.72	.095

significantly shorter tail and hind foot, longer body and maxillary toothrow, narrower zygomatic breadth, and broader nasals and interorbital breadth than *dorsalis* from the Sierra Madre. Other measurements studied which did not show significant differences (at least below the 10 per cent level of confidence) are total length, ear length, cranial length, mastoid breadth, and body weight. *E. d. nidoensis* also has less distinct dorsal striping and tends to have a slightly less prominent rusty stripe on the flanks. By contrast, the median black stripe of *dorsalis* tends to be more distinct (less infiltrated with whitish hairs), broader, and more extended anteriorly. Also the first lateral brown stripe of *dorsalis* is almost always more distinct, as is the white stripe lateral to it. Furthermore, the second brown lateral stripe is distinct in about half of the specimens of *dorsalis* and barely perceptible in the rest. These differences hold true for both the winter and summer pelages.

Another possible difference between *nidoensis* and *dorsalis* which may be highly significant is the size of the baculum. Three bacula were available from the series of *nidoensis.* These were cleaned, stained, and stored in glycerin according to the method used by Lidicker (1960) and compared with the descriptions of *dorsalis* bacula presented by White (1953). Measurements were made with an ocular micrometer. White utilized in his description of *dorsalis* nine bacula from specimens of *E. d. dorsalis* including three from the Sierra Madre de Occidental. Although three bacula are not an adequate sample, they are very similar in their measurements in spite of the fact that the smallest of the three is from a slightly younger individual (see Table 3). Furthermore, it is of great interest that they differ considerably from White's sample. In over-all proportions they are very similar except that all three have an enlarged

TABLE 3.—Measurements in mm of three bacula of *Eutamias dorsalis nidoensis.*[*]

MVZ CAT. NO.	TOTAL LENGTH	SHAFT LENGTH	MAX. WIDTH OF SHAFT	HEIGHT OF KEEL	LENGTH OF TIP	LATERAL WIDTH OF BASE
121743	4.96	4.08	0.37	0.37	1.26	0.67
124827	4.81	3.86	0.30	0.30	1.11	0.67
124831	4.89	3.92	0.37	0.37	1.19	0.89
mean	4.89	3.95	0.35	0.35	1.19	0.74

[*] For an explanation of terms, see White, 1953.

base which has a lateral diameter of about twice the greatest width of the shaft. There is also a slight medial notch on the proximal end of the base. Apparently neither of these features was present in White's material. In addition, the three *nidoensis* bacula are much larger. They average 3.95 mm in shaft length (instead of 2.64 to 3.69 mm), the greatest width of the shaft (other than the base) averages .35 mm (instead of < .20 mm), and the height of the keel is not quite one-third of the length of the tip (instead of equal to ⅓ or ⅕, see pages 616 and 620 of White). If these differences between *nidoensis* and *dorsalis* should persist when larger samples are examined, they will indicate a distinction which is probably of considerable significance.

Compared to *E. d. carminis, nidoensis* has a longer body and tail, slightly longer hind foot, broader interorbital region and nasal breadth, narrower zygomatic breadth, and longer maxillary toothrow. In all four of these cranial features and in body length, *nidoensis* is more divergent from *carminis* than is the *dorsalis* population of the Sierra Madre. On the other hand, *nidoensis* approaches *carminis* slightly in color features. *E. d. carminis* is definitely darker, however, with a dark reddish undertone, and has less distinct dorsal stripes. It also has rustier thighs, a deeper shade of rusty on the flanks, and the facial stripes are broader and more rusty with the white spaces between being a dull gray. All specimens examined had a dark rusty ventral tail stripe which did not overlap in color with *nidoensis* or *dorsalis.* The dorsal surface of the tail is darker because the white tipped hairs are less numerous and have shorter white bands.

In the characterization of *E. d. carminis,* measurements cited by Baker (1956) for four females from two localities in the Sierra del Carmen were added to my figures where the measurements seemed comparable. This served to increase the sample size somewhat for some characters. Unfortunately no bacula were available from this subspecies.

Remarks: The Sierra del Nido population is given subspecific status not only because of the large number of highly significant differences between it and the populations of both the Sierra Madre de Occidental and the Sierra del Carmen, but also because many of the distinguishing features of *nidoensis* are not intermediate between *dorsalis* and *carminis* thus suggesting that *nidoensis* is not merely a step along a gradual east-west cline. Furthermore, since many of the diagnostic features of *nidoensis* seem to vary independently, they are probably genetically independent (for example the inverse relationship between body length and zygomatic breadth) and a considerable degree of genetic differentiation is indicated. This apparent genetic distinctness is undoubtedly made possible in large part by the almost complete geographical isolation of this population from any other of the same species. Moreover, this isolation was very likely accentuated during the xerothermic period of 4000 to 8000 years ago. In summarizing the differences between the three populations, it seems as if *nidoensis* differs greatly from both *dorsalis* and *carminis* in cranial features, but slightly more from *dorsalis*. On the other hand, it differs more from *carminis* than from *dorsalis* in color features.

It is not within the realm of this report to consider the relative differentiation of the Sierra Madre de Occidental population of *E. dorsalis* with that in adjacent New Mexico and Arizona. Nevertheless, the availability of J. A. Allen's name *canescens* makes some comment on this desirable. His description of *canescens* was based on nine specimens from Guanacevi in northwestern Durango (Allen, 1904). It seems clear from his description that this is the same subspecies as that sampled in this report from the Sierra Madre. To check its relationship to typical *dorsalis*, the color of the Sierra Madre population was compared with that of 11 topotypes of *E. dorsalis* and two near topotypes from adjacent Arizona. No obvious differences were noted. The Sierra Madre population is, therefore, here tentatively considered to be included in the subspecies *dorsalis*.

Specimens examined: All are in the collection of the Museum of Vertebrate Zoology.

E. d. dorsalis

A total of 48 from the following localities: ARIZONA: Greenlee County: Blue, 6000 ft, 1; Rose Peak, 8700 ft, 1. NEW MEXICO: Grant County: 2 mi W Santa Rita, 6300 ft, Fort Webster (copper mines), 5; 3 mi SW Santa Rita, 6300 ft, Fort Webster (copper mines), 6. CHIHUAHUA: Rio Gavilan, 7 mi SW Pacheco, 5700 ft, 8; Sierra Azul, 12 mi SW Pacheco, 7200 ft, 1; Water Cañon, 7200 ft, 3 mi S Colonia Garcia, 4; Meadow Valley, 5 mi S Garcia, 7500 ft, 1; 9 mi SE Colonia Garcia, 8200 ft, 1; Yaguirachic, 8500 ft, 130 mi W Chihuahua, 8; 7 mi SW El Vergel (= Lagunita), 7800 ft, 1; La Union, 8400 ft, 10 km N Guachochic, 11.

E. d. nidoensis

A total of 19 from the following localities: CHIHUAHUA: Arroyo del Nido, 7000 ft, 30 mi SW Gallego, 6; Arroyo del Nido, 8000 ft, 30 mi SW Gallego, 1; Arroyo Mesteño, 7600 ft, Sierra del Nido, 2; Cañon del Alamo, 7300 ft, Sierra del Nido, 8; 5 mi N Cerro Campana, 5600 ft, 2.

E. d. carminis

A total of 7 from the following localities: COAHUILA: 5 mi W Piedra

Blanca, 5000 ft, Sierra del Carmen, 1; 8 mi SW Piedra Blanca, 7000 ft, Sierra del Carmen, 2; 8 mi SW Piedra Blanca, 7500 ft, Sierra del Carmen, 4.

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MILLIPEDS COLLECTED IN GUATEMALAN CAVES, INCLUDING *CALYMMODESMUS INQUINATUS*, N. SP. (STYLODESMIDAE: POLYDESMIDA)

By Nell B. Causey[1]
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In June, 1959, William W. Varnedoe, Jr., collected four species of millipeds from Guatemalan caves, of which all are in limestone except La Cueva Camán, which is in volcanic ash. Three species of the millipeds, a colobognath and two spirostreptids, are undoubtedly epigean forms. There are no troglobitic representatives of the orders that they belong to. The fourth species is a small polydesmid of the genus *Calymmodesmus* without any apparent cave modifications other than the yellowish white body color. Additional collections from epigean sites in the vicinity of the cave are needed to establish the ecological classification of this polydesmid.

The male holotype and a female paratype of *Calymmodesmus inquinatus*, n. sp., are in the American Museum of Natural History, and male and female paratypes are in the United States National Museum. All of the remaining specimens in Varnedoe's collection will be retained by the author.

Genus *Calymmodesmus* Carl

Calymmodesmus Carl, 1914, Mém. Soc. Sci. nat. Neuchât., 5: 959. Attems, 1931, Zoologica, 30: 140–142; 1940, Tierreich, Lief. 70: 274–275. Schubart, 1952, An. Acad. Bras. Ciên., 24: 438. Loomis, 1959, Jour. Kansas Ent. Soc., 32: 1–2.

Type species: Calymmodesmus andinus Carl 1914.

Range: Ecuador to Mexico.

Number of species: Ten, of which several are myrmecophilous and one is cavernicolous.

[1] This investigation was supported by Grant No. G14486 from the National Science Foundation.

Yucodesmus, a genus closely related to *Calymmodesmus*, is represented by four species from Yucatan caves (Chamberlin, 1938) and one myrmecophilous species from Vera Cruz (Chamberlin, 1947). In the description of no species of *Yucodesmus* is the presence of minute spicules on the metazonites mentioned; this is a character of the genus *Calymmodesmus*, and its absence in *Yucodesmus* justifies the retention of *Yucodesmus*, at least as a subgenus. Schubart (1952) distinguished between *Calymmodesmus* and *Yucodesmus* by differences in the gonopods, which he did not point out, and by (in *Yucodesmus*) the equal size of the primary tubercles in the four longitudinal rows, the greater lateral projection of the pore cones, and the yellowish white color. Loomis (1959) suggested that the two genera are synonyms but deferred his decision until he had seen specimens of *Yucodesmus*.

The lobation of the collum and the paranota is not uniform through the species of *Calymmodesmus*. In *andinus* Carl from Columbia, the only species with 10 lobes on the margin of the collum, the outer lobe on either side is markedly broader than any of the eight intervening lobes and has a slight median emargination. In *bensifer* Loomis from Oaxaca and *carli* Attems from Ecuador the three outer lobes on either side form two very broad lobes with their component parts but faintly distinguishable, whereas the six intervening lobes are conspicuous. In the remaining species the outermost lobes of the collum are better developed than in the three named above and are almost equal to the intervening lobes. The paranota of segments 2 through 5 have three lateral marginal lobes each. On segments 6 through 16 there are usually four lobes, rarely three. The number of lateral lobes on segments 17, 18, and 19 is variable; usually there are four, sometimes there are three, occasionally five; on segment 19 they are present, absent, or very faintly indicated. The margin of the tergite of segment 20 is divided into six lobes, of which the middle two are closer together than any of the others.

Calymmodesmus inquinatus, new species

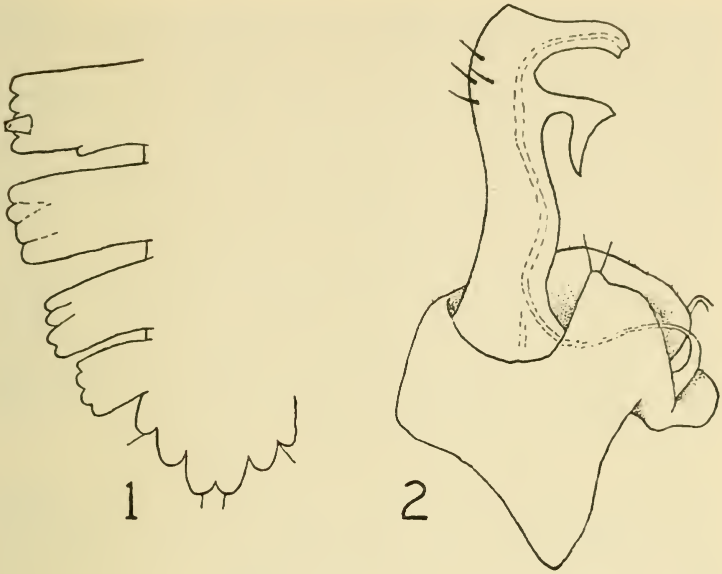
Figs. 1, 2

Diagnosis: Nearest *sodalis* Schubart in the structure of the gonopods and the body size; distinguished from that species by the lighter body color, the presence of radii on the margin of the collum, and the more prominent primary tubercles on the collum.

Type specimens: Male holotype and female paratype, American Museum of Natural History; male and female paratypes, United States National Museum and the author's collection.

Type locality: Gruta el Silvino, near Cayuga and Puerto Barrios, Guatemala; 3 ♂♂, 4 ♀♀; collected 13 June 1959, about 600 feet within the cave by W. W. Varnedoe, Jr.

Description of the male holotype: Color in alcohol whitish except for the pale yellow tubercles. Length about 9.5 mm, width 1.7 mm. Head covered by collum when viewed from above. Dorsum strongly arched and the paranota set low, their ventral surface almost horizontal. Seg-



Figs. 1, 2

ments 1 and 2 very close together; remainder of body loose-jointed, with the length of the exposed parts of the prozonites of segments 4 through 14 as great as the length of the metazonites of those segments. Legs extend to lateral margin of paranota if straightened out. Metazonites thickly covered with short, fine, glassy spicules. Vertex of head with a rectangular granular area that is indistinctly divided into four vertical columns. Antennae short, the fifth segment thickened and twice as long as segment 6; segments 5, 6, and 7 each with a small pad of fine setae on the distolateral surface.

Collum with 12 marginal lobes, of which the outer three on either side are slightly smaller and less evenly formed than the intervening lobes; radii are between all of the lobes. Disk of collum strongly convex; the ten primary tubercles are large and in two rows; the outer primary tubercle is slightly smaller than the intervening ones. The secondary tubercles of the collum are arranged in an even row of 18 on the caudal margin; others are arranged irregularly around the primary tubercles; they do not extend out on the margin between the radii.

Segments 2 through 19 have the primary tubercles arranged in four rows of three tubercles on each segment; they are slightly smaller on the last few segments. On typical segments the primary tubercles in the medial rows are rounded and elongated transversely and those in the lateral rows are slightly smaller, conical, and rounded at the apex. The secondary tubercles of segments 2 through 19 are arranged as follows: two rows of four each between the medial primary tubercles, from three to seven in one or two irregular rows between the medial and lateral primary tubercles, and about 20 laterad to the lateral primary tubercles and on the paranota. Surface of caudal segment granular. Lateral margin of segments 2 through 5 with three subequal lobes, segments 6 through 19 with four subequal lobes, and segment 20 with six subequal lobes, of which the middle two are closer together than the others (Fig. 1). One or two secondary lobes are on the caudal margin of the paranota of most segments. The pore cones are white; they cover the second lobe of segment 5 and the third lobe of segments 7, 9, 10, 12, 13, 15, and 16 and project slightly beyond the lateral margin of the adjacent lobes.

In situ the telopodites of the gonopods are freely exposed and directed caudad. The solenomerite crosses its homologue near the apex and the apex of the acute angle of the tibiotarsus is contiguous with its homologue. The large coxae are connected by a small piece. The sharply bent tibiotarsus (Fig. 2) distinguishes this species from others of the genus except *sodalis*; the femoral region is less curved than in that species. Anterior to the gonopods is a small, medial sternal peg.

Paratypes: The largest female paratype is 10.7 mm long and 1.8 mm wide; other somatic characters are as described for the male holotype. One male differs from all of the other specimens in the series in that the lateral lobes of segments 17 and 18 are less evenly formed, with four on one side and five on the other side of both segments.

Since the description of so many Central American species is inadequate, the determination of the three following species will be deferred until type material can be studied.

A female tentatively identified as *Scaphiostreptus* (S.) *discriminans* (Chamberlin 1922) was collected in total darkness a linear distance of about 450 feet from the entrance of Cueva Lanquín, 1 km northwest of the village of Lanquín and about 25 km east of Cobán, Department of Alta Verapaz.

A male and a female of the subgenus *Scaphiostreptus* were collected either near the entrance or about 300 feet from the entrance of Cueva Jobitzinaj, 3 km south of Flores, which is on Lago Petén, Department of Itza.

A large female of the genus *Siphonophora* was collected about 100 feet from the entrance of a small cave in volcanic ash, La Cueva Camán, which is near Lago de Atitlàn. It is evenly pale yellow, about 45 mm long, 1.9 mm wide, and has 108 body segments. It resembles S. *globiceps* Pocock 1903 but differs in that the beak is slightly longer and the anterior margin of the collum is slightly concave.

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Explanation of Figures of *Calymmodesmus inquinatus*

Fig. 1.—Outline of the last five body segments, female paratype.

Fig. 2.—Left gonopod, anterior view, male paratype.

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GARMANNIA SAUCRA, A NEW GOBIID FISH FROM JAMAICA[1]

By C. Richard Robins
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Among the fishes collected recently in Jamaica by John E. Randall and associates was a single specimen of a distinctive but undescribed goby of the genus *Garmannia.* This species is described below. I am indebted to James E. Böhlke and Ernest A. Lachner for comments concerning the manuscript. The photographs are by Walter R. Courtnay, Jr. The holotype is deposited in the Academy of Natural Sciences of Philadelphia.

Garmannia saucra, new species

Fig. 1

Holotype: ANSP 92985, an adult female, 15.9 mm standard length collected at South Cay, Jamaica, 3 miles south of Port Royal, north side of cay in 3–5 feet of water, 18 December 1959, by John E. Randall, T. Chess, and D. Steven (field number: CRR-Car-5).

Diagnosis: A strikingly spotted species of *Garmannia* with reduced squamation (4 transverse rows on caudal peduncle and a vertical basicaudal row of four modified scales). Fin-ray formula: spinous dorsal fin–VII; second dorsal fin–I, 10; anal fin–I, 9; pectoral fin–15-15; segmented caudal rays–17, branched caudal rays–11.

Description: The pallid body is conspicuously dark-spotted (see Fig. 1); the single series along the lower sides consists of 12 vertically elongate blotches, well separated from the dorsal series. The caudal base is outlined by a dark curved mark. Along the mid-dorsal line are 13 dark spots extending from the nape to the dorsal insertion of the caudal fin. A dorsolateral series of 12 dark spots extends from the area just dorsad of the operculum to the caudal peduncle. The dorsolateral and mid-dorsal series merge under the posterior portion of the soft dorsal fin. A dark diagonal bar crosses the pectoral-fin base. The head is irregularly marked, the pattern showing lateral assymmetry. The anterior narial tubes are black.

[1] Contribution No. 281 from The Marine Laboratory, University of Miami.

All fins are unmarked. Life colors are unrecorded but presumably are much the same as in the preserved specimen (related species lack bright life colors).

The seven spines in the first dorsal fin are arranged as in all other species of *Garmannia* (and many other gobiid genera): the anterior five are equally spaced and spines 6 and 7 are about twice as remote from each other and from the first five spines. Such spacing characteristically results (in other gobiids studied by the writer) from two vertebrae lacking interneural elements and also the spines that would attach to them. The typical gobioid formula is 1 ray to 1 interspinal series to 1 vertebra. Many illustrators have ignored or overlooked this staggered placement of first-dorsal elements and so its occurrence through various phyla of gobioid fishes cannot be easily traced from current literature.

No spines are elongate in the type but it is a female. Presumably males will have one or several elongate spines as in all other species of *Garmannia* (except *parri*).

Eleven elements are in the second dorsal fin, one spine and ten soft rays, the last split to its base. One dorsal ray is branched near its tip. The anal fin contains one spine and nine soft rays, the last split to its base. Several anal rays are branched. The pectoral fins are damaged but both contain 15 rays, all of which are branched except for the upper one or two and the lowest.

The pelvic disc is complete, its central rays are longest and the interspinal frenum is well developed forming a definite basal cup. The caudal fin is nearly truncate behind with rounded corners. As in many gobiids, there are 17 segmented caudal rays, 11 of which are branched.

Head pores are present and well developed. Two are on a vertical canal (the preoperculomandibular canal of other fishes) along the margin of the preopercle. One is on the lateral canal above the anterior margin of the opercle. Each supraorbital canal contains four pores, one behind the eye opposite the posterior dorsal quadrant, two median pores on the interorbit, the posterior one on a line even with the hind margin of the eye, the anterior on a line even with the anterior margin of the pupil, and the fourth pore slightly anterior and mesial to the posterior nostril. One pore, behind the eye near or slightly above is midpoint, is in the infraorbital canal. No head pore is tubular. The posterior nostril is a large opening near the anterior rim of the orbit. The anterior nostril opens through a well-developed tube.

Squamation is reduced in *saucra.* There is the usual vertical row of four modified scales along the caudal-fin base. Four moderate-sized scales are present in a row on the mid-side of the caudal peduncle. They are non-imbricate and strongly ctenoid, their posterior margin being nearly as decorative as the scales on the caudal-fin base. The anterior scale is alone but the posterior scale is in a row of three, and the next in a row of two. In all only seven or eight scales (the two sides differ) are present on each side of the caudal peduncle anterior to the vertical row along the caudal-fin base.

Dentition is confined to the jaws. The dentary patch is several rows broad, the outer enlarged with its posterior members largest but not caninoid. The patch in the upper jaw is perhaps narrower, again with the outer row largest and without canines. The tongue is short and is truncate anteriorly.

The general body form is best seen in Fig. 1. Lengths of body parts expressed as per cent of standard length (15.9 mm) are: head length—27; horizontal eye diameter—6.9; depth of body at (1) origin of spinous dorsal fin—19, (2) origin of anal fin—16; caudal-fin length—23; pelvic-fin length—21. Both pectoral fins were broken but apparently reached to the level of the anus.

The name *saucra* is from the Greek for graceful, pretty.

Discussion: The following species are currently assigned to *Garmannia* in western Atlantic waters. *G. macrodon* (Beebe and Tee-Van), *G. zebrella* Robins, *G. pallens* Ginsburg, *G. gemmata* Ginsburg, *G. schultzi* Ginsburg, *G. spes* Ginsburg, *G. hildebrandi* Ginsburg, *G. mediocricula* Ginsburg, *G. spilota* Ginsburg, and *G. hemigymna* (Eigenmann and Eigenmann).

G. spes and *G. schultzi* differ sharply from *saucra* in lacking the basicaudal row of modified scales and in having more (9–16) lateral scale rows. *G. hemigymna* has many scale rows (the scales continuing forward nearly to the axil of the pectoral fin), a barbel below the posterior nostril, more (19) pectoral rays and canine teeth. (*G. hemigymna* is here removed from the genus *Risor*).

G. spilota, G. hildebrandi, G. mediocricula and the Pacific *G. chiquita, G. paradoxa* (Günther) and *G. homochroma* all have extensive (about 25–34 transverse rows varying with the species) squamation and more pectoral rays (from 16–18 in *hildebrandi* to 21 in *mediocricula*).

The relations of *saucra* lie with the "subgenus" *Tigrigobius*, which contains *macrodon, zebrella, pallens,* and (fide Ginsburg, 1933: 55) *digueti* of the Eastern Pacific.

G. macrodon and *G. zebrella* are distinctly banded, and they possess canine teeth, a moderately high number (16–18 and 18–19 respectively) of pectoral rays. *G. pallens* is less banded than *macrodon* and *zebrella* (Böhlke and Robins, 1960: Pl. 3B) but is scarcely spotted. Also *pallens* has more scale rows (8–13). *G. gemmata* has more second dorsal elements (12–13), more scale rows (5–8, dorsally 8) and it has spotted dorsal and caudal fins.

Austrogobius de Buen (1951: 64–67, Pl. 1) erected for *Gobiosoma parri* Ginsburg should be placed in the synonomy of *Garmannia* and it may be close to or the same as the "subgenus" *Tigrigobius*. Its subgeneric status remains uncertain. *G. parri* differs from *saucra* in having a high number (21) of pectoral rays, and banded coloration and supposedly in the arrangement of papillae and pores on the head.

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Explanation of Figure

Fig. 1.—ANSP 92985, female holotype of *Garmannia saucra*, 15.9 mm in standard length.

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