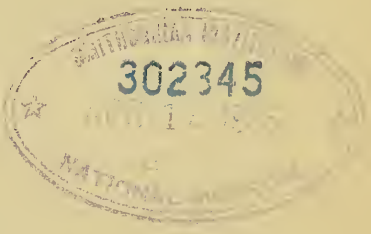
PROCEEDINGS

OF THE

Biological Society of Washington

VOLUME 47
1934



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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 from 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.

PRESS OF
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WASHINGTON, D. C.

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(FOR 1934-1935)

(ELECTED MAY 5, 1934)

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H. C. Oberholser, 1926–1927
E. A. Goldman, 1927–1929
Alexander Wetmore, 1929–1931
H. H. T. Jackson, 1931–1933

*Deceased.

TABLE OF CONTENTS.

The Committee on Publications declares that each paper of this volume was distributed on the date indicated on its initial page. The contents, minutes of meetings, and index for 1934 (pp. v–xii; 203–208) were issued on February 6, 1935. The title page and lists of officers and committees for 1933–1934 (pp. i–iv) were issued on June 13, 1934.

PLATES

Vol. 47, pp. vii–xii

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets from October to May, on alternate Saturdays, at 8 P. M. All the meetings during 1934 were held in the new lecture hall of the Cosmos Club, except the special meeting of May 26 which was held jointly with the Audubon Society of Washington at the National Zoological Park.

January 13, 1934—796th Meeting.

President Chambliss in the chair; 80 persons present.

Informal communications: H. B. Humphrey, Note on recovery of trees in fire-swept areas; P. B. Johnson, Note on recovery of a girdled beech tree; W. T. Swingle, Note on rate of growth of English and hybrid walnut trees.

Formal communications: L. C. C. Krieger, Fleshy fungi of the District of Columbia and vicinity; E. B. Lambert, Mushroom culture in America, Europe, and Japan.

January 27, 1934—797th Meeting.

President Chambliss in the chair; 85 persons present.

New members elected: Irving Fox, R. M. de Schauensee.

Informal communications: J. E. Shillinger, Report on the 20th Annual Game Conference; M. B. Waite, Exhibition of specimens of Pleurotus; F. C. Lincoln, Report on a joint meeting of the Northeastern Bird Banding Association and the Federation of Bird Clubs of New England; I. N. Hoffman, Note on observation of certain birds.

Formal communications: R. G. Green, Searching the Arctic for new biological facts; R. K. Beattie, Searching the Orient for blight-resistant chestnuts.

February 10, 1934—798th Meeting.

President Chambliss in the chair; 85 persons present.

New members elected: Mrs. Lillian C. Athey, J. B. S. Norton.

Informal communications: F. Thone, Exhibition of recent biological publications; H. B. Humphrey, Note on method of feeding wild birds.

Formal communications: Joseph Joffe, Big game animals of Yellowstone Park; P. R. Franke, The cliff dwellers of Mesa Verde.

February 24, 1934—799th Meeting.

President Chambliss in the chair; 58 persons present.

Informal communications: F. Thone, Exhibition of new biological publications; M. B. Waite, Note on the effect of recent extreme changes of temperature on plants and animals; T. Ulke, Note on observation of American coot in winter near Washington; H. B. Humphrey, Note on effects of severe weather on feeding habits of birds.

Formal communications: R. A. Young, The botany and utilization of bamboos; H. G. Deignan, Notes on the fauna of bamboo forests in southern Asia.

March 10, 1934—800th Meeting.

President Chambliss in the chair; 67 persons present.

New members elected: W. W. Bowen, C. L. English, Jr., A. L. Nelson, Hobart Smith.

Informal communications: F. Thone, Exhibition of new biological publications; T. S. Palmer, Note on cooperative feeding of wild birds by Metropolitan Police Department and Audubon Society; I. N. Hoffman, Exhibition of nest and egg of Malayan crested swift; P. B. Johnson, Note on habits of quail and rabbits; H. C. Bryant, Notice of plans for natural history museums in national parks, and Note on new developments in game management in national parks; W. H. Ball, Note on observation of wild turkey near Fairfax Court House and elsewhere.

Formal communications: T. S. Palmer, The activities and accomplishments of the Biological Society of Washington;

H. C. Oberholser, Water birds of the District of Columbia and vicinity.

March 24, 1934—801st Meeting.

President Chambliss in the chair; 103 persons present.

Informal communications: M. B. Waite, Further notes on effect of cold weather on plants; I. N. Hoffman, Note on death of wild ducks during recent cold weather.

Formal communications: P. L. Ricker, Spring wild flowers of the District of Columbia; M. B. Waite, Plant ecology of the District of Columbia and vicinity.

April 7, 1934—802d Meeting.

President Chambliss in the chair; 85 persons present.

New members elected: F. E. Firth, H. H. Richardson.

The president announced the deaths of Otto Widmann and E. J. Brown. Biographical notices of them were given by T. S. Palmer.

Informal communications: W. H. Ball, Exhibition of living specimen of lesser scaup saturated by oil; H. C. Oberholser, Note on oil pollution in the Potomac; T. Ulke, Exhibition of fossil beetle in amber; M. B. Waite, Further note on effect of cold weather on trees; A. L. Davis, Exhibition of photographs of birds and flowers from the Philippine Islands; S. F. Blake, Notice of a proposed crow-killing campaign in Maryland.

Formal communications: C. F. Marbut, Soils of the District of Columbia and vicinity; Austin H. Clark, Our local butterflies.

April 21, 1934—803d Meeting.

President Chambliss in the chair; 50 persons present.

New members elected: C. A. Brown, Ellis Haworth, C. F. Jackson, Phoebe Knappen, H. B. Stough, L. S. Vijjakich.

The president announced the death of J. E. Thayer. H. C. Oberholser gave a biographical notice of him.

Informal communications: F. Thone, Exhibition of a cherry tree injured by a vine, and of recent biological publications.

Formal communications: J. B. Kincer, The climate of the District of Columbia and vicinity; A. H. Howell, The mammals of the District of Columbia and vicinity.

May 5, 1934—804th Meeting.
55th Annual Meeting.

President Chambliss in the chair; 50 persons present.

New members elected: Mabel A. Barkley, H. P. Barss, C. R. Orton.

The reports of the Recording Secretary, Corresponding Secretary, and Treasurer were read. Reports were presented for the Board of Trustees of the Permanent Fund, the Committee on Publications, and the Committee on Communications.

The following officers and members of council were elected:

President, C. E. Chambliss; *Vice-Presidents,* C. W. Stiles, H. C. Fuller, T. H. Kearney, W. B. Bell; *Recording Secretary,* S. F. Blake; *Corresponding Secretary,* J. S. Wade; *Treasurer,* F. C. Lincoln; *Members of Council,* W. R. Maxon, A. A. Doolittle, I. N. Hoffman, E. P. Walker, J. E. Shillinger.

Formal communication: Ynez Mexia, Plant collecting in the Amazon Valley.

May 26, 1934—Special Meeting.

A picnic-luncheon was held jointly with the Audubon Society of Washington at the National Zoological Park, with 127 persons present.

October 20, 1934—805th Meeting.

President Chambliss in the chair; 55 persons present.

The president announced the membership of the Committees on Communication, Publications, and Zoological Nomenclature, and of the Board of Trustees of the Permanent Fund.

The president announced the deaths of J. M. Aldrich, K. F. Kellerman, and E. W. Nelson. Appreciations of Dr. Aldrich, prepared by W. R. Walton, and of Dr. Kellerman, prepared by H. B. Humphrey, were read.

Informal communications: W. M. Mann, Note on new acquisitions at the National Zoological Park; V. Bailey, Exhibition of a large brown bat.

Formal communications: E. A. Goldman, Edward William Nelson, naturalist, 1855–1934; Ben Thompson, Conservation activities of the National Parks.

November 3, 1934—806th Meeting.

President Chambliss in the chair; 155 persons present.

New members elected: S. C. Bishop, Jane E. Crawford, W. H. Gates, Alvah Goodding, M. V. Magruder, Lulu A. Miller.

Informal communications: M. B. Waite, Exhibition of section of red oak tree showing injury from storm of 1899; A. S. Hitchcock, Notice of A. Arber's book on Gramineae; Phoebe Knappen, Note on the observation of a duck lighting on the Capitol dome; P. B. Johnson, Note on the observation of a flight of chimney swifts about the Capitol dome; A. A. Doolittle, Note on a late batch of frogs' eggs; H. B. Humphrey, Note on the observation of Canada geese.

Formal communications: W. L. Schmitt, A trip to the Galapagos Islands and back with Capt. G. Allan Hancock on the Velero III; T. S. Palmer, Current activities of the American Ornithologists' Union.

November 17, 1934—807th Meeting.

President Chambliss in the chair; 70 persons present.

New members elected: D. A. McCauley, L. P. Schultz, J. L. Schwind, L. A. Strong.

Informal communications: F. Thone, Exhibition of recent books on natural history; J. S. Wade, Exhibition of recent books on natural history; H. C. Oberholser, Note on the history and work of the Biological Survey; L. E. Katterfeld, Notice of the resumption of publication of the magazine "Evolution"; Titus Ulke, Exhibition of specimens of a bat and a beetle; F. Thone, Note on the rarity of hurricanes in 1934.

Formal communications: R. V. Truitt, The blue crab industry along the Atlantic seaboard; H. A. Allard, Dermoptera and Orthoptera of the District of Columbia and vicinity

December 1, 1934—808th Meeting.

President Chambliss in the chair; 55 persons present.

New members elected: F. F. Smith, Ivar Tidestrom.

Informal communications: T. S. Palmer, Note on certain birds at the National Zoological Park; I. N. Hoffman, Note on Amherst and golden pheasants; V. Bailey, Note on opportunities

for study of rare animals at the National Zoological Park; H. Darling, Note on the effects of solar radiation on animal life.

Formal communications: E. P. Walker, Catering for peculiar appetites; W. L. Popham, Stem rust and the common barberry on the offensive.

December 15, 1934—809th Meeting.

President Chambliss in the chair; 65 persons present.

New members elected: H. J. K. Agersborg, H. A. Allard, Hugh Darling, N. E. Stevens, R. V. Truitt.

C. E. Chambliss was nominated as Vice-president of the Washington Academy of Sciences.

Informal communications: I. N. Hoffman, Note on the daytime blooming of a night-blooming cereus; H. Darling, Note on recent developments in biomagnetism; A. B. Clawson, Note on the poisoning of cattle by selenium; M. B. Waite, Note on the death of trees due to the drought of 1930, and Note on the morphological distinction between sweet and white potato; Phoebe Knappen, Note on the number of birds killed at Washington Monument in 1934; W. H. Ball, Note on the observation of whistling swan, brown-headed nuthatch, and short-billed marsh wren.

Formal communications: S. B. Fracker, The application of biological data to a fourteen million acre project; Vernon Bailey, Animal ecology of the District of Columbia and vicinity.

Vol. 47, pp. 1–8 February 9, 1934

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

APHID DESCRIPTIONS AND NOTES.

BY FREDERICK C. HOTTES.

In this paper the opportunity is taken to describe several species of aphids which are apparently new to science; to describe a new morphotype, and to add several species to the aphid fauna of Colorado. *Stegophylla quercicola* (Baker) is reduced to a synonym of *Callipterous? quercicola* Monell.

Cinara winonkae, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate 2.82, range from 2.78–2.90. General color of body light reddish-brown, lateral portions of abdomen with small dark brown areas, dorsum of abdomen with a few irregular small brownish spots. Cornicles situated on dark brown cones. First and second antennal segments concolorous with head, third and fourth segments with basal portions yellowish, dusky apically, fifth and sixth segments either uniform brown or with basal portions lighter. Beak with apical three segments brown, remaining portion yellowish mottled with brown. Femora yellowish with knees slightly brownish. Tibiae yellowish with apical regions dusky brown. Tarsi brown.

Head and thorax.—Head divided by a median longitudinal line. Proportional length of antennal segments as follows: III—.37–.40, IV—.16–.18, V—.17–.20, VI—.14–.17. Terminal processes inconspicuous, in some cases apparently absent.

Secondary sensoria distributed as follows: III—1–4, average 2 plus most common number 3; IV—0–1, generally 0; V—0–1, usually 1. Secondary sensoria distributed on apical half of third segment arranged in a straight row and usually more or less tuberculate. Hairs on third segment about two and one half times width of segment and only slightly inclined. Beak extending one-third length of abdomen. Eyes with well developed ocular tubercles. Stigma dusky-brown with a faint dusky suffusion beneath. Media very faint, twice forked, second fork of media closer to margin of wing than to first fork. Cubital and anal veins pronounced. Hairs on

hind tibiae two or more times width of segment and for the most part at right angles to segment. Hind tibiae averaging 2.00 long.

Abdomen.—Base of cornicles average .29 across, provided with one kind of hairs. Cauda and anal plate typical of genus.

This species was collected on the stems and trunks of Arbor-Vitae growing on the campus of Tulane University and in Audubon Park, New Orleans, Louisiana, December 31, 1931. All aphids were enclosed by fuzz sheds constructsd of ants. These sheds were similar to those associated with *Cinara difficilis* Hottes and Frison. This species may be distinguished from *Cinara difficilis* by the lighter colored legs, by the smaller number of secondary sensoria on the third antennal segment, the shorter beak, the absence of a subcostal vein and by the twice forked media. The unusually short or absent terminal process is the most outstanding characteristic of this species and separates it at once from most if not all species belonging to the genus.

Holotype.—Alate viviparous female, deposited in the United States National Museum. Collection data as above. Apterous viviparous material is at hand, unfortunately it is too poorly mounted to describe. However, a slide of apterous viviparous females has been deposited in the United States National Museum.

Aphis kachena, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate 1.44 (range 1.14–1.71). Head and thorax dark dusky-brown with the margins of some sclerites yellowish, ground color of abdomen yellowish-green with brownish markings as follows: anterior portion of abdomen with two broken bands of brown across dorsum, posterior to these there is a large brownish patch which extends to the posterior portion of the abdomen. This patch usually has irregular margins and may contain several yellowish colored islands. The lateral margins of the abdomen are indicated by dark brown areas. Cornicles dusky-brown at base shading to yellowish-green apically. Cauda and anal plate dark brown. Antennae dark brown. Femora yellowish at base, remaining portion brown. Tibiae yellowish-brown, darker apically. Tarsi dark brown. Stigma brownish, veins brown with just a suggestion of a fuscous border. Beak dark brown with the segments clearly separated by yellowish bands.

Head and thorax.—Antennal segments with the following proportional lengths: III—.31–43, average .36, IV—.16–.20, average .18, V—.11–.14, VI—.07–.10 plus .34–.41, average .38. Secondary sensoria present on segments three and four and usually on five. Sensoria with wide rims irregularly arranged on segments, distributed as follows: III—23–45, average 32, IV—5–14, average 10, V—0–3, average 1 plus. All antennal segments setosely imbricated. Hair on antennae fine, shorter than width of segment. Beak reaching mesothoracic coxae. Prothorax with a pair of lateral tubercles. Position of second fork of media not constant but usually closer to margin of wing than to first fork.

Abdomen.—All segments anterior to cornicles with small peg-like tubercles, second segment posterior to cornicles with peculiar inwardly curved tubercles. Brownish lateral areas with large circular, glandular areas. Hairs on abdomen arising from whitish tuberculate areas. Brownish areas suggestive of surface of cornicles. Cornicles .09–.11 in length with slightly developed rims, similar in shape and surface to those of *Aphis bakeri* Cowen. Cauda with two hairs on a side .09–.11 in length, not constricted, rarely extending much if any beyond tip of anal plate.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate 1.73 (range from 1.57–2.00). Head, thorax and abdomen dark green, heavily mottled with dark brownish-black, the patches on the dorsum being more or less confluent. The segments are indicated laterally by brownish patches and many smaller brown areas. First and second antennal segments concolorous with head, third and fourth segments yellowish, fifth antennal segment yellowish at base, remaining portion dusky, sixth segment dusky. Legs yellowish-brown with the knees and apical portions of tibiae and all of tarsi dusky-brown. Cornicles yellowish-green. Cauda and anal plate brown. Head and appendages.—Proportional lengths of antennal segments as follows: III—.16–.20, IV—.07–.11, V—.07–.09, VI—.06 plus .20—.29, average .25. There are no secondary sensoria. There is a distinct tendency for the articulations between the third and fourth segments to be faintly indicated so that the antennae appear to be only five segmented. The beak reaches midway between the meso and metathoracic coxae. Lateral tubercles on abdomen usually not visible, when present minute. Cornicles as in alate viviparous female. Head, thorax and abdomen (particularly the dark areas) setosely imbricated.

This species may be collected on the flower heads of several species of Indian Paintbrush *Costilléia* species, the floral parts of which must be torn apart before the aphids are rendered visible.

This species is closely allied to *Aphis bakeri* Cowen from which it may be quickly separated by the dark colored apterous forms, the larger number of secondary sensoria on the third antennal segment; the comparatively shorter cauda and the larger lateral glands on the abdomen.

Holotype.—Alate viviparous female (specimen mounted on back with spread wings and lacking left antenna, mounted on slide with other alate and apterous viviparous females). Skyway, Colorado, July 18, 1933. Morphotype.—Apterous viviparous female, Skyway, Colorado, same data as holotype. Type slides deposited in the United States National Museum.

Aphis pawneepae, new species.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Length from vertex to tip of anal plate 1.50–1.64, average 1.57. Average width of head .45. Head and thorax brown, remaining portion of body reddish-brown. Antennae dusky-brown, base

of third segment lightest, apical antennal segments progressively darker. Legs brown with knees and apical portions of femora and tarsi dusky. Cornicles brown. Cauda with a V-shaped yellowish area at base, remaining portion brown. Beak brown with apical portion dusky.

Head and appendages.—Antennae either five or six segmented. When six segmented with the following proportional lengths: III—.26–.29, IV—.11–.14, V—.10, VI—.10 plus .20. Secondary sensoria absent, all antennal segments imbricated. The beak reaches mid-way between the meso and metathoracic coxae.

Thorax and abdomen.—Prothorax with a pair of large lateral tubercles. Cornicles .14–.19, average length .16, poorly imbricated without flange, tapering slightly towards apex. Cauda from .11–.14 long with sides straight or with just a suggestion of a constriction, sides with from five to eight hairs.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Length from vertex to tip of anal plate 1.21–1.60, average 1.37. Average width of head .44. Head and thorax dark dusky-brown to black. Abdomen with lateral patches of darker brown. Antennae uniform dusky-brown. Femora yellowish-brown at base, remaining portion dark brown. Tibiae dusky-brown with the apical portions darker. Tarsi dark brown. Cornicles dark dusky-brown. Cauda dark dusky-brown except for V-shaped basal portion. Anal plate dark brown. Stigma dusky, veins dark brown and bordered with fuscous. Accessory radial thickening present.

Head and thorax.—Proportional lengths of antennal segments as follows: III—.17–.36, average .27, IV—.11–.16, average .14, V—.13–.16, average .15, VI—.10 plus .19–.21. Secondary sensoria usually confined to basal half of third segment, ranging in number from two to five, average three. Most common number two. All segments imbricated. The beak reaches just beyond the coxae of the metathoracic pair of legs. Prothorax with a pair of unusually large lateral tubercles. Second fork of media closer to margin of wing than to first fork, all veins ending in fuscous areas. All segments of abdomen anterior to cornicles with a pair of lateral tubercles, the first pair of which is largest. There are two large lateral tubercles posterior to cornicles. Cornicles .14–.19, average .16 long, without flange, in shape similar to those of apterous viviparous female. Cauda .11–.14 long with about seven hairs on a side. Only the extreme tip extending beyond tip of anal plate. Cauda not constricted. Anal plate quite hairy.

Stem mothers of this species are quite similar to apterous viviparous females but are somewhat larger. Stem mothers of this species were collected on the stems of red bud *Cercis canadensis* L. All other forms of this species have been collected in small grass huts constructed by ants. (*Crematogaster lineolata* Det. Burrill). These huts in the case of the specimens collected in Decatur were just at the surface of the ground encircling the trunks of small seedling trees.

This species is very closely allied to *Aphis caliginosa* Hottes and Frison, from which it may be separated by the following characteristics: in *Aphis caliginosa* the secondary sensoria of the alate viviparous females are

usually confined to the apical half and always reach to the apical end of the segment. In *Aphis pawneepae* the secondary sensoria never extend to the apical end and are confined to the basal half of the segment. The minimum number of sensoria in *Aphis caliginosa* being the very maximum in *Aphis pawneepae*. The tibiae in *Aphis coliginosa* are yellowish with the apical portions darker. In *Aphis pawneepae* the tibiae are brown with apical portions darker. The cornicles of *Aphis pawneepae* are longer than those of *Aphis coliginosa*.

Holotype.—Alate viviparous female, Decatur, Illinois, June 9, 1933.

Morphotype.—Apterous viviparous female, Decatur, Illinois, June 9, 1933.

Morphotype.—Apterous viviparous stem mother, Decatur, Illinois, May 19, 1933.

Morphotype.—Ovariparous female, Osage City, Missouri, August 29, 1931, by A. C. Burill, whose assistance and aid in collecting the first material of this species I greatly acknowledge. All types were taken on *Cercis canadensis* L. All types deposited in the United States National Museum.

Amphorophora pawtincae, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Length from vertex to tip of anal plate 2.86–3.78, average 3.40. Width of head through the eyes .64–.69, average .66. Color of head, thorax and abdomen light pea-green with brownish markings as follows: ocelli outlined with brown, posterior portion of head, anterior portion of mesothorax slightly brown, apical three fourths of cornicles yellowish-brown, basal portion concolorous with abdomen, anal plate concolorous with abdomen. Cauda slightly dusky due to dusky colored setaceous imbrications. First antennal segment concolorous with head at base, remaining portion brownish, second antennal segment brownish, third antennal segment yellowish at the extreme base, remaining portion brown with apical portion darker, remaining antennal segments progressively darker brown with their apical portions still darker brown. Femora green with apical halves shading to brown. Tibiae light brown with apical portions dark brown. Tarsi brown.

Head and thorax.—Proportional lengths of antennal segments as follows: III—1.00–1.20, average 1.11, IV—.94–1.14, average 1.02, V—.72–.89, average .82, VI—.14–.21, average .17 plus 1.21–1.40, average 1.32. Secondary sensoria irregularly arranged but confined very largely to one side of segment, ranging in number from 29 to 36, average 33. Clubbed hairs on antennal segment III about two-thirds width of segment in length. Third antennal segment lightly imbricated, remaining antennal segments conspicuously imbricated. Beak reaching to mesothoracic pair of coxae or a little beyond. Stigma long and sharply pointed, accessory radial thickening very faintly indicated. Veins dark brown, second fork of media closer to first fork than to margin of wing.

Abdomen.—Length of cornicles .43–.50, average .47. Cornicles distinctly swollen near middle with a well developed rim. Imbrications on surface of cornicles extremely light. Region of cornicles adjacent to flange some-

what wrinkled but not reticulated. Length of cauda .43–.50, average .47, not constricted with from three to six hairs on a side.

This species can not be keyed further than couplet twenty-three in Mason's (Key to alate viviparous females) Revision of the *Genus Amphorophora* for the antennae are not tuberculate nor are the sensoria in a straight row. From *Amphorophora rossi* Hottes and Frison this species differs in larger number of sensoria on antennal segment three, longer cornicles, differently colored antennae, length of beak and in the shape of the cauda.

This species was collected on the stems, leaves and flowers of *Primula parryi* Gray.

Holotype.—Alate viviparous female, Skyway, Colorado, July 12, 1933, on Cottonwood Lake Trail. Deposited in the United States National Museum.

Dactynotus wakibae, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Length from vertex to tip of anal plate 2.04. Head brown with antennae and lateral margins darker. Thorax brown with the thoracic lobes darker. Abdomen brown except for the following: a narrow interrupted greenish band between first and second abdominal segments, one or two small transverse greenish spots on the dorsum, and the small greenish areas around the base of the cornicles. The brown of the dorsum extends laterally and overlaps the ventral surface somewhat. The ventor is distinctly lighter than the dorsum except for a median dark brown area extending posteriorly from a point in line with the base of the cornicles. Cauda brown. Cornicles brown, darker basely. First and second antennal segments more or less concolorous with head, remaining segments more or less brown except for portion of third segment proximal to first sensorium and extreme tip of segment. Femora of all legs shading gradually from light yellowish at the base to brown apically. Tibiae light yellowish-brown shading to brown apically. Tarsi brown.

Head and appendages.—Antennal tubercles gibbous but not markedly so. Secondary sensoria confined to third segment, arranged in a straight row, numbering ten, in size minute. All antennal segments imbricated. At side of primary sensorium on sixth antennal segment there are five marginal sensoria. On the dorsum of head near the junction of head and thorax there are two small tubercles. Vertex of head with two short hairs, gibbous portions of antennal tubercles with two or three hairs. Hairs on antennae exceedingly fine and short, varying in length from one-fourth to not more than half the width of segment. The beak reaches just beyond midway between the pro and mesothoracic coxae.

Thorax.—Prothorax with very small, rather inconspicuous lateral tubercles. Stigma of forewings dark brown, accessory radial thickening present. Veins dark brown with just a suggestion of a brownish border. All femora free from sensoria. Hairs on femora exceedingly short and fine, entire surface of femora imbricated. Hairs on tibiae short and fine, longer and coarser on proximal portion.

Abdomen.—Cornicles .53 long, sides straight except for reticulated portion which is ever so slightly constricted. Apical portion of cornicles with a flange, reticulated portion of cornicles equal to about one-fifth total length, there being about four rows of closed cells. Portion of cornicles not reticulated distinctly imbricated. Cauda .21 long, constricted near middle, rounded at apex with two long inwardly curved hairs on each side distal to constriction. Hairs on abdomen similar to those on antennae except for those on posterior parts of abdomen, which are more nearly normal.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Length from vertex to tip of anal plate 1.76. Head and thorax lighter than similar parts of alate form and with a distinct greenish tinge. Antennal segments progressively darker from proximal portion of third antennal segment. Abdomen dark brown, color appearing as a dark brown patch surrounded by a lighter brownish-green area which in turn is surrounded by dark brown which extends over the sides of the abdomen and covers up part of the venter. Cornicles, less dark than those of apterous viviparous female, arising from small light areas. Legs similar to those of alate female.

Proportional lengths of antennal segments as follows: III—.50, IV—.37, V—.37, VI—.14 plus .69. Length of cauda .21. Length of cornicles .50. There are no secondary sensoria. Cornicles not reticulated.

This species may be considered by some to belong to the *Adactynus*= *Macrosiphum* because of the not too gibbous antennal tubercles. As a species, however, it shows decided affinities with *Dactynotus cerasi* (Fab.). From *Dactynotus cerasi* (Fab.) alate viviparous females of this species differ in that all of the marginal sensoria are of one size, the presence of tubercles between head and thorax, the reticulated cornicles, the shorter beak and the large brown spot on the ventor. The apterous viviparous of *A. wakibae* differ from similar forms of *A. cerasi* most distinctly by not having marginal sensoria. From *D. pseudosolani* (Theobald) this species may be separated in apterous forms by the absence of marginal sensoria, by the absence of clubbed hairs on tibiae, and more numerous hairs on femora. Alate forms differ from *D. pseudosolani* by reticulated cornicles and the greater intensity of imbrications on various parts of the body and many other characteristics.

Holotype.—Alate viviparous female, Skyway, Colorado, August 6, 1933, on *Pedicularis canadensis* L.

Morphotype.—Apterous viviparous female same data as holotype.

Holotype and morphotype deposited in the United States National Museum.

The following species have thus far not been recorded from Colorado. All of them were taken near Skyway, Colorado, on Grand Mesa: *Dactynotus masoni* (Knoulton 1928), *Pemphiglachnus kaibabensis* Knoulton, *Aphis nyctalis* Hottes and Frison, and *Saltusaphis elongata* Baker.

Alate viviparous females of *Adactynus macrosiphum* (Wilson) were taken near Mesa, Colorado, June 30, 1933, on *Amelanchier.* Thus far only

apterous females have been known. The following salient features of alate forms are worth noting: third antennal segment with from 29–44 secondary sensoria, average number 35 irregularly arranged but confined to one side of segment. Sensoria irregular in size but in general rather small. Second fork of media closer to margin of wing than to first fork. Anal and cubital veins very dark brown and heavily bordered, other veins dark brown and less conspicuously bordered.

Morphotype.—Alate viviparous female data as above deposited in the United States National Museum.

Professor J. J. Davis has kindly made Monell's slide of *Callipterous ? quercicola* Monell available for me for study. Under one cover glass I find two male specimens of the species now known as *Stegophylla quercicola* (Baker) and two specimens of *Colopha graminis* Monell. The species described by Baker now becomes a synonym of the species described by Monell.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

ON A COLLECTION OF CRINOIDS FROM THE RAFFLES MUSEUM, SINGAPORE.

BY AUSTIN H. CLARK.[1]

The Director of the Raffles Museum at Singapore, Straits Settlements, Mr. F. N. Chasen, has recently been so generous as to send me for study an interesting collection of crinoids from both shallow and deep water, brought together and forwarded by Mr. M. W. F. Tweedie of the Museum.

In all, the collection includes representatives of twelve species. One of these species, *Himerometra magnipinna*, represented by three specimens from Singapore, was previously unknown from that region, though reported from Cochin China. Another species of the same genus, *H. martensi*, has long been known to be common at Singapore.

The stalked crinoids in the collection, all from the China Sea, represent *Metacrinus zonatus*, a species described by the author in 1908 from the Philippines and not since reported. The specimens in the present collection are all much larger than those upon which the original description was based, and show a rather considerable range of variation.

This species (*zonatus*) is a typical representative of the genus *Metacrinus;* but it appears to be very closely related to the aberrant *M. rotundus* of southern Japan, which may prove to be simply its extreme northeastern form.

A number of the most interesting specimens in the collection were brought up from deep water by the cable repair ship *The Cable* of the Eastern Australasia and China Telegraph Company. The officials of this company, and the officers of *The Cable*, are to be commended for their zeal in carrying on work over and above their regular line of duty. This work has resulted in a very material increase in our knowledge of the recent crinoids.

In addition to the material described herein, no less than sixteen species

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of rare deep water crinoids have been in previous years collected by *The Cable*. Of these sixteen species, no less than five—nearly one-third—were new (*Leilametra necopinata*, *Stenometra diplax*, *Iridometra maxima*, *Tonrometra multicirra* and *Nepiometra nicippe*), one of these (the first named) representing a remarkable new genus (see Journ. Linn. Soc. [Zoöl.], vol. 36, No. 249, May, 1929, pp. 635–664, pls. 40–44; and Ann. and Mag. Nat. Hist., ser. 10, vol. 10, No. 58, October, 1932, pp. 378–392, pls. 13–15).

But *The Cable* is not the only cable repair ship to which we owe substantial advances in our knowledge of the recent crinoids. Important contributions have been made by the *Patrol*, the *Lady Denison-Pender*, the *Recorder* and the *Norseman* of the Eastern and Associated Telegraph Company, and especially by various ships of the Great Northern Telegraph Company operating on the coasts of eastern Asia, particularly in the region of the Korean Straits, under the command of Captains Suensson, Schønau and H. Christiansen (see Vidensk. Meddel. fra den naturh. Foren. i København, 1909, pp. 115–194; and Proc. Biol. Soc. Washington, vol. 26, pp. 177–182, August 8, 1913).

The officials of the several submarine telegraph companies, and the officers of the cable repair ships, deserve the hearty thanks of all students of marine biology, and of biology in general, for their invaluable contributions toward a better understanding of the fauna of the sea bottom.

Six of the specimens recorded below were identified in 1899 by the late Mr. F. P. Bedford, who lived for a little more than a year in the neighborhood of Singapore and Malacca, making detailed studies of the echinoderms of the region and later publishing an account of the sea-urchins and starfishes.

Capillaster multiradiata (Linné).

Johore Strait, Singapore; on sand bank; April, 1933. one specimen.

Comatula pectinata (Linné).

Malacca Strait, southwest of Singapore (lat. 1° 25′ 03″ N., long. 102° 58′ E.); 33 meters (18 fathoms); bottom temperature 81° F.; gray mud; cable repair ship *The Cable*, Eastern Australasia and China Telegraph Company; February 11, 1933.

Three specimens; one of these is intermediate between *Comatula pectinata* and *C. purpurea*, having XII cirri arranged in three interradial pairs and two interradial threes. These specimens are all of the slender form.

Java Sea, between Java and Borneo, west of Oosterling Reef (lat. 5° 36′ 40″ S., long. 112° 05′ 30″ E.); 66 meters (36 fathoms); bottom temperature 83.5° F.; mud, some sand, and shells; cable repair ship *The Cable*.

One specimen of the slender form.

Johore Strait, Singapore; on sand bank; April, 1933.

One large specimen with 12 arms, two IIBr 2 (1+2) series being present.

Comatula purpurea (J. Müller).

Malacca Strait, southwest of Singapore (lat. 1° 25′ 03″ N., long. 102° 58′ E.); 33 meters (18 fathoms); bottom temperature 81° F.; gray mud;

cable repair ship *The Cable*, February 11, 1933. One typical specimen, with the cirri X, arranged in five interradial pairs.

Himerometra magnipinna A. H. Clark.

Singapore, 1899. One specimen.
Singapore; no further data. Two specimens.

Heterometra aspera A. H. Clark.

New Harbour, Singapore; 15 meters (8 fathoms); July 31, 1899. One specimen.

Amphimetra discoidea (A. H. Clark).

Singapore, 1899. One specimen.

Stephanometra spicata (P. H. Carpenter).

Blakang Mati, near Singapore; 1899.
One fine specimen with 28 arms 125 mm. long; P_2 is 19 mm. long with 17 segments, and P_3 is 14 mm. long with 15 segments.

Stephanometra protectus (Lütken).

Singapore; no further data. One specimen.

Lamprometra palmata (J. Müller).

Singapore, 1899. One specimen.
Christmas Island, Indian Ocean, south of the western end of Java (lat. 10° 25′ S., long. 105° 42′ E.). One specimen.

Pontiometra andersoni (P. H. Carpenter).

New Harbour, Singapore; 15 meters (8 fathoms); July 31, 1899. One specimen.
Singapore, 1899. One specimen.

Neometra alecto A. H. Clark.

China Sea, east of Hainan (lat. 19° 18′ N., long. 112° 14′ E.); 208 meters (114 fathoms); cable repair ship *The Cable*.
Two specimens, attached to the cirri of a large specimen of *Metacrinus zonatus*.

Metacrinus zonatus A. H. Clark.

China Sea, west of Ladd Reef (lat. 8° 26′ N., long. 111° 16′ E.); 210 meters (115 fathoms); cable repair ship *The Cable*.
One specimen. The stem is 180 mm. long, 5 mm. in diameter but distally tapering and only 4 mm. in diameter at the broken end. There are about 16 nodals. The internodals number 11, 10, 10, 12, 11, 12, 12, 13, 11, beginning at the distal end of the stem. In section the stem is rounded-pentagonal, almost cylindrical. The internodals in their middle third

bear a narrow, abrupt, and conspicuous, though not very high, girdle, which is more or less constricted at frequent, though irregular, intervals, so as to suggest incipient division into a row of tubercles; this girdle may be continuous, passing uninterruptedly around the angles of the stem; but there is often a distinct tubercle, sometimes elongated in the direction of the axis of the stem, at the angles. This tubercle, when it occurs, appears on all the columnals in the internode.

The cirri are 60–62 mm. long with 52–55 segments.

Of the five IBr series, four are 7(1+2, 4+5), and one is 7(1+2, 3+4).

China Sea, east of Hainan (lat. 19° 18′ N., long. 112° 14′ E.); 208 meters (114 fathoms); cable repair ship *The Cable*. Six crowns with more or less of the stem attached, and three stem fragments.

In one specimen the stem is 150 mm. long and 6 mm. in diameter at the broken end. The internodals number 15, 11, 12, 12, 12, 11, 11.

The cirri have the six basal segments very short, the seventh about twice as broad as long, and the remainder about one-third again as broad as long with a dorsal carination which on the distal half of the cirri becomes prominent, and on the outer segments may be notched in the middle.

Of the four IBr series present, three are 7(1+2, 4+5), and one is 6 (1+2, 4+5). The distal ends of the elements of the division series, and especially of the brachials in the proximal portion of the arms, are produced, so that the arms appear very rough.

The lowest pinnules have the ends of the segments much produced and more or less everted, and the sides of the segments with broadly thickened edges, or more or less strongly tubercular, so that the pinnules appear very ornate.

This specimen, like that preceding, resembles the type specimen from off Simonor in the Tawi Tawi group, Philippine Islands, very closely; but it is much larger, with the girdle on the internodals broader and somewhat lower, and with the proximal pinnules somewhat more ornate.

In another specimen the stem is 205 mm. long with about 21 nodals, and is 6 mm. in diameter. The internodals number 10, 9, 9, 10, 11, 9, 10, 8, beginning at the distal end.

The stem is pentagonal with broadly rounded angles, and the sides scarcely convex. The internodals alternate high and low, the high being about twice as long as the low. The girdle on the internodals is low, arising from the whole lateral surface, and is more or less tubercular, especially in the middle of the sides.

The cirri are 60 mm. long, and are composed of 60–63 segments.

The arms divide three or four times. The outer branch from each IIIBr axillary divides again, but the inner does not, so that there are 2, 1, 1, 2 : 2, 1, 1, 2 = 12 arms on each post-radial series, or 60 arms in all.

Of the five IBr series, four are 7(1+2, 4+5), and one is 6(1+2, 4+5).

Of the ten IIBr series, four are 9(3+4), one is 8(4+5), one is 7(2+3), one is 7(3+4), one is 7(4+5), one is 7(6+7), and one is 6.

Of six external IIIBr series, four are 13(3+4), one is 14(3+4), and one is 15(3+4). Of six internal IIIBr series, four are 17(3+4), one is 17(3+4, 7+8), and one is 15(2+3).

Seven IVBr series are 17(2+3), 17(3+4), 20(2+3), 21(6+7), 22(2+3), 22(3+4), and 23(3+4).

Usually after an axillary the third and fourth ossicles are united by syzygy.

The arms are 200 mm. long, measured from the radials.

In a third specimen the stem is 260 mm. long with about 20 internodes. The fully developed internodes are 20–22 mm. in length. The internodals number 11, 13, 13, 12, 15, 12, 14, 11, 12, 12, beginning at the broken end of the stem.

The stem is pentagonal with rounded angles. The girdle is low and inconspicuous, and is confined to the middle third of the internodals. On the distal portion of the stem the girdle is uninterrupted, passing unmodified around the angles, but on the proximal portion it becomes tubercular, and there is a slightly enlarged and more or less isolated tubercle at each of the five angles.

The cirri are up to 60 mm. long, equalling from two and one-half to three internodes in length. They are composed of 49–53 segments.

The arms are between 40 and 45 in number, IVBr axillaries being rare.

Of the five IBr series, three are 7(1+2, 4+5), one is 7(1+2, 5+6), and one is 6(1+2, 4+5).

The four IIBr series counted are all 11(3+4).

The three external IIIBr series counted are all 15(3+4). Of the three internal IIIBr series counted, two are 20(3+4, 17+18), and one is 20(3+4, 16+17).

The single IVBr series counted is 44(3+4, 15+16, 24+25, 39+40).

The arms are about 155 mm. long, measured from the radials.

In a fourth specimen the stem is 75 mm. long with 10 nodals. The internodals number 11, 11, 11. The diameter of the stem is 6 mm.

The cirri are up to 54 mm. in length, with 51 segments.

Of the five IBr series, three are 6(1+2, 4+5), one is 6(1+2), and one is 7(1+2, 4+5). One of the 6(1+2, 4+5) series has a small supplementary ossicle interpolated between the two elements of the first syzygial pair, which is apparently united to both elements by syzygy.

The three IIBr series counted are all 11(3+4).

The single external IIIBr series counted is 13(3+4). The two internal IIIBr series counted are 21(3+4) and 13(3+4).

This last specimen agrees with the others except for the slightly fewer ossicles in the IBr series and the smooth stem which in section is pentagonal with rounded angles. There is not the slightest trace of the girdle about the internodals that occurs, in varying degrees of development, on all the other specimens.

It very closely resembles *M. rotundus*, differing only in the regularity of the IBr series, and the longer cirri with more numerous segments.

In *M. rotundus* the stem often has swollen sides, so as to be in cross section pentagonal with the sides of the pentagon more or less convex, and furthermore the external sides of the internodals are commonly more or less swollen, or they may be encircled by a continuous low and inconspicuous narrow girdle which arises from little more than the middle third.

In connection with Indo-Malayan crinoids Dr. F. A. Bather, F. R. S., has recently been so kind as to call my attention to the fact that the generic name *Oreometra* A. H. Clark (Crinoids of the Indian Ocean, 1912, p. 179) applied to a type of comatulid included in the family Calometridæ is preoccupied by *Oreometra* Aurivillius (Wiss. Ergebn. d. Schwed. zool. Exped. nach dem Kilimandjaro, dem Meru u. den umgebenden Massaisteppen Deutsch-Ost-Afrikas 1905–1906, part 9, 1910, p. 38) applied to a group of moths included in the family Geometridæ and subfamily Boarmiinæ. The generic name *Oreometra* A. H. Clark may be replaced by *Reometra*, nom. nov.

Vol. 47, pp. 15–18 February 9, 1934

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW MONKEY FROM DUTCH NORTHEAST BORNEO.

BY GERRIT S. MILLER, JR.[1]

During a rearrangement of the primates in the U. S. National Museum, I have found that a representative of the *Presbytis hosei* group occurring in Dutch Northeast Borneo is a well characterized local form. It may be named and described as follows:

Presbytis canicrus, sp. nov.

Type.—Young adult female (third molars in place and beginning to wear; basal suture not obliterated) skin and skull no. 198282 U. S. National Museum. Collected on the Karangan River, Dutch Northeast Borneo, November 25, 1913, by H. C. Raven. Original number 1137.

Characters.—Like *Presbytis everetti* (Thomas) but dark area on head brownish (not blackish like the hands and feet); line of demarkation between dark and whitish areas on face passing obliquely downward across cheek to angle of mouth instead of horizontally to a point midway between mouth and eye; dark crown area prolonged backward over neck to shoulders without conspicuous narrowing; no whitish spot on forehead; gray of arms and legs always extending to wrists and ankles, the forearm and lower leg never blackish.

Color.—Dorsal surface and sides of body, entire tail, and outer surface of limbs to wrists and ankles, a nearly uniform grizzled gray, the general effect near the quaker-drab of Ridgway (or in some lights more bluish) with silvery reflections. The individual hairs are either pale mouse-gray throughout (appearing silvery whitish in certain lights) or blackish throughout, or blackish with one or two silvery annulations near tip. The blackish hairs are most abundant on shoulders, lumbar region and base of tail. Hands and feet sooty-black in abrupt contrast with arms and legs. Lower lip, chin, lower part of cheeks (to line joining corner of mouth with auditory meatus), throat, sides of neck, under surface of body and inner surface of limbs a whitish buff (paler than the cartridge buff of Ridgway) sharply defined from the darker neighboring regions except near wrists and ankles,

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where it becomes grizzled or clouded with blackish. Face deep sepia (in some lights appearing blackish) to a line extending obliquely across cheek from corner of mouth to auditory meatus. A small spot of very short whitish hairs immediately below nostrils. Eyebrows blackish. Crown uniform with cheeks except that the region behind ears is not so dark (more nearly approaching the sepia of Ridgway). Upper surface of neck to shoulders essentially like crown, but the hairs when disturbed showing conspicuously drab below the tips.

Skull and teeth.—The skull and teeth do not differ appreciably from those of *Presbytis everetti* and *P. hosei*. From the skull of *P. chrysomelas* that of *P. canicrus* is immediately distinguishable by the wider nasal bones and the essentially straight (not convex) profile of the interorbital region or "nose" when viewed from the side. In most specimens the frontal region above the postorbital constriction is less highly domed than it usually is in *Presbytis chrysomelas*. The lower jaw agrees with that of *P. hosei* and *P. everetti* and differs from that of *P. chrysomelas* in the relatively higher, narrower parallelogram of the post-dental segment, the narrower, more abruptly concave sigmoid notch, and, usually, in the greater height to which the coronoid process rises above the articular level.

Measurements.—External measurements of type as recorded by the collector: head and body, 460; tail, 740; foot, 165. Average and extremes of five females including type: head and body, 434 (390–480); tail, 710 (650–760); foot, 160 (152–165). Average and extremes of five males: head and body, 454 (430–473); tail, 726 (690–750); foot, 172 (170–177). Cranial measurements of type and of a slightly older male (basal suture obliterated): greatest length, 85.4 and 89.2; condylobasal length, 65.0 and 69.4; zygomatic breadth, 65.4 and 70.6; postorbital constriction, 41.6 and 45.2; breadth of braincase above zygomata, 54.2 and 54.6; mandible, 61.0 and 65.0; maxillary toothrow (alveoli), 26.6 and 29.2; mandibular toothrow (alveoli), 31.0 and 34.0.

Specimens examined.—Twenty-seven, from the following localities in Dutch Northeast Borneo: Karangan River, 11; Klambu Harbor, 5; Madang, 1; Menganne River, 5; Pelawan River, 1; Talisaian Mountain, 4.

Remarks.—In coloration the series is very uniform. There is practically no variation in the color of the upper parts; such as occurs is limited to a slight increase, in a few specimens, of the amount of black in the grizzle of the limbs and upperparts, and to the presence in two of the skins from Klambu Harbor, of an evident drabby cast on the back. The grizzled area on the outer side of the arm and leg always extends to the wrist and ankle so as to make a sharp contrast with the blackish hand and foot. The position of the line of demarkation between the light and dark areas on the side of the face is particularly constant. In every specimen it begins at the angle of the mouth; in a few its upper limit is above the middle of the ear; in no specimen does the dark area descend below the ear, though in a few (particularly ♀ no. 197655, from Klambu Harbor) some dark hairs are present among the whitish ones close beneath the ear base. The dorsal surface of the head and neck vary somewhat in the depth of the sepia in different regions. Usually the fore part of the head is as dark as the

cheeks, and the hind part of the head and the backward extension of the dark crown area on the neck is distinctly less dark. In no specimen among the twenty-seven is this dark area concolor with the blackish hands and feet as it usually is in *P. everetti.*

Presbytis canicrus represents the North Bornean *P. everetti* in the low lands immediately north and south of the Tinda Hantung or Sakuru Mountain chain, whose eastern extremity, Cape Mangkalihat, situated near the middle of the east coast of the island, forms the most eastwardly projecting point on the coast of Dutch Northeast Borneo. Gyldenstolpe has recorded a typical specimen of *Presbytis hosei* from Kaburan, on the Bulungan River, about two degrees north of the region in which *P. canicrus* was found by Raven (Kungl. Svenska Vetenskapsakad. Handl., vol. 60, no. 6, p. 9, 1919).

For the present I find it more convenient to treat *Presbytis everetti* as a distinct species in spite of the fact that Chasen and Kloss have recently said (Bull. Raffles Mus., no. 6, p. 6, December, 1931) that it is the female of *P. hosei.* Whether their conclusion is right or not is a question about which I am not now in position to form a definite opinion. However, I may mention two facts that seem difficult to reconcile with it, namely, first, that a positively determined female of *P. hosei* in the U. S. National Museum (no. 83412, Mt. Kalulong, Sarawak; full-grown and with completely erupted third molars, but permanent canines not yet in place) has exactly the same color pattern as two normal males; and second, that, although seven of them are males, not one of our 27 specimens of the nearly related East Bornean animal has the *hosei* type of coloration,—all, both males and females, are strictly of the "*everetti*" type.

At my request Mr. R. I. Pocock has kindly examined the seven skins of *Presbytis everetti* in the British Museum. He finds that in the type specimen the leg is distinctly grizzled from knee to ankle, its general color blending with that of the thigh but darkening slightly toward ankle, where it is marked off, though not very sharply from black of foot. The leg is not so gray as represented in the plate that accompanied the original description (Proc. Zool. Soc. London, 1892, pp. 582–583, pl. 41). In another the gray extends down to within about 50 mm. of the ankle. The remaining 5 skins, like all the male specimens with the *hosei* type of coloration, have the leg from the knee down blackish without appreciable grizzling. He finds the whitish spot on the forehead very variable. In one specimen it is a small spot 5 mm. high by 10 mm. wide; in another it is 20 mm. high by 42 mm. wide; in a third it is a transverse stripe 5 mm. high and 32 mm. wide. In one female, (No. 0.8.4.2) from Mount Dulit, there is a large white patch on each side of the crown above. These patches do not join the frontal spot; they extend laterally, though rather interruptedly, to the white that passes over the ears. Sides of neck white and base of hairs of nape white also. This female approaches the male *hosei* in head pattern.

The variability shown by these few specimens contrasts strikingly with the almost stereotyped uniformity of the color pattern in the 27 skins of *Presbytis canicrus.*

Vol. 47, pp. 19–20 February 9, 1934

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW CLAPPER RAIL FROM ANTIGUA, BRITISH WEST INDIES.

BY STUART T. DANFORTH.

In the Lesser Antilles the Clapper Rail has been recorded only from Barbuda and Antigua, from both of which islands it has been known for many years, although so far as I have been able to ascertain no specimens had actually been secured there until those obtained by the present writer. Therefore when I visited the islands in question during the summer of 1933 I made a special effort to secure specimens. On Barbuda, probably due to the shortness of my stay, none were found, although some likely mangrove swamps were visited. On Antigua two specimens were obtained in the mangroves at the locality called Five Islands on August 8 and 10. These prove to differ from specimens from the Greater Antilles, and may be known as

Rallus longirostris manglecola, subsp. nov.

Subspecific characters.—Distinguished from any of the forms of *Rallus longirostris* inhabiting the Greater Antilles by its much longer bill and shorter tarsus.

Type.—No. 1005, Coll. of S. T. Danforth, at present deposited at the College of Agriculture and Mechanic Arts of the University of Puerto Rico, Mayagüez, Puerto Rico, adult ♂, collected at Five Islands, Antigua, August 10, 1933, by S. T. Danforth.

Measurements of type.—Wing, 146.1; tail, 64.7; tarsus, 52.1; culmen, 73.9 mm.

Remarks.—The female collected in Antigua presents the following measurements: Wing, 135.5; tail, 60.7; tarsus, 45.8; culmen, 64.8 mm.

The bill of *manglecola* is longer and the tarsus shorter than that of any specimens from the Greater Antilles which it has been the writer's privilege to examine, or than any of the measurements which he has been able to find recorded in the literature.

For comparative purposes measurements of some specimens of *Rallus longirostris* subsp. from the Greater Antilles, some measured by the writer, and others found recorded in the literature, are appended. *Males:* Two from Jamaica, listed by Wetmore[1] (one of which, from the Museum of Comparative Zoölogy, was also seen and measured by the writer, thanks to the kindness of Mr. J. L. Peters): Wing, 144–147.6; tail, 62.0 (of one), tarsus, 54.2–54.2; culmen 61.8–58.5. Four from Haiti, recorded by Wetmore[1]: Wing, 151–154 (152.2); tail, 61.5–68.7 (64.4); tarsus, 57–59.5 (58.5); culmen, 63.8–68.7 (66.1). Wetmore[2] gives measurements of two from Petite Gonave and Grand Cayemite, islets off the Haitian coast, as: Wing, 152–154; tail, 65.4–68.7; tarsus, 59–59.5; culmen, 67.5–68.7 mm. One from Puerto Rico, Coll. of S. T. Danforth, measures, Wing, 149.5; tail, 69.0; tarsus, 55.0; culmen, 62.1 mm. *Females:* One from Jamaica (Wetmore[1]), Wing, 139.8; tarsus, 50.2; culmen, 54.7 mm. Six from Haiti (Wetmore[1]), Wing, 134.5–144.5 (138.1); tail, 54.4–58.3 (56.4); tarsus, 50.9–59.5 (53.8); culmen, 53.6–63 (58.6) mm., and a seventh (Wetmore[2]), wing, 143.6; tail, 59; tarsus, 51.9; culmen, 60.8 mm. One from Haiti, Coll. of S. T. Danforth, Wing, 138.2; tail, 73.0; tarsus, 49.8; culmen, 60.1 mm.

Distribution.—Island of Antigua, Lesser Antilles, and possibly the nearby island of Barbuda.

[1]Proc. Biol. Soc. Wash., **41**, June 29, 1928, pp. 121–22.
[2]Proc. U. S. National Museum, **81**, 1932, p. 15.

Vol. 47, pp. 21–22 February 9, 1934

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW SUBSPECIES OF YELLOW-THROAT, *GEOTHLYPIS TRICHAS*, FROM GEORGIA.

BY THOMAS D. BURLEIGH.

During a residence of ten years at Athens, Georgia, the writer collected a number of breeding yellowthroats (*Geothlypis trichas*) that, at the time, were tentatively identified as the Florida race, *Geothlypis trichas ignota*. Later these birds were compared with a series from Tarpon Springs, Florida,[1] the type locality of *Geothlypis trichas ignota*, and found to differ from this subspecies in several characters. Further comparison with breeding birds from both North and South Carolina and from various parts of Georgia showed clearly that an undescribed race of *Geothlypis* occurred in the Southeastern States. This new form may be known as

Geothlypis trichas typhicola,[2] subsp. nov.

ATHENS YELLOWTHROAT.

Characters.—Similar to *Geothlypis trichas trichas*, but with longer wing and tail, more brownish upperparts, darker flanks, and more extensively yellow underparts.

Measurements.—Type (♂ adult): wing, 55 mm.; tail, 56; exposed culmen, 10.5. Average of 15 adult males from Athens, Georgia: wing, 54.9; tail, 54; exposed culmen, 10.5. Average of 2 adult females from Beaufort, North Carolina: wing, 50.2; tail, 50; exposed culmen, 10.

Type.—Adult male No. 301459, U. S. Nat. Mus., Biological Survey Collection; Athens, Georgia, May 11, 1930; Thos. D. Burleigh, original number, 896.

[1]Grateful acknowledgment is made to Mr. James L. Peters, Curator of Ornithology of the Museum of Comparative Zoölogy, Cambridge, Massachusetts; to Dr. Frank M. Chapman, Curator of Ornithology of the American Museum of Natural History, New York City; and to Dr. Herbert Friedmann, Curator of Birds of the National Museum, Washington, D. C., for specimens borrowed; and to Dr. Harry C. Oberholser and Mr. Arthur H. Howell of the Bureau of Biological Survey, Washington, D. C., for their assistance and advice in the preparation of this manuscript.

[2]From *Typha*, the generic name of the cat-tails of the southeastern United States.

Distribution.—Central and southeastern Alabama; all of Georgia with the exception of the extreme northwestern corner; South Carolina; North Carolina; and southeastern Virginia (Dismal Swamp); largely resident in the southern part of its range.

Remarks.—This new race of the Yellowthroat can be easily recognized in either sex by its size and coloration. From *Geothlypis trichas ignota* it is readily separated by its distinctly smaller bill, and less brownish upperparts and flanks. From *Geothlypis trichas trichas* it is distinguishable by its longer wings and tail, brownish rather than olive green upperparts, much more brownish flanks, and more extensively yellow underparts. From *Geothlypis trichas brachidactyla* it can be recognized by its more brownish upperparts, duller gray crown patch, smaller bill, and longer tail. Actually it resembles *Geothlypis trichas trichas* in size, while in coloration it more closely approaches *Geothlypis trichas brachidactyla.* Specimens from the coast of North Carolina show intergradation with *Geothlypis trichas trichas* in the smaller size of the wing and paler flanks; while those from extreme southern Georgia and southeastern Alabama approach *Geothlypis trichas ignota* in the larger size of the bill.

TABLE OF COMPARATIVE MEASUREMENTS OF THE FOUR EASTERN RACES OF *Geothlypis trichas.*

	TRICHAS[1]	BRACHIDACTYLA[1]	TYPHICOLA[2]	IGNOTA[3]
Wing	52.9	55.1	55	55.1
Tail	49.3	49.2	54.0	55.6
Exposed culmen	10.5	11.4	10.5	11.7

[1]From Ridgway, Bull. U. S. Nat. Mus. No. 50, pt. 2: pp. 662; 664.
[2]10 adult males from Athens, Georgia.
[3]10 adult males from Tarpon Springs, Florida.

Specimens of *Geothlypis trichas typhicola* examined: Total number 91, from the following localities:

Georgia: Athens, 42; Brier Creek (Burke Co.), 1; Blackbeard Island, 1; Beachton, 1; Newton, 1; Blakely, 2; Augusta, 1; Montezuma, 1; St. Marys, 1; Tybee Island, 2.
South Carolina: McClellanville, 1; Easley, 1; Blacksburg, 2; Otter Island, 1; Anderson, 2; Saluda Gap, 3.
North Carolina: Beaufort, 7; Columbia, 2; Pine Island, 2; Sneads Ferry, 1; Wilmington, 1; Swanquarter, 1; Asheville, 5; Marion, 2.
Alabama: Jackson Lake, 1; Wilsonville, 2; Autaugaville, 1; Dothan, 1; Abbeville, 1; Montgomery County, 1.
Virginia: Dismal Swamp, 1.

Vol. 47, pp. 23–32 February 9, 1934

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THE AMPHIPOD GENUS COROPHIUM ON THE EAST COAST OF AMERICA.[1]

BY CLARENCE R. SHOEMAKER.

Up to the present time only one species of *Corophium* has been recorded from the east coast of the United States. This is *Corophium cylindricum* which was described by Thomas Say under the genus *Podocerus*. *Podocerus cylindricus* was described by Say from Egg Harbor, New Jersey, in 1818, and recent authors have considered it a species of *Corophium*, but from his description it seems to me quite unlikely that he was dealing with the genus *Corophium* at all. However, the name *C. cylindricum* has heretofore been applied to a species of *Corophium* which appears to be rather common on the New England coast. After examining the specimens in the U. S. National Museum which have been identified by different authors as *C. cylindricum*, I find that all are identical with *C. acherusicum* A. Costa, of Europe.

In studying the abundant material from the east coast of America in the collection of the National Museum, I find that five European species are represented, and that there are three species new to science. *Corophium volutator* (Pallas), *Corophium crassicorne* Bruzelius, *Corophium acherusicum* A. Costa, *Corophium acutum* Chevreux, and *Corophium lacustre* Vanhöffen are for the first time recorded from America. *Corophium simile*, *Corophium tuberculatum*, and *Corophium louisianum* are here described as new to science. The two remaining species included in this paper, *Corophium rioplatense* Giambiagi and *Corophium pseudacherusicum* Schellenberg have been previously described from America.

Corophium volutator (Pallas).

Oniscus volutator, Pallas, 1766, Miscellanea Zoologica, p. 192, pl. 14, fig. 20.

This species was described from the west coast of Norway, and has been recorded from the northern coast of Europe and the Mediterranean.

[1]Published by permission of the Secretary of the Smithsonian Institution.

A single specimen was taken at Pine Point, near Portsmouth, Maine, from a duck stomach, by the U. S. Biological Survey, and it has been taken recently by the Biological Board of Canada at several places in the Bay of Fundy, where it occurs principally within the mouths of rivers.

Corophium crassicorne Bruzelius.

Corophium crassicorne, Bruzelius, 1859, Kongl. Svenska Vetenskaps-Akad. Handl. Stockholm, new ser., vol. 3, no. 1, p. 15, pl. 1, fig. 2.

Dr. K. Stephensen in 1929 gives the following distribution for this species: ". . . from Jan Mayen (not Greenland and Iceland) and Norway along the European coasts to Bosporus." It is now recorded for the first time from America.

It was taken by the U. S. Fish Commission in the Bay of Fundy in 1872 and later along the New England coast as far south as Gardiners Bay, Long Island. There are in the National Museum collection two female specimens taken by Dr. Wm. H. Dall at Chichagof Harbor, Attu, Alaska, June 20, 1873.

There seems to have been considerable confusion as to the status of this species until Sars published his description and figures in the "Crustacea of Norway," vol. 1, p. 615, pl. 220, in 1894. He states, however, on pages 615 and 616 that the penultimate joint of antenna 2 in the male is without any spines. This is apparently true only of the most mature males as the youngest males have the second antenna differing very slightly from that of the female, even possessing the single spine on the under margin of the fifth joint which is characteristic of the female.

Corophium acherusicum A. Costa.

Corophium acherusicum, A. Costa, 1857, Mem. Accad. Scienze, Napoli, vol. 1, p. 232.

The range of this species as given by Schellenberg in 1928 was, "Holland to Senegal and the Mediterranean; east coast of Cape Colony and from Dar es Salaam." It is now recorded from America, where it has been found from Baffins Bay to Brazil.

I have examined authentic specimens of this species from Europe and find that they differ in no characters from our east coast specimens which have been identified as *C. cylindricum* (Say). The name *C. cylindricum* would hold by right of priority except for the fact that it is not at all certain that Say was dealing with the genus *Corophium*, and even if this were certain it would be impossible to determine which species he was describing, as several are now known to occur at Egg Harbor, his type locality.

Male.—Rostrum very minute. Lower margin of first joint of antenna 1 provided distally with a small spine and proximally with one or two uneven protuberances, but in younger males this margin possesses three or four evenly spaced spines and no protuberances. The inner margin of this joint is without spines. The fourth joint of antenna 2 has the lower margin produced distally into a stout slightly curved tooth above which are two

smaller teeth; the lower inner side of this joint is without spines except in young specimens where there are several; the fifth joint is armed below proximally with a low tooth which nearly opposes the large tooth of the fourth joint when the fifth joint is flexed. First joint of mandibular palp scarcely at all produced distally where the characteristic plumose seta is borne. The dactyl of gnathopod 2 bears two teeth on inner margin. In peraeopod 5 the fifth joint has the center of the front margin somewhat protruding and above this swelling there is a row of very short straight spinules. In younger males, however, this joint does not possess these characters. Pleon segments 4–6 are completely coalesced with their united lateral margins somewhat depressed, thus making the dorsal surface slightly arched.

Female.—Rostrum small but much larger than in the male. Lower margin of first joint of antenna 1 with four or five spines, and inner margin with three proximally placed spines. Antenna 2 with lower margin of second joint bearing a lobe armed with three minute spinules; third joint bearing a pair of spines on lower margin; fourth joint bearing on lower margin a single distal spine back of which are three equally spaced pairs of spines, making seven spines in all; and fifth joint bearing two equally spaced spines on lower margin. Peraeopod 5 without the swelling or row of short spinules on fifth joint. Length of male and female from 3 to 4 mm.

Corophium pseudacherusicum Schellenberg.

Corophium pseudacherusicum, Schellenberg, 1931, Swedish Antarctic Expedition, 1901–1903, vol. II, no. 6, p. 258, fig. 134.

Corophium bonellii, Stephensen, 1924 (♂), Vidensk. Meddel. fra den naturh. Forening, Kjobenhavn, Bd. 78, pp. 73–78, fig. 3 ♂.

Dr. A. Schellenberg described this species from four females taken in 1892 at Picton Island and Ushuaia, Tierra del Fuego, and Punta Arenas, Chile. He states that the fifth joint of antenna 2 bears two evenly spaced spines on lower margin. Dr. Schellenberg has kindly allowed me to examine one of his specimens and I find that the fifth joint bears only one spine, but after examining a great many specimens in the collection of the National Museum which I believe to belong to this species I find that this joint may bear either one or two spines, though two is the much commoner number. The fourth joint of this antenna appears always to bear on the lower margin a single distal spine back of which are two evenly spaced pairs of spines, making five in all. The third joint bears a single pair of spines, and the second joint a lobe armed with three spinules as in *C. acherusicum.* The first joint of antenna 1 has much the same spine arrangement as in *C. a.* The first joint of the mandibular palp is distally produced at the corner bearing the plumose seta as described by Dr. Schellenberg. The dactyl of gnathopod 2 bears two teeth on inner margin. Pleon segments 4–6 coalesced and together with their appendages much resembling *C. a.*

Male.—The rostrum is long, slender and pointed and curves slightly downward, while in the female it is short and broadly triangular. First joint of antenna 1 armed on lower margin with one terminal spine and

occasionally one near the center. On the inner surface of this joint near the proximal end there is a well developed laminar protuberance which is absent in young males. Fourth joint of antenna 2 bears distally a strong, slightly curved tooth above which are one or two smaller teeth, and on the inner surface of this joint near the proximal end is a shallow depression bearing two minute spinules. First joint of mandibular palp not produced. Dactyl of gnathopod 2 bearing three teeth on inner margin. Fifth joint of peraeopod 5 without the protuberance possessed by *C. a.* Pleon segments 4–6 with appendages about as in female. Length of male and female about 4 mm.

I believe that most authors have mistaken this species for *C. bonellii*, which it superficially resembles. Sars, in "Crustacea of Norway," vol. 1, pp. 616, 617, pl. 221, fig. 1, describes and figures the female of *C. bonellii*, but he never saw a specimen of the male. His figure is correct and exactly corresponds with specimens of *C. b.* taken by the Canadian Arctic Expedition in 1913 at Grantley Harbor, Alaska. I have re-examined the single male specimen of *C. b.* taken on this expedition and observe the following distinguishing characters: Rostrum rather long and spear-shaped, somewhat expanded in the middle, curving slightly downward. Antenna 1 with the lower margin of first joint armed with a terminal spine and one weaker spine near center; inner margin without spines and without any protuberance such as is possessed by *C. pseudacherusicum.* In antenna 2 the lower distal corner of fourth joint is produced into a strong slightly curved tooth above which is a much smaller tooth, and there are no spines on inner surface of this joint; fifth joint is without even a vestige of a tooth on under surface, but the inner distal margin is produced into a lobe like that of *C. pseudacherusicum.* The first joint of mandibular palp is produced as in the female. The dactyl of gnathopod 2 bears only one tooth on inner margin as in the female. Pleon segments 4–6 coalesced and resembling those of *C. pseudacherusicum. C. bonellii,* so far as we now know, is confined to the high northern latitudes, while *C. pseudacherusicum* appears to have an exceedingly wide distribution. *C. p.* has been taken on the northern coast of Europe; British Isles; Gulf of St. Lawrence; Nova Scotia, and the east coast of America as far south as Tierra del Fuego; and there are specimens in the National Museum from San Francisco Bay, California; Oyster Bay, Washington; Alaska; and Hong Kong, China.

Corophium acutum Chevreux.

Corophium acutum, Chevreux, 1908, Bull. Soc. Zool. France, vol. 33, p. 75, fig. 6.

This is apparently a small brackish water species measuring only 3 mm. in length which was described by Ed. Chevreux from Bône, Algeria. Dr. Schellenberg, in recording this species in 1928 from Port Said, Egypt, states that the males have three spines on the lower inside margin of the fourth joint of antenna 2. I have had the privilege of examining specimens from the Lannion River, France, and I find that there are three spines on the lower inside margin of this joint.

The specimens from the east coast of America appear to agree in all particulars with the specimens from the Lannion River.

There have been only a few records of the occurrence of *C. acutum*. Chevreux in 1925 in "Faune de France. 9. Amphipodes," p. 367, gives the distribution as mouth of the Lannion River and Concarneau, France; Monaco; and Bône, Algeria. In 1928 Dr. Schellenberg recorded it from Port Said, Egypt. It is now recorded from America, where I have identified specimens from Long Island Sound, taken by the U. S. Fish Commission in 1874; and specimens taken by Dr. Horace G. Richards at Woods Hole, Mass., in 1929, and Cape May, New Jersey, in 1930. Dr. Waldo L. Schmitt, while traveling on the Walter Rathbone-Bacon Scholarship of the Smithsonian Institution in 1925, took several specimens of this species in the vicinity of Rio de Janeiro, Brazil.

Corophium lacustre Vanhöffen.

Corophium lacustre, Vanhöffen, 1911, Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin, p. 400, figs. 1–4.

This brackish water species was described by E. Vanhöffen in 1911 from the Frisches Haff. E. W. Sexton, in 1912, recorded it from the Harbor of Bremerhaven, Germany. In 1917 Vanhöffen mentions it again from the Frisches Haff and figures the female. W. Hellén records it from Borga on the Gulf of Finland in 1918. Schlienz in 1923 recorded it from the brackish waters of the Elbe. It is now recorded for the first time from America, where its range, substantiated by specimens in the U. S. National Museum, extends along the east coast of the United States, in the bays and rivers from the mouth of the Patapsco River, Chesapeake Bay, to Winyah Bay, South Carolina, in which latter place it was taken by the steamer *Fish Hawk* in 1891. It has been taken in the Potomac River as far as Liverpool Point, Maryland, about seventy miles from the mouth. *C. lacustre* is common on old piling and on old oyster shells.

This species, though superficially resembling *C. acutum*, attains a larger size, the mature males measuring 4.5 mm.

In 1926, Poisson and Legueux (Bull. Soc. Zool. France, vol. 51, p. 320 with figures) described, from Banyuls on the Mediterranean coast of France, what they believed to be a variety of *C. acutum* which they named *chevreuxi*. From their figures it is quite evident that they were dealing with *C. lacustre* Vanhöffen. They do not show the spine on the lower inner margin of the fourth joint of the second antenna of the female, but the tooth at the lower distal corner of this joint is quite characteristic of *C. lacustre*, whereas in *C. acutum* there is no vestige of a tooth on this joint in the female.

Corophium rioplatense Giambiagi.

Corophium rioplatense, Giambiagi, 1926, Ann. Museo Nacional de Historia Natural, Buenos Aires, Tome XXXIV, p. 138, figs. 1, 2, and 3.

This species was described from the La Plata River. I have not had an opportunity to examine specimens of this species, but if the figures are

correct, it appears to be quite different from any species of *Corophium* that I have seen from America, though the second antennae of the male and female are suggestive of *C. crassicorne*. The distinguishing characters appear to be: The absence of rostrum in female; the well-developed distal lobe on the lower margin of the fourth joint of the second antenna in female; the unusually narrow second joint in peraeopod 5; and the uncoalesced pleon segments. No additional records of the occurrence of this species have been published.

Corophium simile, new species.

Description of male.—Rostrum short and triangular. Eye-lobes rounding. Antenna 1 bearing two spines and many long setae on lower margin of first joint and no spines on the inner margin, first joint not as long as second and third combined, flagellum composed of five joints. Antenna 2 robust, fourth joint very strongly developed and bearing on the inner upper margin many long forward-curving setae, lower margin produced apically into a strong tooth above which is a smaller tooth which projects forward nearly as far as the larger one, and on inner side of joint near lower margin a low blunt tubercle, which is often very inconspicuous or entirely lacking, fifth joint with short blunt tooth on inner side of lower margin so placed as to oppose the larger tooth of the fourth joint. Mandibular palp with first joint slightly produced at the distal corner bearing the plumose seta, second joint longer than the first. Gnathopod 1 with palm evenly rounding, finely dentate throughout and bearing sub-marginally stout, bifurcate spines, the last of which defines the palm, dactyl overlapping palm, and bearing on inner edge a tooth and fine serrations. Gnathopod 2 with dactyl rather short and broad and bearing two teeth on inner edge. Pleon segments 4–6 coalesced, with their united lateral margins forming a ridge which is raised above the dorsal surface of the segments. Uropod 2 with rami equal in length to the peduncle. Telson forming an equilateral triangle with evenly rounding apex, dorsal surface with a triangular depression either lateral margin of which bears about four minute spinules. The entire urosome and its appendages are clothed with a fine, velvety pubescence.

Description of female.—The female bears a very close resemblance to the male, even the second antennae of the two sexes being very similar in structure, though the fourth joint in the female is proportionately shorter, and the two lower distal teeth are proportionately larger and stronger, the larger tooth reaching the middle of the flexed fifth joint, and the low tubercle on the inner side near the lower margin is even less conspicuous than in the male. In a female from Vineyard Sound, Mass., there is a slight tubercle bearing a spine at the middle of the lower margin in addition to the usual tubercle near the proximal end of the joint. The first antenna and all other appendages appear to be quite similar to those of the male. Length of male and female about 3.5 mm.

Type.—A male taken by the steamer *Fish Hawk* one mile inside of May River, South Carolina, January 17, 1891. Cat. No. 66786 U. S. N. M.

The first specimens of this species were taken by the U. S. Fish Commis-

sion from piles in Vineyard Sound, Mass., in 1871. In 1874 it was taken by the Commission at Little Peconic Bay, Long Island, and in 1875 at Woods Hole, Mass. Dr. Richard Rathbun in 1880 collected many specimens from washings of oysters in the mouth of New Haven Harbor, Conn. In 1880, 1881, 1882, and 1889 it was taken by the steamer *Fish Hawk* in Vineyard Sound. The *Fish Hawk* again took specimens in 1891 in South Carolina at the mouth of the May River; the mouth of the Kiawah River; at Port Royal; and at Skull Creek which is about half way between May River and Port Royal. This species was first taken in Chesapeake Bay by Prof. R. V. Truitt, who took several males at Great Rock, Tangier Sound, in 1925. In 1929 a specimen was taken from a sponge washed up on the beach at Ocean View, near Norfolk, Virginia, by E. A. Chapin. The most recent specimens, both males and females, were taken by me in 1931 from a sponge washed up on the beach at Grand View Beach near Fort Monroe, Virginia.

The specific name *simile* is given in reference to the similarity in structure of the two sexes.

Corophium tuberculatum, new species.

Description of male.—Rostrum obtusely triangular. Antenna 1, first and second peduncular joints much flattened dorso-ventrally, first joint very little longer than second, flagellum composed of six or seven joints, the last of which is very small, first joint of peduncle bearing two rather small spines on lower margin and bearing many long setae on the lower, inner and outer margins of first joint, and the inner and outer margins of second and third joints. In the largest males from Chesapeake Bay and South Carolina the anterior spine on the lower margin of the first joint of antenna 1 is absent and the posterior spine is reduced in size. Antenna 2, fourth joint not excessively developed, bearing two prominent teeth on the lower distal corner and two rather low tubercles on lower margin a little toward the inner side, fifth joint with prominent tooth on lower margin about one-third the distance from the proximal end, third, fourth and fifth joints and flagellum bearing many long setae along the under side. Mandibular palp with distal corner of first joint very little produced. Gnathopod 1, palm very oblique, even convex, finely serrate and spinose throughout and defined by a single stout bifurcate spine, dactyl long and narrow, overlapping palm, and bearing on the inner margin near the middle a forward-pointing tooth, back of which are fine serrations. Dactyl of gnathopod 2 armed with two teeth and a few fine, blunt serrations on inner margin. Pleon segments 4–6 coalesced with their united edges depressed and the dorsal surface of the joints slightly convex. Uropod 2 with rami about equal in length to peduncle, inner ramus with two distal spines and one or two very slender lateral spines. Telson broader than long with distal end broadly rounding and bearing a small dorsal depression bordered on either side with three minute spinules.

Female.—The female resembles the male except in the antennae. The first joint of antenna 1 bears two spines on lower margin as in male, but the first joint is very slightly and the second not at all flattened. Antenna 2,

considerably shorter than in the male, the fourth joint not very strongly developed and bearing on the lower margin a rather short distal spine and a similar one at the center, fifth joint equal in length to the fourth and without spines on lower margin. All the peduncular joints and flagellum bearing many long setae. The length of both male and female is about 4 mm.

Type.—A male taken at Mispitton Cove, Delaware Bay, Delaware, July 16, 1931, collected by Dr. Horace G. Richards. Cat. No. 66786 U. S. N. M.

The first specimen of this species, a female, was taken off Nantucket, Sept. 8, 1875, in 15 fathoms by the fisheries steamer *Bluelight.* In May, 1880, Dr. Richard Rathbun collected both male and female specimens in oyster washings from the mouth of New Haven Harbor, Connecticut. In August, 1880, the steamer *Fish Hawk* took a specimen in Narragansett Bay, Rhode Island. The *Fish Hawk* took a few more specimens in Vineyard Sound, Mass., in 1881 and 1882. In 1891 she again took many specimens at Skull Creek, South Carolina, and in the mouth of the May River, South Carolina. During the biological survey of Chesapeake Bay by the U. S. Bureau of Fisheries from 1915 to 1921, the *Fish Hawk* took hundreds of specimens in the lower part of the Bay where it appeared to be very abundant. Several immature specimens were taken by the *Fish Hawk* in 1915 off Bogue Inlet, North Carolina. During the summer of 1931, Dr. Horace G. Richards took several fine specimens from Barnegat Bay and the mouth of Mullica River on the east coast of New Jersey, and at the mouth of several small rivers and creeks of Delaware which empty into Delaware Bay.

The range of this species, so far as it is at present known, is the east coast of the United States from Nantucket to South Carolina.

The specific name *tuberculatum* refers to the tubercles on the lower margin of the fourth joint of the second antennae of the male.

Corophium louisianum, new species.

Description of male.—Rostrum short and triangular. Eye lobes broadly rounding. Eyes black and rather poorly defined. Antenna 1 reaching little beyond the end of the fourth joint of antenna 2, first joint with one spine near the distal end of lower margin, inner margin with a low angular protuberance near proximal end, and inside surface of joint bearing a prominent, forward-pointing, angular protuberance near proximal end, second joint about two-thirds the length of first, third joint nearly half the length of second, flagellum of eight joints, the last of which is very small. Antenna 2, second joint bearing below a prominent bilobed process which curves somewhat inward, fourth joint large and powerful, lower distal corner produced into a strong, slightly curved tooth, above which on the inside of the joint is a prominent distal lobe bearing a notch and setule, no spines or tubercles on lower margin as are present in *C. similis* and *C. acutum*, fifth joint nearly as long as fourth and without tooth or protuberance on lower margin, inside distal end broadly lobed. First joint of mandibular palp not distally produced. Gnathopod 1, sixth joint considerably expanded distally, palm convex, slightly oblique, defined by a low rounding angle and bearing bifurcate spines throughout, dactyl fitting

palm and not overlapping. Gnathopod 2, dactyl stout and strong and armed with three strong teeth on inner margin. Peraeopod 5, sixth joint shorter than second. Pleon segments 4–6 coalesced, their united lateral margins raised into a ridge above the dorsal surface. These coalesced pleon segments with their appendages very much resembling those of *C. similis*. Length about 4 mm.

Type.—A male taken in Lagoon Catherine, Chef Menteur, Louisiana, February, 1911, by Mr. W. L. McAtee. Cat. No. 67459 U. S. N. M.

The National Museum possesses another male specimen from Biloxi, Miss., which is slightly larger than the type, but which has only two teeth on the inner margin of the dactyl of the second gnathopods. The female of this species has not been observed.

Vol. 47, pp. 33–36 February 9, 1934

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

AN APPARENTLY NEW SCARAB BEETLE (COLEOPTERA) NOW ESTABLISHED AT CHARLESTON, SOUTH CAROLINA.

BY EDWARD A. CHAPIN.

In 1922, specimens of an unknown scarab related to *Plectris pexa* (Germ.) were captured at Charleston, S. C., and sent to the National Museum for identification. None came in between 1922 and 1930, although an attempt was made in 1928 to secure information as to the economic importance of the insect. Only negative evidence was available, to the effect that no additional complaints had come to the attention of the Charleston Museum staff. A few specimens taken in 1930 and 1932 and many in 1933 resulted in a field investigation by the writer early in June, 1933. Through the kind aid of the staff of the Charleston Museum, to whom very sincere thanks are extended, a few facts concerning the life history of the species were ascertained.

While its natural habitat is unknown, the beetle is presumably indigenous to northern South America, for the genus *Plectris* and other closely related genera have their centers of distribution in that region. The life cycle is apparently one year. During the early part of June only a few first-instar larvae and no larvae of a later stage could be found. Two females, one of which was engaged in depositing eggs, were taken from beneath lawn grass at a depth of 11 inches. When found, this latter female had deposited at least 14 eggs, all in her immediate vicinity. No females were captured above ground. At dusk the males come out of the turf and fly in great numbers and at a high rate of speed back and forth over the turf, rarely higher than 18 inches above ground. These males disappear after 15 to 20 minutes and males are not seen again in flight until the next evening. On the morning after an evening when a heavy flight had been observed,

many individuals of the wasp *Scolia nobilitata* Fab. were seen flying over the same area.

Plectris aliena, n. sp.

Similar in size and general appearance to *Philochlaenia maculicollis* Arrow. Castaneous to yellowish brown above, underparts and legs paler. Clypeus deeply concave, the middle of anterior margin straight, sides broadly rounded, surface coarsely, densely, and asperately punctured. Clypeo-frontal suture distinct. Frons slightly convex, more finely and very densely punctured. Both clypeus and frons closely set with rather short, pale, bristle-like hairs, which become longer and more densely placed posteriorly. Antenna ten-segmented, the first segment strongly claviform, the second rotund, the third half again as long as the fourth, the eighth to tenth forming a club which, in the male, is about twice as long as the first segment, and in the female, a little longer than the first segment. Maxillary palpus slender, the terminal segment as long as the second and third antennal segments together. Labial palpus very short, the terminal segment about one third as long as terminal segment of maxillary palpus, top-shaped, with apex acuminate, almost mucronate.

Pronotum not quite twice as broad as long, lateral margins with, anterior and basal margins without, bead, moderately strongly convex, surface a little more finely and much more sparsely punctured than clypeus, vestiture about like that of clypeus. Lateral margins nearly parallel behind the middle, strongly convergent before middle, basal angles broadly rounded, anterior angles subacute. Scutellum ogival with apex rounded, rather densely clothed with fine, pale hair. Elytra with sutural and lateral margins slightly tumid and each with four indistinct costae, of which two are discal, one humeral, and one infrahumeral. Surface distinctly uneven, with fine and not very densely placed punctures, a scale-like hair arising from each puncture. Pygidium finely and sparsely punctured, with sparse vestiture. Under parts, especially of thorax, sparsely punctured and clad with moderately long, soft hair. Anterior tibia tridentate, the basal tooth more prominent in the female. Claws divergent and dissimilar, the outer one longer and stouter than inner, both split near apex.

Length of holotype male, 12.3 mm., of allotype female 13 mm.; extreme measurements observed, 10.8 mm. and 13.5 mm. (both males).

Type, allotype, and paratypes.—U. S. N. M. Cat. No. 50115.

Locality (present known distribution).—Charleston, South Carolina, in lawns (probably introduced from South America).

This species is described from a series of 134 specimens, most of which were collected between June 5 and 9, 1933. The earliest date of collection is May 19, the latest about July 1. Specimens have been submitted to Mr. G. J. Arrow of the British Museum and Dr. Heinrich Kuntzen of the Berlin University Museum. Neither recognizes the species as having been described. Thanks are extended to both for their kind aid.

It seems impossible at the present time to untangle the synonymy presented by the genera *Plectris* Serville 1828 and *Philochlaenia* Blanchard

1850. Both names have been used for the group to which the present species belongs.

According to the strict application of the International Code, the name *Philochlaenia* was not available for use in this group in 1850, for it had already been published in connection with a valid specific name in 1834–35 by Dejean. Since the discrepancies that exist between the present species and the published information concerning the type species of *Plectris* are slight and since *Philochlaenia* does not appear available, the generic name *Plectris* is selected.

Vol. 47, pp. 37–44 February 9, 1934

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ON THE SIGNIFICANCE OF VERTEBRAL COUNTS IN EXOCOETID TAXONOMY.

BY C. M. BREDER, JR., AND J. T. NICHOLS.

Enumeration of the number of vertebrae in flying fishes for taxonomic purposes has been largely ignored by recent students of the group, including the present writers. In their case, at least, this disregard has been founded on two reasons. One of these, pragmatic, has been associated with the impossibility of obtaining such, in the absence of radiographic equipment, without the destruction of the specimens for other purposes. The other and important reason was a conviction that in this family the range was so slight and the variation relatively so great that without larger series than ordinarily available, little could be established that could not just as well be worked out on other more available characters. Nevertheless we are grateful to Dr. A. F. Bruun (1933) who has lately counted the vertebrae in a large number of species. Although the number of individuals counted in most species is small, he presents, notwithstanding, a valuable record of data. His examination of the current taxonomy of the Exocoetidae as referred to the vertebral count is interesting even if we can not subscribe to a number of his conclusions. The differences between our views and his, discussed herewith, seem to be inherent in differences in the diagnostic value placed on small variations in the number of vertebrae.

All of the current genera, *Fodiator*, *Evolantia*, *Halocypselus*, *Parexocoetus*, *Cypselurus*, *Hirundichthys*, *Exonautes* and *Prognichthys*, have been examined by Bruun and shown by him to have a range of from 35 to 52 vertebrae. The first four, which are exceptionally well differentiated genera on other characters, cover the entire range. The latter four genera, the "four-

winged" forms of very close affinities, have a range of from 41 to 52. Table I gives the data of Bruun arranged by genera. While there never has been any difficulty in separating these fishes generically, it is evident from the table that the vertebral counts could be of scant assistance if there were confusion on any other score. Comparing this table with the phylogenetic tree of Nichols and Breder (1928) however, there are certain items of interest to be mentioned in passing. Obviously, somewhere between the belonid ancestors and the advanced exocoetids, the Synentognathi have undergone a considerable reduction in the number of vertebrae. Evidences of this are now also apparent as generic characters within the family Exocoetidae itself, thanks to the work of Bruun. Thus, the line of two-winged forms shows a reduction of from 51–52 (*Evolantia*) to 41–45 (*Halocypselus*), and the line of high dorsaled forms from 38–41 (*Fodiator*) to 35–40 (*Parexocoetus*). The four-winged line, which Nichols and Breder (1928) indicated as differentiating at a point where the above two lines separated, thus appears to have never suffered such a large reduction, this assemblage showing a spread of 41–52. Within this group, if a divided second pectoral ray can be considered primitive then there has been a reduction in vertebrae in both pairs of genera as follows. *Cypselurus* 41–52 to *Prognichthys* 42–43, and *Hirundichthys* 45–47 to *Exonautes* 45. In all other Synentognathi known to the writers, the second ray is split, as would be expected. It is also to be noted that the primitive genus, *Evolantia*, has as high a count as any *Cypselurus*, presumably splitting off before vertebral reduction took place. After this, in the two-winged line, there was great reduction to *Halocypselus*. On the other hand great reduction took place on the line to the other primitive genus *Fodiator*, but before that genus appeared and continued, at a reduced pace, on to *Parexocoetus*. Thus it might seem that the line leading to *Fodiator* in the tree of Nichols and Breder (1928) should spring from some point well on to *Parexocoetus* rather than at its base, and this entire branch arise further along the *Cypselurus* stem than that of the two-winged forms. On the other hand, it would be a reasonable hypothesis that the four-winged forms again (secondarily) acquired an increased number of vertebrae, correlated with a more elongate body correlated with use of the ventrals in flight. It may be pointed out in this connection, however, that *Parexocoetus* with smaller ventrals farther forward, uses them in a seemingly analogous manner. The differences in their use, while not entirely evident superficially, become clear when referred to the principles of aerodynamics. The areas of the *Parexocoetus* ventrals are not sufficient to have an important lifting value but are sufficiently far back to give better control in flight, as compared with *Halocypselus*. The ventrals of the four-winged genera are definitely large enough to be of value for lift as well as maneuverability. Since, in aerodynamics, the farther rearward such a surface be placed the smaller it may be for maneuvering purposes, due to reasons of leverage, it becomes evident that the spreading of large ventrals in *Cypselurus* is important for lifting the after section of the body, since very small ones in such a position would suffice for tilting purposes. See Breder (1930) (1932) and Hubbs (1933) for other details.

For these broader aspects of phylogeny, as above discussed, the vertebral count is certainly of very real significance when considered in connection with other characters. Its application to the finer details of taxonomy, with the range of the group so small, we maintain, can only be of real value for the establishment of statistical forms involving the use of large series, certainly much larger than those mentioned by Dr. Bruun. For example, the large genus *Cypselurus* has a range of from 41 to 52 vertebrae and an individual variation of up to 3. Bruun himself wrote ". . . the range of variation determined with certainty within the single species is at most 3, but a larger material will probably be able to extend this by 1 or more . . . " This condition leaves room for only four distinct counts within the range of *Cypselurus*. It is also noted that the effect of temperature on the fragmentation of the column is thoroughly established for fishes, and that placing as much emphasis on this character as Bruun does might very well lead to fortuitous "species" dependent on climatic variations. That student recognizes the effect of temperature on vertebral number but considers it only in connection with phylogenetic importance, not mentioning its ontogenetic significance.

With these preliminary remarks the findings of Bruun may be discussed in detail, including both points of agreement and disagreement. Bruun states the high vertebral count "removes *Evolantia* considerably away from the other more primitive genera, *Fodiator* Jordan and Meek and *Parexocoetus* Bleeker." With this we entirely agree as has already been indicated.

A new subspecies, *Fodiator acutus pacificus* Bruun, has been erected for the American fishes on the following data. "The *Fodiator* material consists of 3 specimens from West Africa (Hamburg Zool. Museum) and 1 from the Bay of Panama. The 3 Atlantic specimens have 38–39 vertebrae, the Pacific 41. The difference thus shown between the Pacific and the Atlantic individuals seems, along with a number of other smaller, yet distinct differences in proportion and fin-ray characters, to justify the separation of the Pacific *Fodiator* as a special subspecies, *pacificus* n. subsp. of the Atlantic *F. acutus* C. et V." While we have no philosophical objection to statistical subspecies, we certainly question the validity of erecting one, with the only recognizable difference mentioned in the description being 2 vertebrae, based on a single specimen. The above quotation is the full description.

Of the separation of *Parexocoetus mesogaster* and *mento* a somewhat better case is made out, being based on 14 fishes, with again a separation of 2 vertebrae. The erection of a new subspecies *Parexocoetus mento atlanticus* Brunn, certainly stands as a nomen nudum with its description quoted below.

"Of this species, which is so well characterized by the number of vertebrae, I have found 2 specimens in the British Museum's collections from the eastern, tropical Atlantic, which I think provisionally belong to a special subspecies owing to minor differences from the Indo-Pacific specimens: *P. mento atlanticus* nov. subsp." This, following a criticism of others for inadequate descriptions, is difficult to understand as is also the immediately succeeding statement, following the above quotation. "Examination of Breder's material will probably determine at once whether it should

be referred to this subspecies, which owing to its apparently close relationship with the Indo-Malayan *P. mento* may certainly be expected to have no barbel in the early stages." This statement refers to a question raised by Breder (1932) concerning the possible specific differences of juvenile Atlantic *Parexocoetus* with and without barbels. If the unbarbled young studied by Breder, and the barbled young studied by Hildebrand and Cable (1930), eventually are shown to have a different vertebral count, it would certainly go far to clear the matter up.

Cypselurus comatus (Mitchill) is revived as a species from the synonymy of *C. heterurus* where it has long reposed as a young form. This is done on a basis of its 41–42 vertebrae, as compared with the 45 of *heterurus* which seems to us a questionable specific difference. With the reference of *C. antarei* Beebe and Hollister (1933) to *comatus*, we are provisionally in agreement, and are satisfied with Dr. Bruun's placement of *C. naresi* (Gunther) near it, as supposedly he has seen this material which we have not. On the other hand it may be that *C. antarei* represents the young of *C. lutkeni* or *C. vitropinna*, both of which are close to *C. heterurus*.

According to Bruun, *Cypselurus smithi* Breder and Nichols, is identical with *C. nigricans* (Bennett). This fish (*C. nigricans*), Nichols (1924) referred to the Pacific, considering those specimens recorded from the Atlantic as the nearly identical *C. furcatus*. Since *C. smithi* and *C. nigricans* have identical vertebral counts according to Bruun, they may still be separated by the original points of differences indicated by Breder and Nichols (1930) and Nichols and Breder (1930). Actually, *C. smithi* much more closely resembles *C. bahiensis* than it does *C. nigricans* or *C. furcatus*, as is fully indicated in those two papers.

Apparently Bruun would refer *C. vitropinna* to *C. heterurus* or *C. comatus*, depending on what vertebral count it has. Since, on examination, we found *C. vitropinna* to have 46 vertebrae its identity with *C. comatus*, according to Bruun's criteria, is out of the question. While it is evident that *C. vitropinna* is close to *C. heterurus* as already mentioned by Breder (1927), Parr (1930) and Nichols and Breder (1930), the species in question is certainly not as close to *heterurus* as it is to *C. lutkeni* (Jordan & Evermann) which is clearly differentiable from it, independently of what the vertebral count may be, and over which so far no question has been raised. Although Bruun has just revived *C. comatus* from the synonymy of *C. heterurus*, it is certainly possible that the young of all three of the species, *heterurus*, *lutkeni* and *vitropinna*, are of the *comatus* type. Any taxonomic changes based on other than a developmental series would, in our judgment, be open to question.

The supposed similarity or identity of *C. monroei* Nichols and Breder, to *C. bahiensis*, we can not understand at all. In fact Breder and Nichols (1930) considered the adult so different from other species of *Cypselurus* that they wrote, "A new genus could doubtless be erected for this species..."

Reference to the various papers mentioned must be made to understand completely the reasons for our inability to accept Dr. Bruun's attitude on these three species. However, we have gathered certain figures together and assembled them in a cut, in the conviction that their comparison alone

should be sufficient to satisfy most ichthyologists that the differences displayed are of specific rank, in spite of the similarity of any single character such as the vertebral count.

We have also had radiographs made of fourteen specimens for the purpose of further considering the significance of the vertebral counts in these species.[1] The data so obtained is displayed in Table II. Since these figures add nothing, the range of generic variation obtained by Bruun, Table I, is modified in no way by this additional material.

Our inability to accept the race *Fodiator acutus pacificus* on the basis of one specimen with 41 vertebrae instead of 38 or 39 is strengthened by our radiographs of two Pacific *Fodiator* from a nearby locality, each with 39. The publication of a description of "a number of other smaller, yet distinct differences in proportions and fin-ray characters" which are so far undefined, would be necessary to render this proposed race valid, if they are sufficiently important.

The vertebral counts of the present material of *Parexocoetus* (from the Atlantic) exactly coincide with those of Bruun for *P. mesogaster* as defined by him. This, unfortunately, gives no aid in defining the nomen nudum *P. m. atlanticus.*

The various species of *Cypselurus* examined show only a range of from 44 to 46 vertebrae and are consequently of no taxonomic value in separating these forms. Table II gives the comparative data. It does, however, clearly show that none of our fish can be *C. comatus,* if, as Bruun contends, the low count (41–42) is diagnostic of that form.

TABLE NO. I.

Comparison of Exocoetid Vertebral Counts, based on the data of A. F. Bruun.

GENERA	NUMBER OF VERTEBRAE. (UROSTYLE COUNTED AS LAST VERTEBRA.)																	
	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Evolantia																	x	x
Fodiator				x	x		x											
Halocypselus							x	x	x	x	x							
Parexocoetus	x	x		x	x	x												
Cypselurus							x	x	x	x	x	x	x	x	x	x	x	x
Hirundichthys											x	x	x					
Exonautes											x							
Prognichthys								x	x									

[1]We are grateful to Dr. W. Antopol of the Mt. Sinai Hospital, New York City, for having the radiographs made which are here discussed.

Evolantia.....*E. microptera*, 4 specimens.
Fodiator.....38–39 *F. acutus acutus*, 3 specimens.
41 *F. a. pacificus*, 1 specimen.
Halocypselus.....? –44 *H. evolans*; ? –45 *H. obtusirostris*.
"large number"
Parexocoetus.....35–36 *P. mento* and *P. m. atlanticus*, 4 specimens;
38–40 *P. mesogaster*, 10 specimens.
Cypselurus.....41–42 *C. comatus*; 45 *C. furcatus* and *heterurus*;
49 *C. californicus*; 51–52 *C. lineatus* (other species, *C. bahiensis* and *nigricans* and *smithi* mentioned as in this range between *comatus* and *furcatus*).
Hirundichthys.....45 *H. speculiger* (others not named).
Exonautes.....*E. rondeletii*, 1 specimen.
Prognichthys.....*P. gibbifrons*.

TABLE NO. II.

Vertebral Counts of mostly American Museum of Natural History Material Compared with Some of Dr. Bruun's counts.

SPECIES	NUMBER OF VERTEBRAE. (UROSTYLE COUNTED AS LAST VERTEBRA.)	
	A.M.N.H. MATERIAL	BRUUN'S COUNTS.
Fodiator acutus	39 (2)[1]	38, 39, 41 (4)[2]
Parexocoetus mesogaster	38, 39, 40 (5)[3]	38, 39, 40 (10)
Cypselurus bahiensis	46 (1)	----
Cypselurus lutkeni[4]	44 (1)	----
Cypselurus vitropinna[5]	44 (1)	----
Cypselurus heterurus	46 (1)	45
Cypselurus furcatus[6]	45 (1)	45
Cypselurus monroei[7]	45 (1)	----
Cypselurus smithi[8]	44 (1)	----
Cypselurus comatus	----------	41–42

[1]Numbers in parenthesis represent number of specimens.
[2]The one fish with 41 vertebrae from the Bay of Panama, Bruun considers a new race *F. a. pacificus*. Compare with the present material from Bahia Hundu, Panama. See Table I and text. Bingham Oceanographic Collection.
[3]Three specimens from the Dry Tortugas from the material of Breder (1929) (1932) which Bruun refers to, had 38, 39, 40 vertebrae, the others from Diamond Shoal lightship 39 and 40, obtained through the kindness of Mr. Van Campen Heilner.
[4]Figured by Breder and Nichols (1930).
[5]Paratype. Bingham Oceanographic Collection.
[6]Figured in accompanying plate.
[7]Figured by Breder and Nichols (1930).
[8]Paratype.

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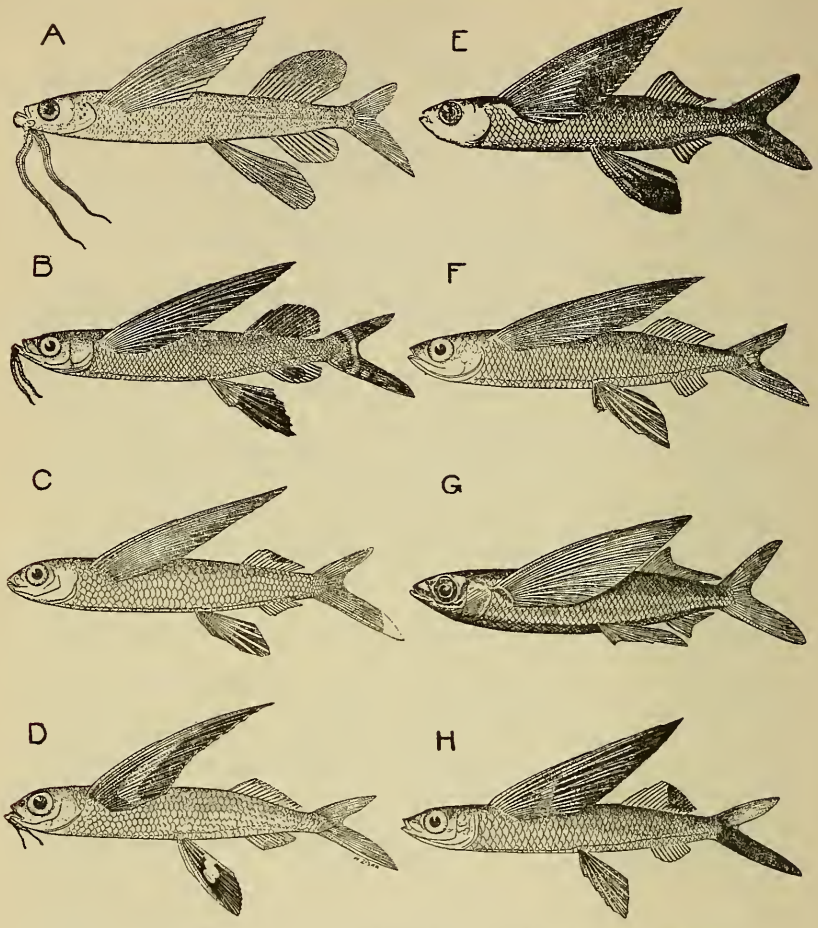

Fig. 1. Comparative plate of the species of *Cypselurus* under discussion.

A. *C. monroei* (young) Type 48 mm. s. l. Nichols and Breder 1928; 432.
B. *C. monroei* (adult) 151 mm. s. l. Breder and Nichols 1930; 2.
C. *C. bahiensis* 230 mm. s. l. Nichols and Breder, 1930; 2.
D. *C. furcatus* 150 mm. s. l. (Mentioned by Breder and Nichols 1930, 3) original.
E. *C. heterurus* 178 mm. s. l. Smith 1907; 167 (In Smith's Fishes of North Carolina as *C. lutkeni;* not of Jordan and Evermann 1896 or Breder and Nichols 1930. (See synonymy of Nichols and Breder 1930.)
F. *C. lutkeni* 241 mm. s. l. Breder and Nichols 1930; 6.
G. *C. vitropinna* Type 183 mm. s. l. Breder 1927; 20.
H. *C. smithi* Type 200 mm. s. l. Breder and Nichols 1930; 5.

Vol. 47, pp. 45–48 February 9, 1934

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW BIRDS FROM ANGOLA.

BY RUDYERD BOULTON.[1]

Among the birds collected by the Pulitzer Angola Expedition of the Carnegie Museum, a guinea fowl and a flycatcher appear to be undescribed.[2] To Mr. W. E. Clyde Todd, of the Carnegie Museum, I am indebted for his cordial cooperation and permission to continue studies on this collection. Dr. James P. Chapin, of the American Museum of Natural History, and Mr. H. B. Conover, of Field Museum, have kindly loaned specimens for comparison.

Numida meleagris bodalyae, new subspecies.

Type.—From Chitau, 5000′, District of Bihé, Angola; adult male; January 31, 1931; collected by R. and L. Boulton, Pulitzer Angola Expedition; Carnegie Museum No. 109265.

Diagnosis.—Differs from all races of Helmeted Guinea fowl, except *marungensis*, in the bulbous shape and lemon chrome color of the casque. From *marungensis* it differs in much larger size, especially in wing, tarsus and casque (see figure 1). Upper breast distinctly bluer than in *marungensis*, the white bars on the outer webs of the wing feathers averaging finer and closer together. In *bodalyae* the white spots on the underparts are in greater contrast to the black ground color, than in *marungensis*.

Description.—Head and throat bare, except for a few black hair-like feathers. On the back of the neck a "mane" of black, semi-decomposed, bristly feathers which point forward. Feathers of the lower throat and neck and upper back and breast, black with six or seven narrow bars of bluish white. The tips of the barbs of the feathers are suffused with cerulean blue, giving a bluish cast to the upper breast. Rest of the plumage black, spotted with white, the spots on the outer webs of the tectrices elongated into saw-tooth white marks. Freckling of the feathers of the back very fine (some specimens show almost none). Skin of face and neck, dark blue, lighter under the eye, on the chin and malar region; iris, brown;

[1] Published by permission of the Director, Field Museum of Natural History.

[2] See Boulton, Rudyerd, 1931. Ann. Carnegie Museum, "New Species and Subspecies of African Birds," Vol. XXI, No. 1, for other new birds collected by this expedition.

bill, greenish horn; casque, smooth lemon chrome; wattles, blue tipped with red; rough skin of forehead, bright red; rough skin of skull, yellow-brown; legs and feet, black. Wing, 315 mm. Tail, 160 mm. Culmen (from skin of forehead), 27.1 mm. Tarsus, 83 mm. Casque: length, 44 mm.; depth, 17 mm.; width, 16 mm.

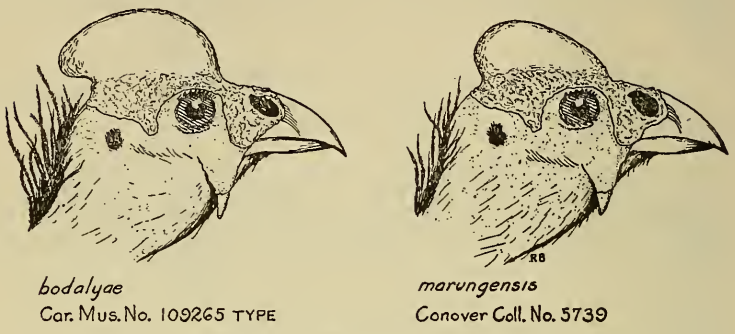

Fig. 1.—Heads of Guinea Fowl (one-half natural size).

Remarks.—I take pleasure in naming this distinctive guinea fowl in honor of Mrs. Jean Bodaly of Missão Chitau, hostess to many naturalists who have visited Angola.

Series of four specimens of *marungensis* and eight of *bodalyae* are remarkably uniform in size and reference to the following measurements show that, with respect to length of wing, tarsus, and length and depth of casque, there is an appreciable difference with no overlap. This coupled with the greater amount of blue on the breast in the Angolan series, confirms the suspicion I had when collecting the type that this was a new form of guinea fowl.

N. m. marungensis: wing, 295–300 (296.8); culmen, 25.5–26.7 (25.9); tarsus, 71–76 (74.0); length of casque, 31–34 (32.5); depth of casque, 12–13 (12.8); width of casque, 11–14 (12.5).

N. m. bodalyae: wing, 310–320 (314.0); culmen, 25.0–29.0 (27.1); tarsus, 78–84 (81.6); length of casque, 39–45 (43.1); depth of casque, 15–20 (16.5); width of casque, 13–18 (15.1).

Angola birds in fresh plumage collected in April and July show even more blue than does the type and can be immediately distinguished on this character alone from two Marungu birds taken in April. The type of *bodalyae* taken in January, when compared with two *marungensis* collected in December and January, is distinguished principally by its greater size and by the greater purity of the black and white markings, which in the Katanga birds are decidedly brownish in tone and more freckled with tiny dots of white between the larger white spots on the back.

There are apparently four races of guinea fowl inhabiting Angola, as follows:

Numida meleagris callewaerti Chapin. Angola, north of the Quanza

River. Helmet low, not bulbous; white spotting similar to that in *marchei*. Localities: Duque de Braganza, Kuango River. No specimens examined.[3]

Numida meleagris bodalyae Boulton. Central highlands of Benguella and Bihé, probably extending eastward through the province of Lunda. Characters as above. Localities: *Chitau;*[4] *Dando* (west bank Quanza River). Eight specimens examined.

Numida meleagris maxima Neumann. Plateau of southern Angola, intergrading with *papillosa* at Chipopia, 20 kilometers west of Capelongo (2 specimens). Helmet horny, straight, broad, laterally compressed; much brownish freckling on the back; smaller than *bodalyae*. Localities: *Capelongo*, Caconda, Galanga. 3 specimens examined.

Numida meleagris papillosa Reichenow. Southern and coastal Angola, generally at lower altitudes and in drier country than *maxima*. Helmet horny, slender, cylindrical, generally decurved, sometines strongly hooked; distinct papillae or caruncles on the forehead; white spots on back small, more freckling on back and tail than in *maxima*. Localities: *Mulondo, Kilo 101* (*Mossamedes Ry.*), *Luwando, Chingoroi, Caleueque*, Huilla, Rio Coroca, Humbe, Gambos. 10 specimens examined (plus 2 *maxima*> *papillosa* from Chipopia).

I have not been able to compare specimens with skins from Southwest Africa. It is possible that southern Angola birds are referable to *damarensis* Roberts rather than to *papillosa* Reichenow.[5]

Batis margaritae, new species.

Type.[6]—From Moco Mt., 6500′, District of Benguella, Angola; adult female; February 24, 1931; collected by R. and L. Boulton, Pulitzer Angola Expedition; Carnegie Museum No. 109439.

Diagnosis.—Different from any known species. Combines the brown wing coverts of *B. capensis* and *B. mixta* with the black chest of *B. diops*.

Description.—Crown, back and rump, blue gray; forehead and narrow line above the lores, white; lores, superciliary line, cheeks, auriculars and indistinct collar about the neck, black; throat, white; broad breast band, black; belly and flanks white, faintly suffused with a wash of chestnut; thighs, black; primaries and secondaries, black, broadly margined at the base of the inner web with white, and narrowly margined on the outer web with bluish gray; the two innermost secondaries (but not the tertiaries) broadly margined with white on the outer web, producing a longitudinal white stripe on the wing; all of the secondaries narrowly tipped with white; primary coverts broadly edged with bluish gray; greater coverts, black; middle coverts, rich chestnut with a hidden basal area of black; lesser coverts, black; axillaries, white; under wing coverts and upper tail coverts, black; under tail coverts, white; tail, black tipped with white, the outer web of the outermost rectrix, white. Bill, legs and feet, black; iris, red with

[3]See Chapin, J. P. 1932, Amer. Mus. Novitates, No. 570, p. 2.

[4]Localities in italics are those of specimens examined.

[5]See Sclater, W. L. 1924, Syst. Av. Eth. p. 97.

[6]A female is selected for the type since it shows characters more distinctive than those of males.

an orange circle next to the pupil. Wing, 67.5 mm. Tail, 48 mm. Exposed culmen, 11.5 mm. Tarsus, 20 mm.

Specimens examined.—*B. margaritae:* 2 ♂, 3 ♀, Mt. Moco, 6500′, Angola (Boulton). *B. diops:* 1 ♂, Mt. Ruwenzori, 7000′, 1 ♀, Mt. Mikeno, 7900′, Belgian Congo (Chapin). *B. mixta:* 6 ♂, 10 ♀, Mt. Rungwe, 5650–6000′, Tanganyika Territory (Boulton). *B. capensis dimorpha:* 4 ♂, 5 ♀, Mt. Mlanje, 6000′, Nyasaland (Boulton). *B. capensis erythrophthalma:* 2 ♂, 4 ♀, Mt. Selinda, 4000′, S. Rhodesia (Boulton).

Remarks.—I have always thought of the genus *Batis* as being essentially feminine in character and I therefore name this species after Margaret Pulitzer (Mrs. Ralph Pulitzer).

A male paratype resembles the type in all details except that it lacks the suffused wash of chestnut on the belly and the middle wing coverts are white instead of chestnut, producing a white patch on the wing in addition to the longitudinal white stripe. It consequently closely resembles the males of *capensis* and *mixta* from which it may be distinguished by having the narrow white line on the forehead and above the lores.

B. margaritae has been found only in the dense mountain rain-forests of Mt. Moco, occupying there the same habitat that *diops*, *mixta* and *capensis* do in their respective ranges. It is probably restricted to this type of forest. By an interesting combination of characters, it shows its relationship to east and south African birds, a phenomenon that becomes increasingly important as our knowledge of the birds of the mountain forests of Angola grows.

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PROCEEDINGS
OF THE
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DESCRIPTION OF A RACE OF THE MEXICAN VOLE, *MICROTUS MEXICANUS*, FROM SOUTHEASTERN UTAH.

BY SETH B. BENSON,
Museum of Vertebrate Zoology, University of California, Berkeley, California.

In the summer of 1933 the writer and Emma Dennis Benson were invited by Miss Annie M. Alexander to accompany her and Miss Louise Kellogg on a collecting trip to Navajo Mountain, Utah. This field trip was planned to fulfill a desire, long held by Miss Alexander, to determine the constituents of the vertebrate fauna of that isolated mountain. Among the results obtained was the discovery that the Mexican vole inhabiting Navajo Mountain differs from any of the races heretofore described. It may be known as:

Microtus mexicanus navaho, new subspecies.

Type.—Adult male, skin and skull, no. 58817 Mus. Vert. Zool.; from Soldier Spring, about 8800 feet altitude, east slope of Navajo Mountain, San Juan County, Utah; collected June 17, 1933, by Seth B. Benson; original number 2155.

Distribution.—Known only from Navajo Mountain, in southeastern Utah and northeastern Arizona.

Diagnosis.—A race of *Microtus mexicanus* (Saussure) characterized by small size and pale (grayish) coloration. Hairs of back with plumbeous bases, some black-tipped, most tipped with pinkish buff. Hairs of lower surface tipped with white. Skull with short braincase, heavy rostrum. Nasals flaring widely anteriorly.

Comparisons.—Compared with *Microtus mexicanus mogollonensis* (Mearns), represented by 34 topotypes: Size equal; hairs of back tipped with pinkish buff rather than cinnamon brown; hairs of ventral surface white-tipped rather than buffy-tipped; skull similar in most details, but, on the average, braincase shorter, rostrum heavier, nasals wider anteriorly.

Measurements.—Average, minimum and maximum measurements in millimeters of 10 adult males (when measurements are not available for all

ten specimens the number measured is indicated in parenthesis): Total length, 133 (122–138); length of tail vertebrae, 29 (24–33); length of hind foot, 19 (18–19); height of ear from notch, 13 (12–14); weight (5), 30.5 grams (28.6–31.8); length of head and body, 104 (95–113); condylobasal length (8), 25.5 (24.2–26.1); length of nasals, 7.0 (6.8–7.3); greatest zygomatic breadth (8), 14.6 (13.8–15.1); width of interparietal (9), 7.9 (7.5–8.5); lambdoidal width (9), 11.7 (11.2–12.1); alveolar length of maxillary toothrow 6.5 (6.3–6.7); least interorbital breadth (9), 3.4 (3.1–3.9). Measurements of 8 adult females: Total length, 134 (130–141); length of tail vertebrae, 28 (25–34); length of hind foot, 19 (18–20); height of ear from notch (7), 13 (11–14); length of head and body, 106 (101–108); weight (4), 33.8 grams (30.0–37.0); condylobasal length (6), 25.5 (25.0–26.2); length of nasals (7), 7.3 (7.0–7.7); greatest zygomatic breadth (7), 14.8 (14.3–15.4); width of interparietal (7), 8.3 (7.7–8.8); lambdoidal width (6), 11.6 (11.3–12.0); alveolar length of maxillary toothrow, 6.6 (6.3–7.1); least interorbital breadth (7), 3.5 (3.2-3.8).

Specimens examined.—Total number, 33, all from Navajo Mountain, San Juan County, Utah, as follows: War God Spring, 8400 feet altitude, 29; Soldier Spring, about 8800 feet altitude, 4.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON ARIZONA RODENTS.

BY E. RAYMOND HALL AND WILLIAM B. DAVIS,
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In continuance of her plan to build up at the University of California a representative collection of the mammals inhabiting the southwestern United States, Miss Annie M. Alexander recently deposited in the Museum of Vertebrate Zoology more than one thousand specimens personally collected and prepared by herself and Miss Louise Kellogg in 1933. Included in the part of this material so far prepared for study are specimens which, together with specimens already present in the Museum of Vertebrate Zoology and in some other collections, constitute a basis for adding to the existing store of knowledge concerning the speciation and distribution of four genera of rodents.

One of the rodent species, the pocket gopher from northwestern Arizona, was recognized as a new geographic race from the study of specimens taken by Miss Alexander and Miss Kellogg in 1932. In the summer of 1933, they, with Dr. and Mrs. Benson, returned to the locality and on this visit additional specimens were obtained which permit of more satisfactory diagnosis of the new subspecies. The new race may be named and described as follows:

Thomomys bottae trumbullensis, new subspecies.

Type.—Male, adult, skin-and-skull; no. 58588, Mus. Vert. Zool.; three miles south of Nixon Spring, Mt. Trumbull, Mohave Co., Arizona; May 26, 1933; collected by Seth B. Benson, original no. 2005.

Distribution.—Northwestern Arizona and extreme southwestern Utah, from the Colorado River north to the Virgin River, west of Kanab Wash.

Diagnosis.—A *Thomomys* of the *bottae* group. Resembles *T. b. planirostris* Burt in size (see measurements), but coloration (attaining summer pelage) much darker. General ground color near Cinnamon Buff, but

upper parts tinged with black; fore and hind feet and distal one-third to one-half of tail pinkish white; black post-auricular patches distinct. Skull: Similar in shape to that of *planirostris*; lambdoidal and parietal ridges well developed; zygomata wide-spreading, slightly wider anteriorly than posteriorly; dorsal profile of skull in longitudinal axis shows very little convexity; dorsal face of rostrum near junction of nasals and frontals usually transversely flat or slightly concave, rather than convex; bullae well inflated and anteriorly truncate; paroccipital processes well developed.

Comparisons.—As compared with *Thomomys bottae planirostris* Burt [two topotypes and Burt's (1931, p. 39) measurements available], *T. b. trumbullensis* averages smaller in total length, length of tail and length of hind foot; color much darker in dorsal aspect; skull approximately same size, but less convex dorsally in longitudinal axis; bullae more inflated; palatal pits deeper; alveolar length of maxillary tooth row less; rostrum less depressed distally and extensions of premaxillae posterior to nasals one-third shorter. Differs from *T. b. absonus* Goldman (eighteen topotypes available) in darker coloration dorsally; larger and heavier skull; palatal pits deeper; rostrum relatively broader, longer and distally less depressed; zygomata heavier and actually, though not relatively, broader; parietal and paroccipital processes much more developed.

Remarks.—As judged by cranial characters, *Thomomys bottae trumbullensis* is closely related to *T. b. planirostris* Burt. In color, however, *trumbullensis* is considerably darker. Three specimens from six miles north of Wolf Hole, Mohave County, Arizona, which are somewhat lighter in color and are too young to present sufficient diagnostic cranial characters, are, for the present, referred to *trumbullensis*. Two females from the south side of the Virgin River, St. George, Washington County, Utah, are intermediates. They show characters of each of the four geographically adjacent races, *T. b. centralis* Hall, *T. b. planirostris* Burt, *T. b. absonus* Goldman and *T. b. trumbullensis*, though on the basis of size and five out of eight cranial characters they are referable to *trumbullensis*. These, and two specimens from just north of the Virgin River at St. George which have characters of *centralis*, *planirostris* and *trumbullensis*, but which are referable to *centralis*, would tend to show that in the vicinity of St. George the four above mentioned races merge and blend almost imperceptibly with one another.

Two specimens from the head of Toroweap Valley, Mohave County, Arizona, tend toward *trumbullensis* in three out of five cranial characters, but approach *absonus* in the other two cranial characters and in color. Though clearly intergrades, they here are referred to *trumbullensis*. Seven specimens from near Kanab Wash at the southern boundary of the Kaibab Indian Reservation, and one specimen from Kanab, Kane County, Utah, though not typical *absonus* are referred to that race rather than to *trumbullensis*. Much of Mount Trumbull is of volcanic origin and dark colored. Perhaps the dark color of the pocket gophers there indicates a response to their environment. At any rate, each of the 25 specimens examined from Nixon Spring, and points within 4 miles thereof, are darker colored than individuals of nearby geographic races, and four of the specimens have

jet black pelage everywhere save on the feet and distal third of the tail. These parts are white.

Measurements.—Average and extreme measurements of 13 adult males and 8 adult females of *T. b. trumbullensis*, excluding the specimens from Utah and those from the head of Toroweap Valley and six miles north of Wolf Hole, are as follows: Total length, ♂ 227 (251–201), ♀ 200 (216–182); length of tail, 70 (82–58), 61 (69–54); length of hind foot, 28 (31–25), 27 (29–23); basilar length, 34.3 (37.7–30.0); 30.7 (32.5–29.0); length of rostrum, 16.9 (18.8–14.0), 14.5 (15.1–13.8); length of nasals, 13.6 (15.8–11.0), 11.7 (12.6–10.5); zygomatic breadth, 24.6 (26.7–21.2), 21.8 (22.8–21.0); mastoid breadth, 20.2 (21.5–18.4), 18.5 (19.6–17.6); interorbital breadth, 6.5 (6.8–6.3), 6.5 (6.8–6.2); maxillary tooth row, 7.8 (8.8–7.2), 7.3 (8.0–6.8); breadth of rostrum, 8.2 (9.5–7.0), 7.2 (7.6–6.8); extension of premaxillae posteriorly to nasals, 2.4 (3.0–1.8), 2.5 (3.6–1.5).

Specimens examined.—Total number, 31, as follows: From Mohave County, Arizona: Nixon Spring, 6250 ft., Mt. Trumbull, 8; three miles south of Nixon Spring (volcanic sand), Mt. Trumbull (type locality), 3; four miles south of Nixon Spring (volcanic sand), Mt. Trumbull, 13; head of Toroweap Valley, 2; six miles north of Wolf Hole, 4900 ft., 3; south side Virgin River, St. George, Washington County, Utah, 2.

Sigmodon hispidus cienegae A. B. Howell. Cotton Rat.—Two adult males, nos. 50857–8, from Fort (Camp) Grant, 5200 ft., Graham County, Arizona, indicate intergradation between *Sigmodon hispidus confinis* Goldman, as known to us by ten topotypes, and *Sigmodon hispidus cienegae* of which three topotypes and thirteen other specimens from Continental, Arizona, are available for comparison. Near approach to *confinis* is shown in the short (13.4 and 14.7 mm.) nasals. The basilar length and zygomatic breadth are exactly intermediate as between *confinis* and *cienegae*. The other parts of the skull measured are more like those of *cienegae*. The same is true of color. The external measurements are even larger than in *cienegae*. In adult males of comparable age, the hind foot is found to average 38 (36–39) mm. in the animals from Fort Grant, 35 (35–36) in four *cienegae* from Continental, and 31 (31–31) in three topotypes of *confinis*. The teeth of the Fort Grant males are smaller than those of *cienegae*. Even so, the size of the cheek teeth is nearer to that in *cienegae* than it is to that in *confinis* which has much smaller teeth. It is interesting that these two males from Fort Grant were trapped at the same place where an adult female *Sigmodon minimus minimus* Mearns was taken. The latter was taken in a trap set beneath mesquite bushes one-half mile south of the military buildings at Fort Grant now used as an industrial school. The two male *hispidus* were taken the following day in traps set in a thick patch of sunflowers in an area alongside the school garden where Miss Alexander found cuttings of bunch grass among the sunflowers and squash vines.

Two specimens from Pinery Canyon, Chiricahua Mountains, Cochise County, are referable to *cienegae* rather than to *confinis* on the basis of large hind foot (35 mm. dry) and size of skull and teeth which, as in the

Fort Grant specimens, resemble corresponding parts of *confinis*, but show nearer approach to *cienegae*. The color is darker than in the Fort Grant specimens and about as in *cienegae*.

Other specimens recorded from this general part of Arizona, and probably referable to *cienegae*, are 12 from Fairbank (Allen, 1895, p. 220) and 3 from 7 miles north of Patagonia (Swarth, 1929, p. 363).

Three young specimens from Peterson Ranch, 6100 ft., Huachuca Mountains, Cochise County, Arizona, one from head of Miller Canyon, 8400 ft., in the same mountains, and one young from four miles northwest of San Luis Pass, 5200 ft., Animas Valley, Hidalgo County, New Mexico, provide new record stations of occurrence. These five young specimens agree in having the nose and a ring around the eye cinnamon colored. Although traces of this same color have been detected in young topotypes of *Sigmodon hispidus arizonae*, in *S. h. cienegae* from Continental, Arizona, and in the two adults from Fort Grant, Arizona, the cinnamon color in these young specimens from the Huachuca Mountains and Animas Valley is so intense and extensive as to suggest the existence there of a variant uniformly characterized by this coloration. This coloration does not appear among ten young and adult topotypes of *S. h. confinis* nor in two specimens of *S. h. berlandieri* from two miles north of Canadian, Hemphill County, Texas. Unfortunately, the specimens in question are so young as not to show cranial characters of systematic worth in comparison with the geographically adjacent subspecies now known. For the present we tentatively refer these young specimens to *Sigmodon hispidus cienegae*.

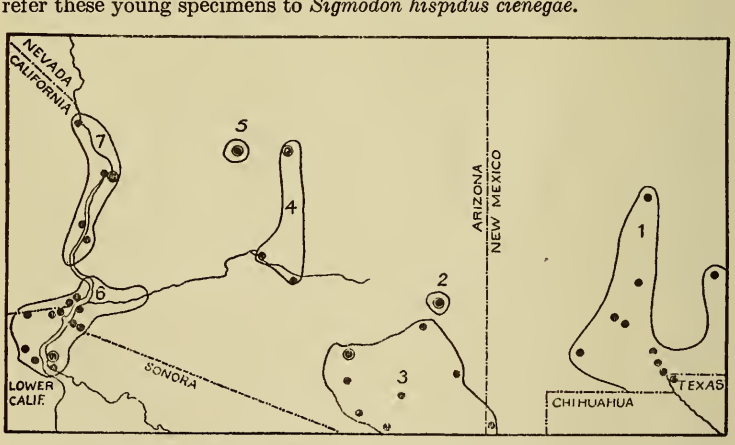

Fig. 1. Map showing the distribution of *Sigmodon hispidus* in California, Lower California, Arizona and parts of Sonora and New Mexico. 1. *Sigmodon hispidus berlandieri* Baird. 2. *S. h. confinis* Goldman. 3. *S. h. cienegae* A. B. Howell. 4. *S. h. arizonae* Mearns. 5. *S. h. jacksoni* Goldman. 6. *S. h. eremicus* Mearns. 7. *S. h. plenus* Goldman.

As basis for the accompanying distributional map, we have employed, n addition to the specimens above mentioned, those recorded by Bailey

(1931, p. 167), Goldman (1928, p. 206), Grinnell (1914, p. 230) and Mearns (1907, p. 453), three in the collection of the California Institute of Technology from Laveen, Arizona, and specimens in the Museum of Vertebrate Zoology from localities as follows: Sacaton, Arizona, and from Lower California, Mexico: Colorado River, 20 mi. S. Pilot Knob; Alamo River, 50 ft., 20 mi. S. Pilot Knob; Colorado River, Lat. 32° 15′; 5 mi. E. Cerro Prieto, 30 ft.; 9 mi. E. Cerro Prieto, 30 ft.; Imperial Canal, 11 mi. E. Mexicali, one-half mile south of the International Boundary, near Allison Heading.

Clethrionomys limitis (Bailey), Red-backed Vole.—Twelve specimens from Hannagan Meadow, 9500 to 9600 feet, and ten from Hannagan Creek, 8600 feet, all in Greenlee County, Arizona, were trapped beneath logs in the fir and pine forest, save in one instance where the animal was taken on a moss-covered stone beneath alders. With six topotypes of *C. limitis* taken in late October, 1906, for comparison, our specimens are seen constantly to differ, at all ages, in having the posterior border of the hard palate straight rather than provided with a median posterior projection. Comparing six of our specimens, comparable in age, with the six not fully adult topotypes, it develops that, on the average, the Arizona-taken animals have narrower teeth and a rostrum which, relative to its length, is narrower. Also, the palatal breadth, as measured between the second upper molars, is wider. In the Arizona specimens the breadth of the palate, on the average, amounts to 88 per cent of the width of the rostrum as opposed to only 79 per cent in the topotypes of *C. limitis*. Indeed, among the 12 specimens of similar age that were measured, only one instance of overlap in these percentages occurs. Finally, comparing specimens judged by cranial characters to be of the same age, the Arizona animals are smaller; the total length is only 125.6 millimeters as against 134.0 and length of tail 30.4 as against 36.8.

The topotypes are in winter pelage, whereas our specimens taken in July and late September are in summer pelage. The marked seasonal difference in coloration prevents our judging of geographic color variation if such exists.

Although several of the above mentioned differences, for example the trenchant differences in construction of the palate, may constitute adequate basis for subspecific separation of the Arizona animals, we refer them to *C. limitis* at least until opportunity permits us to make comparison with additional specimens from the general range of *C. limitis*.

Zapus luteus luteus Miller, Jumping Mouse.—The taking of two specimens at 8200 feet elevation on Hannagan Creek, one at 8600 feet elevation on Hannagan Creek, Greenlee County, Arizona, and eight at 7700 feet on the west fork of Black River, Apache County, Arizona, marks a notable extension of recorded geographic range to the westward for this form which is thought not to have been reported before from the State of Arizona. All were taken under, or in openings among, alders along the stream where the vegetation, other than alder, was relatively sparse.

With two adult, female, topotypes (nos. 133602–03, U. S. Nat. Mus.) of *Z. luteus* available for comparison no differences judged to be of systematic worth can be detected in our specimens. They answer, precisely, to Miller's original description (1911, p. 253) of the species. How *Zapus luteus australis* Bailey differs from *Z. l. luteus* or from our specimens is not known. Average and extreme measurements of ten adults from Greenlee County, Arizona, are as follows: Total length, 209 (197–220); length of tail, 128 (120–138); length of hind foot, 30.6 (29–32); occipito-nasal length, 23.6 (22.8–24.3); zygomatic breadth, 11.5 (11.0–11.9); least interorbital breadth, 4.5 (4.3–4.9); mastoid breadth, 10.5 (9.9–11.0); height of skull above a plane touching tips of incisors and inferior margins of tympanic bullae, 9.2 (9.0–9.6); crown length of upper molar-premolar tooth-row, 3.8 (3.6–4.0); length of palate, 3.3 (3.0–3.7).

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OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

SOME FURTHER NEW THYSANOPTERA FROM PANAMA.

BY J. DOUGLAS HOOD.

In two previous papers[1] the author described a number of new Panamanian Thysanoptera taken during the summer of 1933, principally at Barro Colorado Island, Canal Zone, and at Porto Bello. Most of these were outstanding species which required little study for their differentiation. In the present paper are described certain additional ones, belonging to more difficult genera, as well as a few which were collected under the direction of Mr. James Zetek by Silvestre Aviles, one of the resident care-takers of the Barro Colorado Island Biological Laboratory.

A set of paratypes, in so far as they exist, will be deposited with Dr. Thomas Barbour, Director of the Museum of Comparative Zoology of Harvard University, while the holotypes and allotypes will remain in the writer's collection.

Heterothrips flavicruris, sp. nov.

Female (macropterous).—Length about 1 mm. (distended, 1.2 mm.). Color brown, darkest in head, palest in abdominal segments III–VIII, prothorax with a little red subhypodermal pigmentation along front and hind margin as well as on lower surface and in median line, the pterothorax and base of abdomen with orange pigmentation which here and there becomes reddish; ocellar pigmentation red; femora blackish brown, the fore pair yellow at tip, the middle and hind pairs yellow at base only, *all tibiæ and tarsi pale yellow*, excepting only the brown tarsal cups; fore wings gray, *with a clear white subbasal cross-band; antennæ largely pale whitish yellow in segments I–VI, uniform dark gray in VII–IX*, segment I lightly shaded with brown basally, III just perceptibly darkened apically,

[1] *Three New Urothripidæ* from Panamá, in Proc. Biol. Soc. Washington, Vol. 46, pp. 213–215, Nov. 20, 1933; and *New Thysanoptera from Panamá*, in Journ. N. Y. Ent. Soc., Vol. XLI, pp. 407–434, Feb., 1934.

IV with a narrow gray encircling band occupying the portion between the circlet of major setæ and the sensoria and another band occupying the extreme apex of the segment beyond the sensoria, V gray in the very short broad pedicel and also in distal third, VI gray in pedicel and in distal half.

Head about 1.65 times as wide as long, widest about midway between eyes and base, cheeks arcuately rounded and minutely serrulate because of six or seven deep anastomosing striæ on occiput; frontal costa with emargination minute and V-shaped; ocellar area and eyes at posterior margins not delimited by the heavy dark chitinous line found in some species, the head thus without a transverse occipital groove. *Eyes* of normal form and structure, i. e., about 0.7 as long as head, setose, protruding anteriorly, with the dorsal facets smaller than the ventral ones and separated from one another. *Ocelli* of posterior pair about twice the diameter of anterior ocellus and two-thirds as wide as their interval. *Antennæ* about 2.16 times as long as pronotum, of normal form and structure; segment III only 2.5 times as long as greatest width, its length from base to third incision just one-half the length of segment IV; IV less than 0.7 as long as III, its sides arcuate; each of these segments with two rings of encircling sensoria at tip.

Prothorax about 1.43 times as long as head and about 1.65 times as wide as long, broader posteriorly, with sides and posterior margin rounded and anterior margin nearly straight; notum with a few short dark setæ and the usual longer ones at anterior angles and along posterior margin, the anastomosing lines of sculpture pale and inconspicuous. Mesonotum very closely striate. *Wings* of fore pair with about 23 setæ on costal margin, 23 on anterior vein, and 18 on posterior vein.

Abdomen stout (as is usual in the genus); *pubescence dark, close, and very regular*, disposed as usual on anastomosing lines, these not heavy or especially prominent; *posterior margins of abdominal terga I–VIII fringed at sides with dark parallel slender spines which are not at all fused to form plates*, I bare on posterior margin at median line, II with two minute spines at this point, III with 8, IV and V each with 11, *VI–VIII with the comb continuous and unbroken;* sterna II–VI each fringed posteriorly with a continuous even comb and with a single regular row of dark setæ arising close to their posterior margins, sternum V with 12 of these setæ.

Measurements of holotype (♀): Length about 0.98 mm. (distended, 1.19 mm.); head, length 0.090 mm., greatest width 0.149 mm., width across eyes 0.148 mm., least width (at base) 0.136 mm.; eyes, length 0.063 mm., width 0.048 mm., interval 0.052 mm.; prothorax, median length of pronotum 0.129 mm., width 0.213 mm.; pterothorax greatest width 0.269 mm.; abdomen, greatest width 0.284 mm.

Antennal segments:	1	2	3	4	5	6	7	8	9
Length (μ):	22	39	67	46	29	28	15	15	17
Width (μ):	29	26	27	27	18	15	10	8	5

Total length of antenna 0.278 mm.

Described from one female taken by Silvestre Aviles in flowers of *Brysonima coriacea* [Dr. Paul C. Standley, det.], Barro Colorado Island, Canal Zone, August 6, 1933 [Hood No. 1037].

The presence of spines, rather than chitinous plates, on the posterior margins of the abdominal terga, the unbroken comb on the sixth tergum, the banded fore wings, the yellow tibiæ, and the dark femora ally this species with *minor* and *brasiliensis*. From the former it differs in having much paler antennæ, the second segment being clear yellow instead of concolorous with the head, and segments five and six being largely whitish yellow instead of uniform dark brown; in the presence of a group of distinct median spines on the posterior margins of each of the abdominal terga from the second to the fifth; and also in having two rings of circular sensoria, instead of only one, at the apex of the third and fourth antennal segments. From *brasiliensis* it differs in the less closely sculptured pronotum and also in the much paler antennal coloration, *brasiliensis* having the first two and the last five segments dark brown.

Heterothrips pubescens, sp. nov.

Female (macropterous).—Length about 1.1 mm. (partially distended, 1.2 mm.). Color dark brown or blackish brown (black to the naked eye), thorax and abdomen with orange-colored subhypodermal pigmentation; ocellar pigmentation red; femora concolorous with body, the fore pair yellow apically, the middle and hind pairs yellow at extreme base only; fore tibiæ deep yellow, with a brown cloud in basal half or more, shading to lemon yellow at tip; middle tibiæ blackish brown, paler at base, lemon yellow in distal fourth; *hind tibiæ colored much like middle tibiæ but pale yellowish brown at base;* all tarsi pale yellow, with dark brown tarsal cups; fore wings dark gray, with a clear white subbasal cross-band; *antennæ with segment I light brownish gray, II uniform orange-yellow, III clear yellow, IV yellow with a slight cloud of gray over most of distal portion exclusive of sensoria, V–IX uniform dark gray-brown.*

Head about 1.68 times as wide as median dorsal length and 0.7 as long as prothorax, decidedly broadest just behind eyes (where it is abruptly widest and provided with a tooth-like projection), tapering concavely to base; surface with a few small setæ; *ocellar area and eyes at posterior margins delimited by a dark chitinous line* which crosses the head as the anterior margin of a distinct transverse occipital groove, behind which are about six dark anastomosing lines; *frontal costa with a deep U-shaped emargination.* Eyes of normal form and structure, 0.7 as long as head, nearly 0.9 as wide as their interval. *Ocelli* of posterior pair about twice the diameter of anterior ocellus and about 0.6 as wide as their interval. Antennæ about 2.76 times as long as median length of head and twice that of pronotum, of normal form and structure; *segment III about 2.76 times as long as greatest width, its length from base to third incision about three-fourths the length of segment IV; IV only 0.57 as long as III, its sides arcuate.*

Prothorax about 1.36 times as long as head and about 1.6 times as wide as long, sides and posterior margin rounded, the latter roundly emarginate medially, front margin straight; notum with a few short inconspicuous setæ and the usual longer ones on anterior and posterior angles, its *surface nearly rugose, the anastomosing lines almost forming polygons.* Mesonotum

closely striate. Wings of fore pair with about 26 setæ on costal margin, 22 on anterior vein, and 17 on posterior vein.

Abdomen stout (as is usual in the genus); *pubescence close, the larger reticles crossed by about six delicate spines;* posterior margins of *terga I–VII fringed at sides with chitinous plates* whose distal ends are prolonged as usual into flat acute spines, *the spines short and evenly spaced on the more laterad plates, shorter and less regular on the mesad ones;* tergum I broadly bare across middle, II–V with 4–9 small spines forming a median group on posterior margin, *VI–VIII with the comb continuous and unbroken.*

Measurements of holotype (♀): Length about 1.12 mm. (partially distended, 1.23 mm.); head, length 0.095 mm., greatest width (just behind eyes) 0.160 mm., least width (at base) 0.136 mm., width across eyes 0.155 mm.; eyes, length 0.067 mm., width 0.049 mm., interval 0.057 mm.; posterior ocelli, diameter 0.017 mm., interval 0.027 mm.; prothorax, median length of pronotum 0.130 mm., width 0.210 mm.; pterothorax, greatest width 0.260 mm.; abdomen, greatest width (at segment IV) 0.347 mm.

Antennal segments:	1	2	3	4	5	6	7	8	9
Length (μ):	23	38	69	39	23	22	15	15	19
Width (μ):	32	29	25	25	20	16	11	9	6

Total length of antenna 0.263 mm.

Described from two females taken in flowers of *Byrsonima coriacea* [Dr. Paul C. Standley, det.], on Barro Colorado Island, Canal Zone, August 6, 1933, by Silvestre Aviles [Hood No. 1037].

This species is closely related both to *H. flavicornis* and *H. fimbriatus.* From them it differs in the much more closely pubescent abdomen and the differently colored antennæ. The fringing abdominal plates are about as in *flavicornis,* except that the delicate spines at their ends are longer and much more evenly spaced. *H. flavicornis* has the third antennal segment distinctly longer in relation to its width, and the distance from the base of this segment to the third incision about 0.54, instead of 0.75, the length of segment four.

Heterothrips fimbriatus, sp. nov.

Female (macropterous).—Length about 0.9 mm. Color brown, abdomen paler than rest of body, thorax and abdomen with orange-colored subhypodermal pigmentation; ocellar pigmentation red; femora blackish brown, the fore pair yellow apically, the middle and hind pairs yellow at base only; fore tibiæ pale yellow, with a distinct brown cloud in basal half; *middle tibiæ blackish brown, distal third pale yellow, proximal fourth yellowish and somewhat shaded with brown; hind tibiæ colored much like middle tibiæ but more extensively yellow at base;* all tarsi pale yellow, with dark brown tarsal cups; fore wings gray, *with a clear white subbasal cross-band; antennæ largely yellow in segments I-VI, uniform gray in VII–IX,* segment I shaded very lightly with brown at base, II–IV with yellow internal pigmentation, IV shaded with brown at apex, more darkly on the inner surface, V and VI grayish yellow in middle portion, the sides, bases, and apices lightly shaded with gray.

Head of normal form, but widest and angulate just behind eyes, cheeks nearly straight and converging to base; *ocellar area and eyes at posterior margins delimited by a dark chitinous line* which marks the anterior margin of a distinct transverse occipital groove, behind which are about four dark anastomosing lines; *frontal costa with the emargination large and U-shaped. Eyes* of normal form and structure, almost as wide as their interval. *Ocelli* of posterior pair about twice the diameter of anterior ocellus and 0.56 as wide as their interval. *Antennæ* about 2.17 times as long as median length of pronotum, of normal form and structure; *segment III about 2.6 times as long as greatest width, its length from base to third incision about three-fourths the length of segment IV; IV only 0.57 as long as III, its sides arcuate.*

Prothorax about 0.8 as long as greatest width of head and about 1.72 times as wide as median length, broader posteriorly, with sides and posterior margin broadly rounded and anterior margin nearly straight; notum with a few short dark setæ and the usual longer ones at anterior and posterior angles, those along posterior margin about equal in length to those on disk but stouter; *anastomosing lines of sculpture distinct along posterior margin, very inconspicuous elsewhere.* Mesonotum only moderately closely striate. *Wings* of fore pair with about 27 setæ on costal margin, 22 on anterior vein, and 17 on posterior vein.

Abdomen stout (as is usual in the genus); *pubescence very sparse,* almost wholly lacking on tergum II; *posterior margins of terga I–VII fringed at sides with chitinous plates* whose distal ends are prolonged as usual into flat acute spines, these spines *moderately long on the mesad pair of plates, much shorter on the others;* tergum I broadly bare across middle portion of posterior margin, II with two minute median spines, III–V each with 6, *VI–VIII with the comb continuous and unbroken.*

Measurements of holotype (♀): Length 0.90 mm.; head, greatest width 0.147 mm., least width (at base) 0.135 mm., width across eyes 0.142 mm.; eyes, width 0.047 mm., interval 0.048 mm.; prothorax, median length of pronotum 0.115 mm., width 0.198 mm.; pterothorax, greatest width 0.242 mm.; abdomen, greatest width 0.232 mm.

Antennal segments:	1	2	3	4	5	6	7	8	9
Length (μ):	22	32	70	41	20	19	15	13	17
Width (μ):	28	27	27	27	17	15	10	9	6

Total length of antenna 0.249 mm.

Described from one female taken by the author on Barro Colorado Island, Canal Zone, July 29, 1933, in flight [Hood No. 1016].

From the other members of the genus which have the abdominal terga fringed at the sides posteriorly with plates rather than simple spines, and whose hind tibiæ are yellow in the basal third, this species may be known by the shorter third antennal segment (70 μ long in the present species, more than 80 μ long in *arisæmæ* and *moreirai*), the darker fourth antennal segment (uniform bright yellow in *flavicornis*), the much longer spines arising from the mesad pair of plates on the terga of the abdomen (these teeth minute in *flavicornis* and *pubescens*), and the sparse abdominal pubescence (the pubescence abundant in *pubescens*).

Corynothrips cruentatus, sp. nov.

Female (macropterous).—Length about 1.3 mm. (distended, 1.4 mm.). General color lemon yellow, with much crimson subyhpodermal pigmentation; head and prothorax dark gray, with a dense and nearly continuous underlying layer of crimson which extends *posteriorly to occupy a little more than the anterior third of the metanotal plate;* sides of mesothorax, remainder of metathorax, all of abdominal segments I and II, and extreme sides of III–VII, bright yellow, the sides of VII shading to bright orange posteriorly; *in segments III–X of the abdomen the dense crimson pigmentation reappears, and forms in each of III–VII a large median blotch which occupies most of the dorsum of the segment,* these blotches smaller in IV and V and rounded posteriorly, the integument above at least the more posterior ones darkened somewhat with gray; VIII–X dark gray, with the crimson pigmentation restricted in VIII to about the posterior three-fifths of the segment, in IX to a thin broken median patch, and in X to a dense area occupying about the caudal three-fifths of the segment; ovipositor narrowly margined with crimson; legs, including all coxæ, pale whitish yellow, with traces of orange pigmentation at ends of tibiæ and a small nearly black spot in each tarsus; *fore wings gray in proximal eighth* (the anal area or "scale" darker) *and in distal three-fifths, the veins in these areas bright crimson,* the wing in the intervening portion of its length clear white; hind wings with a nearly black median vein extending almost to tip, in front of this vein white save for a gray spot at the base of each wing seta, behind the vein gray in distal three-fifths, base of wing with some crimson pigmentation along veins; antennal segments I and II blackish brown and with much crimson pigmentation; III blackish brown basally (save for a narrow colorless band at proximal ninth), paling to light gray distally, narrowly darker along sides and at tip, with abundant crimson pigmentation in all except distal eighth; IV gray in pedicel, darker gray in distal third, with a nearly black line around tip, the intervening portion white; V similar in color to IV, but with the pedicel darker; VI very narrowly gray at extreme base, almost white beyond, shading to pale gray in distal two-fifths; VII–IX pale gray, IX palest.

Head formed as in genotype, about 1.08 times as long as greatest width, which is across eyes, and 1.22 times as long as the width just behind eyes, the cheeks slightly diverging to base and with a slight swelling at middle; cephalic process (measuring from anterior margin of eyes) scarcely 0.23 as long as head, its least width about 1.4 times its length, sides concave; surface of head smooth, save for a few dark anastomosing lines across occiput; *interocellar setæ short, only 76 μ in length, nearly black,* arising from distinct tubercles, slightly fringed distally; vertex with a short seta on either side of anterior ocellus about midway between the latter and the eyes, two pairs of setæ near inner posterior margins of eyes, and two pairs, one directly below the other, on cheeks just behind eyes. *Eyes* normal to the genus, i. e., strongly protruding, pilose, and composed of circular facets which on the dorsal surface are separated by dark gray integument, the facets on the lower surface larger and contiguous. *Ocelli* rather close together, about 17 μ in diameter, the interval between posterior pair about

25 μ, median ocellus directed forward and upward but scarcely overhanging. *Antennæ* as in the genotype. *Mouth-cone* nearly attaining posterior margin of prosternum, normal in structure.

Prothorax nearly 0.9 as long as head and 1.27 times as wide as long, surface smooth, with three pairs of long setæ which are fringed distally, and *nearly black in color, those near anterior angles 69 μ, epimerals 83 μ, posterior marginals 60 μ;* pronotum apparently with only four pairs of additional setæ, all of them short and pale, one situated on sides near anterior angles, one on sides above outer end of pleural suture, one on the line between posterior marginal setæ, and one (slightly farther apart than the last mentioned) between and behind the large pair near anterior angles, all of them very difficult to see because of the very dense prothoracic pigmentation. *Mesothorax* about 1.4 times as wide as prothorax, distinctly wider than metathorax, surface nearly or quite smooth. *Wings* as in genotype, i. e., very narrow and sabre-shaped, the fore pair with the anterior vein fusing with ambient just beyond the anal area, and with the posterior vein represented briefly at middle of wing but partly fused with ambient and anterior vein at or near either end, these fusions without doubt representing cross-veins; two rows of large heavy setæ, most of them similar in structure to interocellars and pronotals, borne by the fused veins, one row (of nine) inclined cephalad and the other (of eight) caudad, in addition to a similar seta arising from the end of the anal vein. Legs very long and slender, as in the genotype.

Abdomen long and slender, not much broader than prothorax, with all setæ short, excepting on segments IX and X, the former segment having two pairs and the latter having one pair of long grayish yellow setæ which are curved, fringed distally, and about 110 μ in length.

Measurements of holotype (♀): Length about 1.29 mm. (distended, 1.40 mm.); head, length 0.154 mm., greatest width (across eyes) 0.143 mm., least width (behind eyes) 0.126 mm., width near base 0.132 mm., length in front of eyes 0.045 mm., least width of this prolonged portion 0.064 mm.; eyes, length 0.066 mm.; prothorax, median length of pronotum 0.135 mm., width 0.171 mm.; pterothorax, greatest width 0.242 mm.; abdomen, greatest width 0.183 mm.

Antennal segments:	1	2	3	4	5	6	7	8	9
Length (μ):	27	45	93	85	67	44	17	13	16
Width (μ):	28	30	21	18	17	14	9	6	4

Total length of antenna 0.407 mm.

Described from one female taken July 29, 1933, by Señorita Carmen Paredes A., on the lower surface of a banana leaf, Barro Colorado Island, Canal Zone [Hood No. 1017].

The italicized portions of the above description should serve to distinguish this species from the closely allied genotype.

Eurythrips conjunctus, sp. nov.

Female, forma macroptera.—Length about 1.4 mm. (distended, 1.79 mm.). Color of head bright yellow, slightly shaded with gray along cheeks and in

the region of the ocelli, thorax yellowish brown, the pterothorax darker along sides and in anterior portion of metanotum, where it is about concolorous with the base of abdomen, the latter shading to nearly blackish brown in last four or five segments, tube paler apically and more narrowly so at base; legs yellow, the middle and hind pairs slightly shaded with brown in femora and tibiæ along outer surface and at base; wings grayish brown, the fore pair darker at base, at tip, along middle of distal half, and in the second fourth behind a narrow pale median line, nearly clear in an irregular area along posterior margin beyond the second subbasal seta; antennæ concolorous with head in basal portion of segment I, shading to light brown distally, II largely brown but yellow or yellowish brown distally at middle, III–VIII nearly blackish brown save only the yellow pedicel of III and sometimes the brown middle portion of the distal three-fifths of III and IV; subhypodermal pigmentation bright red, distributed in ocellar region of head, in thorax, and in the first nine abdominal segments; ocellar pigmentation red.

Head nearly 1.4 times as long as greatest width, which is at base or at proximal third of cheeks, the latter nearly evenly but decidedly rounded to eyes and very slightly converging in basal third, with a slightly wider basal collar, serrate as seen from above because of short anastomosing lines which do not extend onto dorsum of head excepting faintly at extreme base; head sharply constricted at posterior margin of eyes, at this point narrowest and about 0.85 the least subbasal width, the width across eyes nearly equal to greatest width; vertex slightly elevated, sloping abruptly downward in front but scarcely overhanging, bearing the median ocellus at its extremity, distinctly subreticulate, and with two pairs of small setæ about 16 μ long, one of them behind posterior ocelli, the other about midway between posterior ocelli and anterior ocellus; cheeks with about four pairs of similar small setæ in addition to a pair behind and between postocular setæ; postoculars pale yellowish, expanded at tip, 67 μ long and 90 μ apart. *Eyes* strongly protruding, composed of relatively few large convex facets, about 0.3 as long as head, their width about 0.8 their interval and about 0.77 their length. *Ocelli* present, posterior ones about 17 μ in diameter and about 0.63 as wide as their interval, *median ocellus with posterior margin about on line with anterior margin of eyes. Antennæ* about 2.1 times as long as head, *segments VI–VIII rather compactly united because of the very short and broad pedicels of VII and VIII which are retracted into the apices of the preceding segments, VII with pedicel about 16 μ wide and twice as broad as that of VI, VIII with pedicel 13 μ wide;* segments III–V roughened with faint lines of sculpture; sense-cones slender, the number on inner (and outer) surfaces of segments as follows: III 1 (2), IV 1 (2), V 1 ($1+^1$), VI 1 ($1+^1$) VII with the usual one on dorsum near apex; setæ long, slender, pale, and pointed. *Mouth-cone* broadly rounded at tip, surpassing middle of prosternum.

Prothorax along median line of pronotum about two-thirds as long as head and (inclusive of coxæ) about twice as wide as long, with a very short vestigial median thickening, with a few faint lines of sculpture along posterior margin, and fused with posterior half or more of epimera; anterior

marginal setæ minute, the others long, yellow, and dilated at tip, the anterior laterals 68 μ, midlaterals 60 μ, epimerals 68–70 μ, posterior marginals 77 μ, coxals 42 μ. Pterothorax distinctly wider than prothorax, notal plates nearly smooth. *Legs* normal; fore tarsus with a slight downwardly-directed tooth or claw at inner distal angle of first segment. *Wings* normal, the fore pair without accessory setæ and with the three subbasal setæ long, knobbed, yellowish, and comparable with postoculars.

Abdomen about 1.33 times as wide as prothorax across coxæ, free of sculpture save for the usual dark transverse line near bases of terga II–IX and a few faint anastomosing lines at base of IX, major setæ mostly knobbed, the lateral pair on VII about 102 μ and nearly pointed, its homologue on VIII about 83 μ and knobbed, that on IX about 113 μ and nearly pointed; tube about two-thirds as long as head and only 1.7 times as long as greatest subbasal width, this twice the apical width, sides very slightly concave in distal five-sixths, its terminal setæ light brown and about three-fourths its length.

Measurements of holotype (♀): Length about 1.37 mm. (distended, 1.79 mm.); head, length 0.184 mm., greatest width (at basal fourth and at base) 0.132 mm., width across eyes 0.130 mm., width at posterior margin of eyes 0.110 mm., least subbasal width 0.130 mm.; eyes, length 0.053 mm., width 0.041 mm., interval 0.050 mm.; prothorax, median length of pronotum 0.122 mm., width (inclusive of coxæ) 0.253 mm.; pterothorax, greatest width 0.301 mm.; abdomen, greatest width (at segment IV) 0.337 mm.; tube, length 0.122 mm., width near base 0.072 mm., at apex 0.035 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ):	40	50	60	58	54	52	41	32
Width (μ):	40	30	28	28	25	26	22	13

Total length of antenna 0.387 mm.

Female, forma brachyptera.—Color much as in macropterous form but paler, the head with cheeks and ocellar region not shaded with gray, the thorax brownish yellow, the legs uniform bright yellow, the antennæ with segments I and II nearly concolorous with head and only lightly shaded with brown along sides and in pedicel of II. Structure as in macropterous form, excepting as follows: Head about 1.32 times as long as wide; ocelli wanting; eyes smaller, hardly 0.3 as long as head. Prothorax longer, about 0.77 as long as head, less than twice as wide as long. Wings short, elliptical, but the three subbasal setæ not reduced in size. Abdomen about 1.4 times as wide as prothorax across coxæ; setæ shorter, the nearly pointed lateral pair on VII about 93 μ, the corresponding pair on VIII about 80 μ and knobbed, that on IX slightly dilated and 103 μ; tube about 0.6 as long as head and about 1.57 times as long as greatest subbasal width, this more than twice the apical width.

Male (brachypterous).—Length about 1 mm. (distended, 1.31 mm.). Color exactly as in brachypterous female. Head 1.24 times as long as greatest width; postocular setae 60 μ long and 77 μ apart. Eyes nearly 0.36 as long as head. Ocelli wanting. Antennæ nearly 2.3 times as long as head, the last three segments compactly united as in female, the pedicels of

VII and VIII respectively 15 μ and 13 μ broad at base. Prothorax along median line of pronotum about three-fourths as long as head and nearly twice as wide across coxæ as long; major setæ as in female but shorter, anterior laterals 57 μ, midlaterals 58 μ, epimerals 57 μ, posterior marginals 63 μ, coxals 37 μ. Fore tarsus as in female. Abdomen about 1.27 times as wide as prothorax across coxæ; lateral setæ on segment VII swollen at tip and 78 μ long, homologous pair on IX similar and 65 μ long, longest pair on IX pointed, 105 μ; tube about 0.6 as long as head and only 1.5 times as long as greatest subbasal width, this just twice the apical width, its terminal setæ about 0.83 its length.

Measurements of allotype (♂): Length 1.05 mm. (distended, 1.31 mm.); head, length 0.150 mm., greatest width (at base and at basal third) 0.121 mm., width across eyes 0.111 mm., width at posterior margin of eyes 0.099 mm., least subbasal width 0.117 mm.; eyes, length 0.042 mm., width 0.030 mm., interval 0.050 mm.; prothorax, median length of pronotum 0.110 mm., width (inclusive of coxæ) 0.215 mm.; pterothorax, greatest width 0.205 mm.; abdomen, greatest width (at segment II) 0.274 mm.; tube, length 0.093 mm., width near base 0.062 mm., at apex 0.031 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ):	37	44	51	50	48	46	38	28
Width (μ):	37	27	28	27	24	24	21	13

Total length of antenna 0.342 mm.

Described from 2 macropterous females, 3 brachypterous females, and 8 brachypterous males, all taken under dead grass and fallen leaves on Barro Colorado Island, Canal Zone, Panamá, June 26, 1933, by Miss Sabra J. Hook and the writer.

This species is very closely related to *E. ampliventralis* Hinds, the type of the genus. Aside from the more darkly colored third antennal segment, it differs particularly in the form of the sixth antennal segment. In *ampliventralis* this segment is about 42 μ long and 23 μ wide, with a distinct nearly parallel-sided pedicel which is not more than 12 μ wide; in *conjunctus* the segment is about 52 μ long and 26 μ wide, and the pedicel flares widely at the base, where it is 16 μ wide. These differences are thoroughly constant in the material which I have seen.

Trichothrips moultoni, sp. nov.

Female (macropterous).—Length about 1.6 mm. (distended, 2.1 mm.). Color brown, darker in head, paler in pterothorax and abdominal segment I, becoming nearly yellow in distal portion of abdomen, segments III–VII of the latter with an indistinct gray band along the subbasal transverse line of sculpture and another band, more distinct, along posterior margin, VIII and IX without the subbasal band but with the posterior one darker, especially in IX, the tube bright yellow in basal three-fifths, thence yellowish gray and narrowly tipped with darker gray; legs (excepting the dark brown fore coxæ) much paler than body, all tibiæ and tarsi clear lemon yellow (save for the dark brown tarsal cups), all femora shading to yellow at apex; fore wings brownish, darkest in scale; antennæ with segments I

and II paler than the others, I pale yellowish basally, darkest along sides, and with the remainder light brown, II light brown, darkest along sides, and yellow medially in distal portion, III with pedicel yellow and shading rapidly to nearly blackish brown, IV–VIII blackish brown; subhypodermal pigmentation bright red, scant, distributed in head, thorax, and along sides of abdomen; ocellar pigmentation darker red.

Head about 1.14 times as long as wide, broadest just behind eyes, the cheeks very nearly straight and converging to base, which is 0.9 the postocular width; dorsal surface, as seen from the side, arched and swollen in occipital region; vertex distinctly overhanging, bearing the large (27 μ) median ocellus at its extremity, with two pairs of short curved setæ on sides and a straighter pair behind posterior ocelli, its surface minutely subreticulate; at sides with faint dark anastomosing lines (which become more distinct posteriorly, where they are diagonal in direction and extend closer to median line), and with about ten pairs of slender pale setæ in addition to a longer pair (33 μ) situated 28 μ behind postoculars and 69 μ apart; postocular setæ not expanded at tip, blunt, 92 μ long and 132 μ apart. *Eyes* of medium size, about 0.3 as long as head and 0.8 as wide as their interval. *Ocelli* large, 27 μ in diameter, the median one with its posterior margin on a line with front margin of eyes, the posterior ocelli of slightly greater diameter than their interval and with posterior margins on a line with middle of dorsal aspect of eyes. *Antennæ* about 2.25 times as long as head, eighth segment fusiform and pedicellate; sense-cones on inner (outer) surfaces as follows: III 1 (2), IV 1 (2), V 1 (1+^{1}), VI 1 (1 +^{1}), VII with the usual one on dorsum near apex; all setæ long and pointed. *Mouth-cone* large, rounded at tip, extending nearly across prosternum.

Prothorax along median dorsal line about 0.7 as long as head (inclusive of coxæ) about 2.35 times as wide as long, without median thickening, posterior margin with a few faint anastomosing lines of sculpture, epimeron not fused with pronotum; major setæ all present, yellow, very slightly expanded at tip, long, the anterior marginals 65 μ, anterior laterals 67 μ, midlaterals 102 μ, epimerals 123 μ, posterior marginals 120 μ, coxals 81 μ. *Legs* normal; fore tarsus with a minute tooth at middle. *Wings* apparently normal (distal portion wanting in the dealated holotype); subbasal setæ three in number, slightly expanded distally, the longest about 90 μ. *Pterothorax* distinctly wider than prothorax across coxæ.

Abdomen of normal form and structure, broadest at segment III, where it is distinctly wider than pterothorax, free of sculpture excepting for the usual transverse subbasal line across terga II–VIII and slight anastomosing lines at sides and on proximal portion of tergum IX; tube about two-thirds as long as head and nearly 1.7 times as long as greatest subbasal width, the last scarcely twice the distal width, sides nearly straight beyond the basal shoulder; setæ long, slender, all pointed excepting the dorsal pair on VIII which is slightly expanded distally and 93 μ long, all yellow excepting the wing-retaining ones and those at tip of tube, these being brown; VII with lateral setæ 167 μ, VIII with these 130 μ, IX with lateral and dorsal setæ subequal and 173–177 μ, longest terminal setæ 187 μ.

Measurements of holotype (♀): Length about 1.60 mm. (distended,

2.11 mm.); head, length 0.202 mm., greatest width (just behind eyes) 0.177 mm., least width (near base) 0.159 mm.; eyes, length 0.060 mm., width 0.052 mm., interval 0.065 mm.; prothorax, median length of pronotum, 0.141 mm., width (inclusive of coxæ) 0.332 mm.; pterothorax, width, 0.374 mm.; abdomen, greatest width (at segment III) 0.402 mm.; tube length 0.137 mm., width near base 0.081 mm., width at apex 0.043 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ):	43	57	65	63	63	57	53	53
Width (μ):	46	34	35	35	33	28	24	17

Total length of antenna 0.454 mm.

Described from one macropterous dealated female taken by the author from a dead branch of a tree at Porto Bello, Panamá, July 10, 1933 [Hood No. 988].

Readily known from *angusticeps*, *occipitalis*, and *medi americanus* by the much longer setæ, most of which are pointed.

Diceratothrips princeps, sp. nov.

Male (macropterous).—Length about 4.5 mm. (distended, 5.2 mm.). Color nearly uniform dark blackish brown (shining black to the naked eye or under low magnifications), with knees, tarsi, and distal portion of segment II of antennæ slightly paler.

Head just less than twice as long as width at middle, decidedly broadest across basal collar, wider across eyes than at middle, the cheeks broadly and evenly concave, each with about four strong, dark setæ (50–70 μ x 7 μ) projecting beyond its outline, in addition to a much shorter and weaker seta almost directly below the large anterior one, none of these setæ arising from protuberances; dorsal surface nearly free of sculpture, with two pairs of small setæ on a transverse line about midway between postocular setæ and base of head; vertex transverse, not prolonged, distinctly surpassed by eyes, with a strong, dark, nearly pointed seta measuring about 91 μ on either side of the median ocellus; postocular setæ 224 μ, pointed, dark in color. *Eyes* about 0.23 as long as head and 0.72 as wide as their interval, on ventral surface of head as wide as on dorsal surface but only four-fifths as long. *Ocelli* of posterior pair 32 μ in diameter, situated slightly behind middle of eyes, and about 0.44 as wide as their interval, with a minute seta behind inner margins; median ocellus directed forward and upward. *Mouth-cone* heavy, labium broadly rounded and surpassed by labrum, the tip of the latter beyond middle of prosternum; maxillary palpi with segment I about 42 μ x 25 μ and segment II about 91 μ x 19 μ. *Antennæ* almost twice as long as head, of normal form and structure, segment IV slightly, V and VI distinctly, prolonged ventrally at apex, VIII conical and broadly joined with VII; III 2.8 as long as II and 1.38 times as long as IV; sense-cones short (about 20 μ); segment III with one on outer surface, and one on ventral surface at apex of a slight tubercle; IV with one inner, two outer, and one ventral (at apex of the slight prolongation); V with one inner and one outer; VI with one inner and one more slender dorsal; VII with the

usual dorsal trichome at apex; setæ short, pointed, the longest on III about 47 μ; length (width) of segments in microns, I 83 (68), II 107 (52), III 305 (58), IV 221 (57), V 180 (48), VI 135 (40), VII 102 (33), VIII 57 (21).

Prothorax across coxæ about 1.68 times the median length of pronotum, the latter about 0.85 the length of head, broadly rounded posteriorly, with concave anterior margin, most of its surface delicately and minutely reticulate, and with a distinct median thickening; epimeron not fused with pronotum; anterior marginal, anterior lateral, and midlateral setæ minute, epimeral 210 μ, posterior marginal 168 μ (sometimes much shorter), both dark brown basally, coxal 70 μ. *Fore femora* very large (924 μ x 437 μ,) broadened near base on inner surface, the latter decidedly concave at middle of femur, *dorsal* surface near base with a varying number of short, very stout, dark setæ which do not extend beyond outline of femur as seen from above; fore tibiæ with a row of distinct setigerous tubercles on inner surface; fore tarsus with a nearly straight tooth 145 μ long; middle and hind tibiæ (the latter 655 μ long) on outer surface with two long pale setæ, the one at basal two-fifths about 308 μ long, the distal one shorter. *Wings* of fore pair typical in form, with about 47 accessory setæ on posterior margin; subbasal setæ brown, the outermost scarcely pointed and longest (157 μ).

Abdomen of normal form and structure, little more than 0.8 as wide across segment II as prothorax across coxæ; setæ dark brown, with pale distal ends, mostly pointed, those at apex of segment IX longest, 585 μ; tube slightly longer than head, about 3.5 times as long as basal width, and about 2.6 times as wide at base as at apex, narrowed (but not constricted) at apex and slightly narrowed at basal sixth, so that the sides are just perceptibly sinuate; terminal setæ dark, 238 μ.

Measurements of male (holotype).—Length 4.54 mm. (distended, 5.18 mm.); head, length 0.602 mm., greatest width (at basal collar) 0.354 mm., least width (at middle) 0.277 mm., width across eyes 0.308 mm.; eyes, length 0.140 mm., width 0.091 mm., interval 0.126 mm.; prothorax, length of pronotum 0.511, width (including coxæ) 0.860 mm.; pterothorax, greatest width 0.812 mm.; abdomen, greatest width 0.699 mm.; tube, length 0.612 mm., width near base 0.175 mm., at apex 0.067 mm.; antennæ, length 1.19 mm.

Female (macropterous).—Length about 4.5 mm. (distended, 5.7 mm.). Color nearly uniform dark blackish brown, as in male.

Head about 1.53 times as long as width at middle, broadest across basal collar, narrower across eyes than at middle, the cheeks slightly converging to eyes and to basal collar, with the middle portion straight and parallel; setæ on cheeks as in male but shorter and more slender, the pair on lateral margins behind eyes largest, 50 μ x 7 μ; vertex not surpassed by eyes, transverse and nearly vertical, but with the median ocellus directed upward as well as forward and not overhanging; frontal setæ 119 μ, longer than in male. *Eyes* nearly 0.25 as long as head, scarcely 0.7 as wide as their interval. *Ocelli* of posterior pair 33 μ in diameter, almost opposite middle of eyes and about 0.41 as wide as their interval. *Antennæ* about 2.1 times as long as head, formed as in male; length (width) of segments in microns, I 83 (67),

II 113 (52), III 280 (58), IV 207 (58), V 170 (50), VI 133 (44), VII 110 (37), VIII 47 (22).

Prothorax across coxæ about 2.46 times the median length of pronotum, the latter only 0.6 the length of head, much less rounded than in male and without median thickening, but with delicate and minute reticulation; epimeron not fused with pronotum; epimeral seta 238 μ in allotype, posterior marginal and coxal setæ 70 μ. *Fore femora* of normal form and size, with a few short but not particularly stout setæ on inner and dorsal surface near base; fore tibiæ with a row of setæ on inner surface, but the slight irregularities from which they arise are scarcely tubercles; fore tarsal tooth arising from inner distal angle of first tarsal segment, very short, rounded, and directed somewhat downwardly; middle and hind tibiæ (the latter 728 μ long in allotype) with setæ on outer surface as in male, but longer, the one at basal two-fifths of hind tibiæ often 360 μ long. *Wings* about as in male.

Abdomen broader than in male, 1.1 times as wide across segment II as prothorax across coxæ; setæ longer than in male, those at apex of IX often 700 μ; tube about 1.2 times as long as head, about 3.7 times as long as basal width, and about 2.5 times as wide at base as at apex, less narrowed near base than that of male.

Measurements of female (allotype).—Length 4.49 mm. (distended, 5.73 mm.); head, length 0.539 mm., greatest width (at basal collar) 0.368 mm., width at middle 0.353 mm., width across eyes 0.330 mm.; eyes, length 0.133 mm., width 0.095 mm., interval 0.139 mm.; prothorax, median length of pronotum 0.322 mm., width (including coxæ) 0.791 mm.; pterothorax, greatest width 0.882 mm.; abdomen, greatest width 0.876 mm.; tube, length 0.651 mm., width near base 0.176 mm., at apex 0.070 mm.; terminal setæ 0.266 mm.

Described from 4 males and 28 females, taken by the writer from dead branches of various trees at Barro Colorado Island, Canal Zone (type locality), and Porto Bello, Panamá, July 4–10, 1933 [Hood Nos. 971, 973, 984, and 988].

This species, apparently the largest of the genus, I have in vain endeavored to reconcile with the allied *D. armatus* Bagnall, *D. robustus* (Schmutz), *D. persimilis* Priesner, and *D. bicornis* Bagnall. The first of these (*armatus*, from Venezuela) differs in having the fore femora armed in both sexes with stout, tooth-like setæ on the inner surface, the head (particularly that of the female) narrowed posteriorly, and the pronotum of the female three-fourths the length of the head. The second (*robustus*, from Brazil), even after making full allowance for obvious inaccuracies in drawing, would appear to be a very different insect because of the numerous, closely-placed, and very stout, nearly triangular, tooth-like setæ on the inner surface of the slenderer fore femora at base, and the obviously longer frontal setæ (Schmutz illustrates each of these structures in two separate figures). The third (*persimilis*, from Surinam), though described in this genus, is said to lack the ventral prolongations found on the lower surface of the apex of the intermediate antennal segments, to be without accessory setæ on the posterior margin of the fore wings (both of them generic charac-

ters), and to have three sense-cones only (instead of the usual four) on the fourth antennal segment; but even if we dismiss these striking differences as possible misobservations, *princeps* may nevertheless be distinguished by the much longer fore femora (in the female 532 μ vs. 467 μ) and posterior tibiæ (728 μ vs. 623 μ). The fourth and last species (*bicornis*, probably from Brazil) is said to have the eyes half as wide as their interval (0.7 in *princeps*), the third antennal segment 1.2 times as long as the fourth (1.35–1.38 in *princeps*), the tube 1.33 times as long as head (1.0–1.2 in *princeps*), and the mesothorax 0.7 mm. wide (0.88–0.94 in *princeps*).

In common with the other species of *Diceratothrips* which I have observed alive, this has the habit when disturbed of curling the abdomen upward and forward over the thorax, so that when seen from above it looks like a small black shining beetle. It was common at Barro Colorado Island on a dead branch of pomarosa (*Eugenia jambos* L.) which had been cut a week or more previously. It feeds on fungus spores and is viviparous.

Karnyothrips ochropezus, sp. nov.

Female, forma macroptera.—Length about 1.4 mm. (distended, about 1.8 mm.). Color brown or blackish brown, darker in head and distal portion of abdomen, with *all legs clear bright yellow beyond coxæ* (excepting only that the fore femora are infrequently lightly clouded with brown on outer surface at base), all coxæ brown, fore pair darkest; antennæ with segment I about concolorous with head but paler across base, II black in pedicel and narrowly blackish brown along all of inner surface and basal half of outer, the remainder of segment brownish or yellowish and paler outwardly at apex, III pale yellow, often brighter in pedicel, with a narrow edging of black on outer surface at apex and along inner surface, a blackish cloud extending from the latter across the segment just beyond pedicel, IV darker and more brownish than III, darker along inner surface and nearly black in at least the outer portion of pedicel, V–VIII nearly uniform blackish brown; subhypodermal pigmentation bright red, usually a patch in ocellar region of head, a band extending around margin of dorsum of prothorax, a patch on ventral surface of prothorax occupying the membranous areas, a broken strip across front of mesothorax, and a line along each side of pterothorax and the first nine segments only of abdomen, this line broadest (or doubled) in pterothorax; wings clear and easily overlooked, fore pair with anal area ("scale") brown.

Head very long but quite variable, in the holotype 1.77 times as long as greatest width (in the other specimens this proportion is 1.57, 1.73 and 1.76), the actual length varying from 165 μ to 200 μ and the width from 103 μ to 113 μ, broadest at about middle, the cheeks very nearly parallel but somewhat converging to eyes and narrowed to a very slight neck which is about 0.9 the greatest width; surface shining and entirely free of sculpture save only for the usual transverse subbasal line, vertex evenly declivous, not at all produced or overhanging, with a pair of very minute setæ just laterad of median ocellus and a similar pair on a line with outer margin of posterior ocelli and midway between them and the usual vertical pore;

a third pair of slightly longer setæ directly behind posterior ocelli, a fourth pair behind postocular setæ and as far apart as their distance from the latter, cheeks with a few similar minute pale setæ; postoculars about 35 μ, pale brownish, slender, and broadly knobbed; ocelli 9–11 μ in diameter, the interval between the posterior pair nearly three times their diameter, the median ocellus directed nearly upward, its posterior margin slightly behind line of front margin of eyes. *Eyes* about 0.3 as long as head and about 0.65 as wide as their interval, evenly rounded with curve of head and not at all protruding. *Antennæ* about 1.6 times as long as head, segment VIII subconical and broadly articulated with VII; sense-cones slender and very inconspicuous, the number on inner (and outer) surfaces of segments as follows: III 0 (1), IV 1 (2), V 1 ($1+^1$), VI 1 ($1+^1$), VII with the usual one on dorsum near apex; setæ short, pale, and pointed. *Mouth-cone* short and broadly rounded, the tip of labrum not attaining tip of labium.

Prothorax along median line of pronotum about 0.62 as long as head and (inclusive of coxæ) about 1.7 times as wide as long, with a short median thickening at middle; surface free of sculpture and shining; anterior marginal setæ minute, a similar pair between them and anterior laterals, the others brownish, knobbed, and variable in length, holotype with anterior laterals 22 μ, midlaterals 19 μ, epimerals 47 μ, posterior marginals 35 μ, and coxals 30 μ. Pterothorax slightly narrower than prothorax. *Legs* moderately short, fore and hind femora somewhat swollen, fore tarsi with a downwardly projecting claw at inner distal angle of first segment. *Wings* slender and weak, scarcely narrowed at middle; fore pair with the three subbasal setæ knobbed (the distal one about 33 μ long), and with 2–3 accessory hairs on posterior margin.

Abdomen of normal form, distinctly broader than prothorax; tube half as long as head, 1.76 times as long as basal width, and twice as wide at base as at apex, sides straight; major setæ slender and pale yellowish, all knobbed, excepting the pointed lateral pair on VII (measuring 113 μ) and all on IX and XI, the dorsal pair on former 110 μ and the lateral pair 137 μ, the longest on XI about 100 μ and darker in color.

Measurements of holotype (♀): Length about 1.39 mm. (distended, 1.82 mm.); head, length 0.200 mm., greatest width 0.113 mm., width at base 0.101 mm.; eyes, length 0.059 mm., width 0.028 mm., interval 0.043 mm.; prothorax, median length of pronotum 0.123 mm., width (inclusive of coxæ) 0.213 mm.; pterothorax, greatest width 0.197 mm.; abdomen, greatest width 0.235 mm.; tube, length of segment X 0.097 mm., width at base 0.055 mm., width at apex 0.028 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ):	34	45	43	47	47	42	42	23
Width (μ):	33	27	25	27	26	23	20	12

Total length of antenna 0.323 mm.

Female, forma brachyptera.—Identical with long-winged form in all details of color and structure, save only that the ocelli are sometimes much smaller (measuring only 5 μ, instead of 9–11 μ, in diameter) and that the

wings are reduced to pads which attain the middle of the first abdominal segment.

Male, forma macroptera.—Length about 1.05 mm. (distended, 1.27 mm.). Color and structure as in macropterous female.

Male, forma brachyptera.—Identical with long-winged form in all respects save wing development, or with the ocelli smaller.

Described from 6 females (2 brachypterous) and 10 males (8 brachypterous), from Frijoles (type locality) and Barro Colorado Island, both in the Canal Zone, taken under dead grass and leaves, June 30–July 23, 1933, by Sabra J. Hook, Helen H. Hood, James Zetek, José Villaneuva, and the author.

The coloration of the legs serves for its immediate recognition.

Eupathithrips spectator, sp. nov.

Female (macropterous).—Length about 4.1 mm. (distended, about 5.1 mm.). Color dark blackish brown, nearly or quite black to the naked eye, with five pairs of prominent lateral white spote (visible only by *reflected* light) on abdomen, the first pair involving sides of segment I and extending onto segment II, the remaining pairs occupying the anterior third or more of the sides of segments IV–VII and extending onto both dorsal and ventral surfaces; tube paler at apex than at base; femora blackish brown, the fore pair with tooth yellowish brown, the middle and hind pairs shading to yellowish-brown in trochanters; fore tibiæ blackish brown at extreme base, bright lemon yellow beyond, middle and hind tibiæ blackish brown in basal third and three-fifths, respectively, yellow beyond; all tarsi bright yellow with blackish brown cups; wings light brownish, darker at base, and with a nearly black median streak extending to near tip; antennæ brown or blackish brown in segments I, II, VII, and VIII, the remaining segments largely or partly yellow, III–V successively more darkly and extensively clouded with dark brownish gray in the distal enlargement and in the constriction beyond, III more brightly yellow at extreme base than at middle, IV and V with basal third or more lightly overlain with gray, VI dark brown in more than distal half and brownish yellow basally; subhypodermal pigmentation of two colors, red and snow-white, the former appearing purplish through the dark portions of the integument, the latter situated beneath transparent portions of the integument and producing the ten white spots described above.

Head about 2.18 times as long as greatest width (measuring the latter from tip to tip of tubercles behind middle of cheeks), the width across eyes about 1.18 times the least width which is just behind eyes, the cheeks curving evenly to eyes and more abruptly to near base, in front of the basal collar almost exactly equal to width behind eyes, usually with 5 or 6 pairs of pointed setigerous tubercles (which measure 10–13 μ in length) forming a single row along exact side of each cheek, and with a dark pointed seta about 34 μ long arising from a low tubercle higher up on cheek a short distance behind eye, in addition to a number of small pale setæ above the row of tubercles; postocular setae 67 μ, short, stout, dark in color, broad-

ened at apex, their interval about 128 μ; dorsal surface of head subreticulate medially at base; vertex much reduced in size by the enlarged eyes, margined along edge of eyes by the usual dark curved setæ of which a postocellar pair (50 μ) is longest and less curved, the ocelli about 37 μ in diameter, the interval between the posterior pair 29 μ, that between median and posterior ocelli 34 μ. *Eyes* typical of the genus (i. e., reniform, greatly enlarged, strongly protruding, and finely facetted), three-eighths as long as head and about 1.57 times as wide as their interval across posterior ocelli, ventrally only slightly wider than their interval and about 0.79 as long as dorsally. *Antennæ* of normal form; lateral setæ at distal end of segments III and IV much less than half as long as sense-cones, knobbed (sense-cone on outer surface 167 μ, accompanying seta 70 μ); segment III averaging 0.94 as long as IV, the sense-cone on its outer surface much shorter than the segment itself; sense-cones on inner (and outer) surfaces of segments: III 1 (2), IV 1 (2), V 1 (1), VI 1 (1), VII 1 dorsal. *Mouth-cone* long, acute, extending beyond base of prosternum.

Prothorax along median dorsal line of pronotum about 0.45 as long as head and about 2.4 times as wide as long, with distinct black median thickening lying mostly in front of middle, epimeron and the raised posterior margin of pronotum with fine anastomosing lines, remainder smooth; all major setæ present, not stout, dark in color, and expanded at tip, the anterior marginals 72 μ, anterior laterals 67 μ, midlaterals 77 μ, epimerals 127 μ, posterior marginals 110 μ, coxals 67 μ. *Pterothorax* slightly wider than prothorax, of normal structure. *Legs* normal, fore femora and tibiæ both with low setigerous tubercles along inner surface, the fore femora with the usual distal tooth, the fore tarsi with a short downwardly-directed tooth at middle. *Wings* of the usual structure, with 40 or more accessory setæ and with the distal subbasal seta about 132 μ long.

Abdomen of normal structure, sculptured as in the other species of the genus; setæ mostly knobbed, lateral pair on VII 266 μ, on VIII 210 μ, on IX pointed and 322 μ; *tube* 0.47 as long as head, 2.3 times as long as greatest subbasal width, and 2.3 times as broad near base as at apex, sides straight, terminal setæ 266 μ.

Measurements of paratype (♀): Length about 4.09 (distended, 5.14 mm.); head, length 0.672 mm., width across eyes 0.304 mm., width just behind eyes 0.258 mm., greatest width (at basal third including tubercles) 0.308 mm., same width exclusive of tubercles 0.288 mm., least subbasal width 0.259 mm.; eyes, length 0.252 mm., greatest width 0.143 mm., interval across posterior ocelli 0.091 mm.; prothorax, median length of pronotum 0.305 mm., width (inclusive of coxæ) 0.739 mm.; pterothorax, greatest width 0.749 mm.; abdomen greatest width (at segment III) 0.658 mm.; tube, length 0.316 mm., width near base 0.137 mm., at apex 0.060 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ):	100	87	237	250	253	142	103	56
Width (μ):	65	47	57	58	49	38	32	17

Total length of antenna 1.23 mm.

Male (macropterous).—Length about 3.3 mm. (distended, 4.3 mm.). Color as in female. Head about 2.21 times as long as greatest width and 1.22 times as wide across eyes as least subbasal width; ocelli about 31 μ in diameter, interval between posterior pair 23 μ, that between median and posterior ocelli 27 μ; postocular setæ 73 μ, their interval 105 μ. Eyes three-eighths as long as head, 1.62 times as wide as their interval across posterior ocelli, ventrally 1.25 times as wide as their interval and about 0.87 as long as dorsally. *Antennæ* with segment III nearly as long as IV, the sense cone on its outer surface 140 μ, much shorter than the segment itself, its accompanying seta 63 μ. *Prothorax* proportioned as in female but with shorter setæ, the anterior marginals 47μ, anterior laterals 52 μ, midlaterals 57 μ, epimerals 93 μ, posterior marginals 73 μ, coxals 60 μ. *Fore femora* and tibiæ with setigerous tubercles minute. *Wings* with fewer accessory setæ, usually about 35, the distal subbasal seta about 93 μ. Abdomen more slender than in female; lateral setæ on VII 185 μ, on VIII 162 μ, on IX pointed and 235 μ; tube about 0.45 as long as head, about 2.4 times as long as greatest subbasal width, and not quite twice as broad near base as at apex, terminal setæ 224 μ.

Measurements of paratype (♂): Length about 3.33 mm. (distended, 4.27 mm.); head, length 0.574 mm., width across eyes 0.266 mm., width just behind eyes 0.221 mm., greatest width (at basal third and including tubercles) 0.259 mm., same width exclusive of tubercles 0.246 mm., least subbasal width 0.216 mm.; eyes, length 0.216 mm., greatest width 0.125 mm., interval across posterior ocelli 0.077 mm.; prothorax, median length of pronotum 0.241 mm., width (inclusive of coxæ) 0.580 mm.; pterothorax, greatest width 0.553 mm.; abdomen, greatest width (at segment II) 0.456 mm.; tube, length 0.269 mm., width near base 0.108 mm., at apex 0.057 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ):	80	77	200	205	202	107	97	51
Width (μ):	54	40	52	52	45	34	30	17

Total length of antenna 1.02 mm.

Nymph, Instar II.—Color cream-yellow in mesothorax, abdominal segments I and II, extreme sides of IV, all of V excepting a spot of bright red at middle, and in lateral thirds of VII, the remainder of body bright red, excepting as the pigment is overlain with the dark blackish brown integument of head, prothorax (particularly anteriorly), posterior angles of abdominal segment VIII and all of IX and X; all femora and extreme bases of tibiæ blackish brown, the remainder of tibiæ nearly white, clouded with gray distally; segments I and II of antennæ dark blackish brown, excepting distal third of II which is abruptly nearly white; III pale whitish yellow, shaded with dark brown at extreme base and with gray brown in distal sixth; IV gray brown with a pale area just beyond base, darkest just before apex, at base, and along the transverse lines of sculpture; V similarly colored but darker; VI and VII nearly uniform dark gray-brown.

Structure, in general, normal to the genus; cephalic horns (morphologically these are setigerous tubercles) present in the usual position (much

as in *Acanthothrips nodicornis*); eyes small, composed of three (possibly four) facets, of which the most posterior is borne at the end of a slight lateral process from which a thumb-shaped chitinous projection about 13 μ long extends laterally; this portion of the eye is thus briefly stalked, with the facet carried beyond the side margin of the head and protected externally by the heavy thumb-like tubercle.

Described from 22 females, 30 males, and 3 nymphs taken by the author from dead branches of various species of trees and from molding fruit of the Corozo Palm (*Scheelea zonensis* Bailey, = *Attalea cohune* Seemann, = *A. gomphococca* of lists), on Barro Colorado Island, Canal Zone (type locality), and at Porto Bello, Panamá, June 25–August 9, 1933.

Very close to *E. silvestrii* (Buffa), the only other species of the genus with short lateral setæ on the third and fourth antennal segments external to the sense cones, but abundantly distinguished by the longer third segment of the antennæ, with its shorter sense-cones, and by the differently colored tibiæ. The structure of the eye of the nymph is remarkable and unique.

Macrophthalmothrips narcissus, sp. nov.

Female (macropterous).—Length about 1.7 mm. (distended, 2.0 mm.). Color brown, with intermingled red and opaque-white subhypodermal pigmentation: By *reflected* light and in freshly-mounted specimens which have not remained too long in preservative, with a prominent white laterodorsal stripe extending from the eye to base of head and traversing the prothorax, where it is widened posteriorly; pterothorax with a pair of white spots at sides of mesonotum close to tegulæ and another larger pair between metanotum and metaepimeron, in addition to more obscure spots at middle of mesonotum, at anterior angles of mesothorax, and just behind posterior wings at the base of the fused metathoracic epimeron and episternum, sometimes with the lateral surfaces largely white because of the extension and fusion of the above markings; abdomen with segment I and sides of I–VII largely white; red pigmentation prominent in thorax and darker portions of abdomen; eyes bright red. By *transmitted* light, and in specimens which have remained longer in preservative, these white markings are not evident as such but the nearly transparent areas of the cuticula through which the white pigmentation may normally be seen show as pale yellowish markings; the sides of the body, including the head but not the tube, are thus largely yellow save for the posterior part of mesothorax and of metathorax, and the broad median portion is dark brown; head, thorax, first two abdominal segments and the last four, with much bright red pigmentation; *abdomen darkest at base and much paler distally, often shading to nearly clear yellow both dorsally and ventrally in segments VI–IX and with the median brown blotch on these segments often reduced to a small transverse subbasal cloud; base of tube sometimes yellow;* all coxæ blackish brown; middle and hind femora somewhat paler and tipped with yellowish, the hind pair paler also at base; fore femora pale yellowish white at either end, middle portion pale brownish and usually darker ventrally;

fore tibiæ yellow, with an irregular blackish ring around middle; middle and hind tibiæ similarly ringed, the latter darker basally; tarsi yellow, with brown cups; wings brownish, with a dark median streak; antennæ with segment I brown in basal half and yellowish distally, II yellow, with a dark gray cloud occupying outer portion of distal half, III yellow in basal three-fifths and clouded with gray or brown beyond, IV and V with basal two-fifths, and *VI with basal half, yellow*, the remainder of antennæ dark gray or brown.

Head about 1.43 times as long as greatest width (which is near base) and about 1.73 times as long as width across eyes, the cheeks nearly parallel in posterior portion and curving to eyes anteriorly, where they are very minutely serrulate; vertex produced, overhanging, bearing the partially obscured median ocellus below its apex, with about four pairs of strong, brown, medially-curved setæ at sides in front of posterior ocelli and a nearly straight pair (30 μ) behind them, its rounded anterior portion with a number of raised longitudinal darker lines of sculpture, the portion behind the ocelli reticulate and with 4–6 slender setæ which are shorter than the postocellar pair; dorsal surface of head, in the dark median area (which is about equal in width to the distance across eyes), with transverse anastomosing lines of sculpture, *the reticles in median portion not occupied by minute wrinkles*, the pale vitta on each side of head free of sculpture; postocular setæ 36 μ, dilated at apex, a minute pair of setæ between them equal to about a dozen scattered pairs in darkened area, and to several very inconspicuous ones in the pale vittæ and on profile of cheeks; one to three minute setæ in narrowest part between eyes. *Eyes* normal to the genus, i. e., very large, finely facetted, nearly touching dorsally (*not more than 2 μ apart*) and completely touching beneath vertex, reniform as seen from above. *Ocelli* of posterior pair with diameter about 0.86 their interval. *Antennæ* with all of segment I and more than half of II covered by eyes; *segments VII and VIII fused on dorsal surface.* Mouth-cone long and pointed *but scarcely attaining metasternum.*

Prothorax about 2.4 times as wide across coxæ as median length of pronotum, the last about 0.43 as long as head, with a deep transverse apodemal furrow very slightly behind middle, in front of which are two pairs of small round impressions, one directly in front of the other, at the inner margin of the white vitta; central dark area nearly quadrangular, *very closely transversely striate with very fine dark lines* which are *closer* together in the region behind the transverse furrow, the *interspaces usually completely devoid of sculpture*, though some occasionally with a single row of minute stipple-like dots; white vittæ marked off into polygonal reticles by faint sculpture; episternum, epimeron, and pronotum fused, no separating sutures visible; all usual setæ present, stout, pale, and dilated at tip. *Pterothorax* slightly narrower than prothorax; mesonotum transversely, metanotum longitudinally, striate with darker anastomosing lines between which the surface is minutely granulate and stippled in appearance. *Legs* short and slender, the fore femora only half as long as head, the middle tibiæ even shorter, fore tarsus unarmed. *Wings* of normal form; three subbasal

setæ almost clear, dilated at apex, about comparable with posterior marginals on pronotum; posterior margin of fore pair with 3–5 accessory hairs.

Abdomen long and slender, only 0.9 as wide as pterothorax; terga II–VII with a patch of minute spines laterad of the wing-retaining setæ, the spines arising from lines of sculpture, the patches smaller and the spines weaker on the posterior terga, those on VII just distinguishable; tube about 0.4 as long as head, about 1.9 times as long as greatest subbasal width which is slightly more than twice the apical width, sides straight; major abdominal setæ knobbed, excepting only the pointed lateral pair on VI, VII, and IX, which are respectively 79 μ, 111 μ, and 107 μ; knobbed dorso-lateral setæ on VII measuring 100 μ, on VIII 74 μ, on IX 93 μ; terminal setæ pointed, 100 μ.

Measurements of paratype (♀): Length about 1.67 mm. (distended 2.04 mm.; head, length 0.287 mm., greatest width 0.201 mm., width across eyes 0.166 mm.; eyes, length 0.157 mm., width 0.082 mm.; posterior ocelli, diameter 0.018 mm., interval 0.021 mm.; prothorax, median length of pronotum 0.123 mm., width (inclusive of coxæ) 0.313 mm.; pterothorax, greatest width 0.302 mm.; abdomen, greatest width 0.278 mm.; tube, dorsal length of segment 10, 0.117 mm., greatest subbasal width 0.062 mm., width at apex 0.030 mm. Setæ: anterior marginal 43 μ, anterior lateral 47 μ, midlateral 36 μ, epimeral 68 μ, posterior marginal 52 μ, coxal 39 μ.

Antennal segments:	1	2	3	4	5	6	7
(Length (μ):	33	50	70	66	57	56	71
Width (μ):	32	35	27	27	24	24	22

Total length of antenna 0.403 mm.

Male (macropterous).—Color and structure (including sculpture) as in female. Size much smaller, the length averaging about 1.27 mm. (distended, about 1.53 mm.), the greatest width of pterothorax about 0.234 mm.

Described from 4 females and 7 males, all taken from dead branches at Porto Bello, Panamá (type locality), July 11, 1933, by the writer, and on Barro Colorado Island, Canal Zone, July 29, 1933, by James Zetek and the writer.

In his description of *M. hemipteroides*, the only species of the genus with which this may profitably be compared, Priesner makes no reference to the sculpture of the head and pronotum and does not describe the dorso-lateral vittæ as white; but in both of these respects I am sure that his species does not differ from the present one. However, his description and figure agree in ascribing eight instead of seven, segments to the antennæ; the latter are slenderer than in *narcissus* and composed of much longer segments; and the mouth-cone is said to extend over the first third or quarter of the mesosternum. From *M. helenæ*, described below, this species differs most conspicuously in the very differently sculptured head and pronotum.

Like the other members of its genus, it is a strikingly beautiful thrips. Though rather sluggish in its gait, it is, remarkably enough, an excellent jumper; and this characteristic, which seems never to have been noted in

a member of its suborder, leads the collector at first to think it a terebrantian.

Macrophthalmothrips helenæ, sp. nov.

Female (macropterous).—Length about 1.4 mm. (distended, about 1.8 mm.). Color brown, with intermingled red and opaque white subhypodermal pigmentation. By *reflected* light and in freshly-mounted specimens which have not remained too long in preservative, with a prominent white latero-dorsal stripe extending from the eye to base of head, traversing the prothorax (where it is widened posteriorly), and extending along sides of pterothorax and abdomen to distal third of segment VII; pterothorax with a pair of white spots at sides of mesonotum close to tegulæ, another larger pair just laterad of metanotum, and a third pair just behind origin of posterior wings; abdominal segment I largely white; red pigmentation prominent in thorax and segments VII–X of abdomen; eyes bright red. By *transmitted* light, and in specimens which have remained longer in preservative, these white markings are not evident as such but the nearly transparent areas of the cuticula through which the white pigmentation may normally be seen show as pale yellowish markings; the sides of the body, including the head but not the last three abdominal segments, are thus largely yellow and the broad median portion is dark brown; head, thorax, first two abdominal segments and the last four, with much bright red pigmentation; *abdomen dark both dorsally and ventrally in segments II–IV and VIII–X*, segments V and VI paler at sides (VI more broadly so) and VII in basal two-thirds; all coxæ blackish brown; middle and hind femora blackish brown and tipped with yellowish, the hind pair more broadly so and paler also at base; *fore femora pale yellowish white throughout, save only for a small brown cloud at base;* fore tibiæ yellow, with a nearly black ring around middle; middle and hind tibiæ similarly but more darkly and broadly ringed, often somewhat shaded basally; tarsi yellow, with brown cups; wings pale brownish, with a dark median streak; antennæ with segment I largely brown and yellowish distally, II yellow, with a dark gray or brown cloud occupying at least the outer portion of distal half or more, III pale yellow in basal three-fifths and abruptly gray-brown beyond, with constricted apical portion often decidedly paler, IV and V with basal two-fifths or half pale yellow and nearly blackish brown beyond, VI usually yellow *shading* to *light* brown in distal third or more, VII + VIII blackish brown.

Head about 1.42 times as long as greatest width (which is near base) and about 1.8 times as long as width across eyes, the cheeks nearly parallel in basal two-thirds and curving to eyes anteriorly, where they are very minutely serrulate; vertex produced, overhanging, bearing the partially obscured median ocellus below its apex, with about four pairs of strong, brown, medially-curved setæ at sides in front of posterior ocelli and a nearly straight pair (23 μ) behind them, its rounded anterior portion with a number of raised longitudinal darker lines of sculpture, the portion behind the ocelli reticulate and with 4–6 slender setæ which are shorter than the post-

ocellar pair; dorsal surface of head, in the dark median area (which is about equal in width to the distance across eyes), with anastomosing lines of sculpture, the *reticles all occupied by numerous minute wrinkles,* the pale vitta on each side of head free of sculpture; postocular setæ 24 μ, dilated at apex, a minute pair of setæ between them about equal to about 9 scattered pairs in darkened area and to several very inconspicuous ones in the pale vittæ and on profile of cheeks, one or two minute setæ in narrowest part between eyes. *Eyes* normal to the genus, i. e., very large, finely facetted, nearly touching dorsally (about 5 μ apart) and completely touching beneath vertex, reniform as seen from above. *Ocelli* of posterior pair with diameter about 0.86 their interval. *Antennæ* with all of segment I and about half of II covered by eyes; *segments VII and VIII fused on dorsal surface. Mouth-cone* long and pointed, *about attaining metasternum.*

Prothorax about 2.4 times as wide across coxæ as median length of pronotum, the last nearly half as long as head, with a deep transverse furrow across middle, in front of which are two pairs of small round impressions, one directly in front of the other, at the inner margin of the white vitta; central dark area nearly quadrangular, *with rather widely-spaced anastomosing lines which form almost complete reticles, the latter all occupied by numerous stipple-like granules or minute wrinkles;* white vittæ marked off into polygonal reticles by faint sculpture; episternum, epimeron, and pronotum fused, no separating suture visible; all usual setæ present, stout, pale, and dilated at tip. *Pterothorax* about equal in width to prothorax; mesonotum transversely, metanotum longitudinally, striate with darker anastomosing lines between which the surface is minutely granulate and stippled in appearance. *Legs* short and slender, the fore femora only half as long as head, the middle tibiæ even shorter; fore tarsus unarmed. *Wings* of normal form; three subbasal setæ almost clear, dilated at apex, about comparable with posterior marginals on pronotum; posterior margin of fore pair usually with 5 (infrequently with 6 or 7) accessory hairs.

Abdomen long and slender, only 0.9 as wide as pterothorax; terga II–VII with a patch of minute spines laterad of the wing-retaining setæ, the spines arising from lines of sculpture, the patches smaller and the spines weaker on the posterior terga, those on VII just distinguishable; tube about 0.44 as long as head, about 1.9 times as long as greatest subbasal width, which is hardly twice the apical width, sides straight; major abdominal setæ knobbed, excepting only the pointed lateral pair on VII and IX, which are respectively 110 μ and 116 μ; knobbed dorso-lateral setæ on VII measuring 100 μ, on VIII 70 μ, on IX 83 μ; terminal setæ pointed, 103 μ.

Measurements of paratype (♀): Length about 1.44 mm. (distended, 1.82 mm.); head, length 0.240 mm., greatest width 0.169 mm., width across eyes 0.132 mm.; eyes, length 0.127 mm., width 0.064 mm., interval 0.005 mm.; posterior ocelli, diameter 0.018 mm., interval 0.021 mm.; prothorax, median length of pronotum 0.117 mm., width (inclusive of coxæ) 0.268 mm.; pterothorax, greatest width 0.271 mm.; abdomen, greatest width 0.247 mm.; tube, dorsal length of segment 10, 0.106 mm., greatest subbasal width 0.057 mm., width at apex 0.031 mm. Setæ: anterior

marginals 38 μ, anterior laterals 38 μ, midlaterals 34 μ, epimerals 51 μ, posterior marginals 45 μ, coxals 35 μ.

Antennal segments:	1	2	3	4	5	6	7
Length (μ):	30	47	59	63	53	51	67
Width (μ):	31	33	27	27	23	23	22

Total length of antenna, 0.370 mm.

Male (macropterous).—Color and structure (including sculpture) as in female. Size much smaller, the length averaging about 1.16 mm. (distended, about 1.44 mm.), the greatest width of pterothorax about 0.224 mm.

Described from 34 females and 3 males, all taken from dead branches on Barro Colorado Island, Canal Zone (type locality), and at Porto Bello, Panamá, July 10–August 10, 1933, by James Zetek and the writer.

Like *M. narcissus* described above, this is closely allied to *M. hemipteroides* (Priesner), from Paraguay, and may be distinguished from it by the same characters. From *narcissus* it may be known by the differently sculptured head and pronotum, the more widely separated eyes, and the differently colored abdomen, fore femora, and sixth antennal segment. The species is named after my wife, in acknowledgment of much help given over a period of several years in collecting and mounting insects of this order.

Vol. 47, pp. 83–86 March 8, 1934

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW SUBSPECIES OF THE AMERICAN ARCTIC HARE.

BY E. W. NELSON,

Research Associate, Smithsonian Institution.

In a revisionary study of the American Arctic hares, based upon a large amount of new material gathered by expeditions within comparatively recent years, I find three undescribed geographic subspecies and one having a preoccupied name requiring a change. For the opportunity to examine fine series of northern hares in the collections under their charge I take pleasure in acknowledging my indebtedness to Dr. R. M. Anderson, National Museum of Canada, Ottawa; Mr. C. M. B. Cadwalader and Mr. Wharton Huber, Academy of Natural Sciences, Philadelphia; Mr. H. E. Anthony, American Museum of Natural History, New York, and Mr. A. Avinoff, Carnegie Museum, Pittsburgh. I am also indebted to Dr. Morten P. Porsild, Danish Arctic Station, Disko, Greenland, for his friendly cooperation in securing series of specimens from southern and southwestern Greenland for the Biological Survey. These have been of prime importance in confirming relationships otherwise resting on assumption.

Lepus arcticus porsildi, subsp. nov.

Type.—From near Julianehaab, Greenland (60° 20′ N. lat.) U. S. National Museum no. 248723 adult (Biological Survey coll. no. 24637 x). Collected by Dr. M. P. Porsild, September 5, 1926.

Distribution.—Extreme southern Greenland; intergrading with *grænlandicus* a few degrees northward along west coast; extinct on east coast.

General characters.—Differs from the other subspecies of Greenland hares by smaller size, well decurved upper incisors and ordinarily with four united capule-like bony covers to upward projecting roots of molariform teeth in lower, anterior part of orbit. Size near that of typical *arcticus*

of northern Baffin Island, upper incisors similarly decurved but slenderer, less strongly grooved; zygomatic arch heavier, pit-like depression on front of outer face of jugal deeper and extending farther forward nearer front angle of zygomatic process.

Color.—Winter pelage snowy white except small black ear-tips; summer pelage during July and most of August mainly white with pale, grizzly grayish over top and sides of head and body; outside front and anterior border inside of ears the same; at times these gray areas shaded with pale buffy, strongest on head and ears.

Remarks.—Unlike typical *arcticus* the present subspecies does not become definitely gray in summer. Its range is much restricted and specimens from Sukkertoppen and elsewhere to the northward along the west coast of Greenland show complete intergradation between *porsildi* and *grœnlandicus*.

No weights or measurements in the flesh of this subspecies are available.

Specimens examined.—19 skulls, 6 skins. From near Julianehaab, 60° 20′ N. latitude, 6 skins and skulls, 60° 42′ N. lat., 10 skulls; near Neria 61° 36′ N. lat. 3 skulls. All in U. S. National Museum.

Lepus arcticus persimilis, nom. nov.

Lepus variabilis hyperboreus Pedersen, Meddelelser om Grönland, vol. 77, pp. 363–373, 1930. Applied to hare of East Greenland. Name preoccupied by *Lepus hyperboreus* Pallas, Zoographia Rosso-Asiatica, vol. I, p. 152, 1831, applied to a species of *Ochotona* of eastern Siberia.[1]

Type.—From south side of Clavering Island, east Greenland, Academy of Natural Sciences, Philadelphia, no. 13461 adult. Collected by Harry Whitney, August 6, 1930.

Distribution.—Coastal margin and adjacent islands of eastern Greenland from south of Cape Dalton, approximately 68° north latitude, to extreme north end near North-East Foreland.

General characters.—Differs from its nearest relative *grœnlandicus* of western Greenland in larger size, slenderer, more extended premaxillae and longer protruding upper incisors, broader brain case and larger bullae.

Color.—Winter pelage, pure white except small black ear-tips. Type in summer pelage, nearly all white with top of head from front of eyes to base of ears and upper cheeks pale grizzled gray produced by grayish white tips of black hairs; front of outer ear and exposed part of inside of ear largely same as top of head, but appreciably tinged with dull buffy; ears with a subterminal white band and small black tips; top and sides of shoulders and back white with scattered fine black guard hairs; an irregular patch of grizzled grayish, remaining from summer pelage, extends for several inches along middle of back; the grizzled summer fur on top of head being replaced in two small areas by short, clear white, winter fur coming in; bristles on sides of nose white.

Remarks.—When Mr. Pedersen named the east Greenland hare, he gave a general account of the animal, but designated no type nor type locality.

[1] I desire to express my appreciation of the courtesy of Dr. Lee R. Dice, who brought this preoccupied name to my attention.

In view of the variations among the hares of Greenland, it appears desirable to have the present form more definitely allocated and in proposing a new name for it, I have established a type and type locality chosen from within the general area in which Pedersen made his observations.

Specimens examined.—8 skins with skulls (all in Academy of Natural Sciences, Philadelphia); from south side of Clavering Island, 4; Francis Joseph Fiord, 3; North Fiord, 1. All from middle east Greenland.

Lepus arcticus monstrabilis, subsp. nov.

Type.—From Buchanan Bay, Ellesmere Island, northern Canada. U. S. National Museum, no. 126169, ♂ adult. (Biological Survey collection no. 3923 x) collected by J. S. Warmbath, April 21, 1901.

Distribution.—All of Ellesmere and Devon Islands and probably Axel Heiberg Island.

General characters.—Largest of the farther northern hares, with most marked extension of the premaxillae and longest, most obliquely projecting upper incisors compared with *grœnlandicus* and *persimilis* which have these characters in lesser degree.

Color.—Adults remain white throughout the year with small black ear-tips; young, according to Captain Fielden, pale gray at birth but become white like adults before end of July, except black tips of ears and a wash of mouse gray down top of head to nose which persist later.

Remarke.—The type of *grœnlandicus* came from Robertson Bay, west Greenland, at no great distance diagonally across Smith Sound from Buchanan Bay, the type locality of *monstrabilis*, yet the two animals are plainly different as shown by the comparison of considerable series of specimens from the two coasts.

Specimens examined.—Total 28: Buchanan Bay, 6; Bache Peninsula, 1; Woodward Bay, 4; N. E. Grant Land, 10; Cape Sheridan, 5; Craig Harbor, and all preceding, from Ellesmere Island, 1; Dundas Harbor, south side Devon Island, 1.

Lepus arcticus andersoni, subsp. nov.

Type.—From Cape Barrow, Coronation Gulf, Northwest Territory, Canada. National Museum of Canada, Ottawa, no. 2858, ♀ adult. Skin and skull collected by Dr. R. M. Anderson, August 14, 1915.

Distribution.—Arctic drainage of Mackenzie, Northwest Territory, from Great Slave, Artillery and Aylmer lakes to the Arctic coast, and west along the coast to Franklin Bay, also on Victoria and Banks islands and to an unknown distance on mainland eastward of Coronation Gulf.

General characters.—Summer pelage grizzled dusky gray over entire upper parts, varying from rather pale to dark much as in *labradorius*, but averaging darker. Skull larger, more heavily proportioned.

Color of type.—Top and sides of head dull, grizzled gray similar to rump except top and sides of nose dull grayish buffy and area around eyes and chin dull whitish; ears mainly black slightly grizzled with fine rather thinly scattered whitish tips to hairs and strong white margin to posterior edge, short white subterminal marginal area near tip on anterior border; under

side of head, anterior part of neck all around and flanks dull blackish gray; top of back and entire rump grizzled, rather dark gray, palest on rump; tail, feet, and most of legs, except outside of thighs, white.

Measurements of type, in flesh.—Total length 678 mm.; tail 63 mm.; hindfoot 157 mm.

Remarks.—Although no weights are available, yet the measurements of the hares from the Coronation Gulf region of northern Canada, and their large, massive skulls indicate the possibility that they may be the heaviest of the eastern group of American Arctic hares.

Specimens examined.—28, from numerous localities within range outlined above.

Cranial Measurements of Types.

(in millimeters.)

	Greatest length.	Basilar length.	Diagonal length of nasals.	Greatest width of nasals near base.	Width of rostrum over premolars.	Depth of rostrum front of premolars.	Least interorbital breadth.	Parietal breadth.	Diameter of bullae across middle.	Length of molar series.
Lepus arcticus porsildi U. S. National Museum no 248723 ad. (Biological Survey collection no. 24637 x)	99.3	74.3	41.2	20.6	25	22.8	16.4	32.8	8.2	18.5
Lepus arcticus persimilis Academy of Natural Sciences, Philadelphia, no. 13461 ad.	105.4	77.5	41	21	25.8	24.8	18	35.5	9	18.9
Lepus arcticus monstrabilis U. S. National Museum no. 126169 ad. (Biological Survey collection no. 3923 x)	107.3	78.9	40.9	20.8	25.8	25	16.4	35.1	9.2	18.5
Lepus arcticus andersoni National Museum of Canada, Ottawa, no. 2872 ♂ ad.	103	78.3	43.3	24.6	28	24.9	17	35	8.5	17.4

Vol. 47, pp. 87–90 April 2, 1934

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RACE OF LEPIDOCOLAPTES LEUCOGASTER FROM SONORA, MEXICO.[1]

BY ROBERT T. MOORE.

In May, 1933, the author collected two specimens of a dull colored woodhewer near Guirocoba in extreme southeastern Sonora. Comparison of these with large series in the Museum of Comparative Zoölogy and the American Museum of Natural History, convinced him that an undescribed race exists in southern Sonora and Sinaloa. He hesitated to describe it on the basis of two specimens. Recently two new skins have been forwarded to him by collectors in Sinaloa, and a fifth specimen has been found in a previous shipment. These confirm all the characters of the first two specimens and therefore the race is herewith described as new. My thanks are offered to Dr. Thomas Barbour and Mr. James L. Peters for placing the material in the Museum of Comparative Zoölogy at my disposal, and to Dr. Frank M. Chapman and Mr. John T. Zimmer of the American Museum of Natural History and to Dr. Alexander Wetmore and Dr. Herbert Friedmann of the Smithsonian Institution for a similar courtesy.

Lepidocolaptes leucogaster umbrosus, subsp. nov.

DARK WOODHEWER.

Type.—Male adult in breeding plumage, No. 7040, Collection of Robert T. Moore; between Guirocoba and San Jose, Sonora, Mexico; May 15, 1933; Collected by Robert T. Moore; Original No. M–B52.

Sub-specific characters.—Nearest to *Lepidocalaptes leucogaster* (Swainson), but size smaller, particularly tail; light colored portions of plumage—pileum, nape, upper back and entire under parts—whiter, and dark parts of same much blacker; greater wing-coverts grayer, about Drab.[2]

[1] Contribution from the California Institute of Technology, Pasadena, California.

[2] Capitalized names of colors in paper are taken from Ridgway, Color Standards and Color Nomenclature, 1912.

Geographical distribution.—Extreme southeastern Sonora (near Guirocoba and Muri), portions of Chihuahua (Hacienda de San Rafael, Mina Abundancia and Carmen), Sinaloa (Santa Gertrudis), and possibly Nayarit (Sierra Madre) and northern Jalisco (Sierra Bolanos).

Description of type.—Adult male, No. 7040. Pileum and hind neck between Fuscous-Black and Clove-Brown, each feather centered by a broad guttate spot of almost pure white, becoming slightly buffy white on hind neck. Back, scapulars, and lesser wing-coverts Saccardo's Umber, the upper back having the guttate spots of the pileum continued posteriorly for a short distance in narrower shaft-streaks, these margined by narrow lines of Fuscous-Black, the outer portion of each feather being Saccardo's Umber; middle and greater wing-coverts Drab; remiges between Walnut-Brown and Kaiser-Brown including their bases, but distal two-thirds of inner web of outer primary Clove-Brown, this color area decreasing on each succeeding primary; a large triangular spot of Clove-Brown near the tip of the inner webs of the secondaries, generally absent on tertiaries; rump and upper tail-coverts Hazel; rectrices Chestnut-Brown, the median rectrices including the shafts Hazel; under side of rectrices Fawn color, the shafts yellowish; superciliary stripe grayish white widening into a postocular stripe of the same color; the greater portion of the postocular and auricular region white, each feather bordered by Fuscous-Black; suborbital and malar region grayish white; chin white; throat grayish white with a faint tone of very light buffy white, the lower throat margined on each side by one or two very narrow streaks of dusky; the feathers of the extreme lower throat and malar region narrowly margined with the same; foreneck and chest grayish white or very pale buffy white, the feathers more narrowly margined with Fuscous, creating a squamate appearance; rest of under-parts similar, but the large guttate spots of the upper chest becoming more narrow posteriorly, particularly on the under-tail coverts and the blackish lines on each feather becoming submarginal instead of marginal, the feathers broadly edged with light Grayish Olive, the light Grayish Olive border on the posterior under tail-coverts occupying nearly two-thirds of each feather; under wing-coverts Pinkish Buff; posterior portion of under side of remiges Wood Brown; bend and edge of wing white with two or three fine streaks of dusky; maxilla Clove-Brown; mandible similar along tomia, but narrowly whitish along basal edge; legs and feet Blackish Brown (in dried skins). Wing 110.9; tail 88.7; exposed culmen 30.8; tarsus 19.2; middle toe minus claw 14.1.[3]

Female Adult.—Similar to male.

Male Juvenile.—Similar to adults, but dark portions of feathers of pileum, nape, upper back and under parts black; rest of back Light Brownish Olive with two or three very indistinct fine bars of black; the light mesial portion of feathers on the abdomen and under tail-coverts much more irregular and obscure.

[3]Wing is measured without flattening; tarsus is measured for this paper only from middle point of joint between the tibia and metatarsus behind to anterior edge of first divided scute, anterior to lowest undivided scute; middle toe is measured from the last point mentioned to distal end of toe, where its integument ends on base of claw. Mr. van Rossem tells me he employed the same method of measuring on the Temascaltepec birds.

Specimens examined.—Twenty-five specimens of *umbrosus* from Sonora, Sinaloa and Chihuahua; nine specimens of *leucogaster* from Temascaltepec, Puebla, Vera Cruz and Oaxaca; and thirty-two specimens from Nayarit, Jalisco, Colima, Michoacan and Guerrero.

Remarks.—The type of *Xiphorhynchus leucogaster* Swainson came from Temascaltepec not far from Mexico City. I have examined a specimen in the Smithsonian Institution collection, labelled Vera Cruz, and Mr. Adriaan J. van Rossem has kindly permitted me to use his measurements made in European museums of two specimens from the type locality at Temascaltepec. These with several others from "near City of Mexico" and Puebla may be considered topotypical material. The new race, from southern Sonora and northern Sinaloa, seems to be a well-marked form, in general considerably darker in all its browner shades, but lighter—almost white—where true *leucogaster* is buffy. The measurements of wing, tail and exposed culmen are all considerably smaller, but the greatest disparity occurs in the last two.

A note in Brewster's handwriting, at the Museum of Comparative Zoölogy proves that he detected a difference between birds from Chihuahua, and the specimen which he had seen in the National Museum from Verreaux's collection, labelled "*Picolaptes leucogaster.*" He wrote they "are considerably duller and grayer above, the back and wing-coverts being decidedly tipped with ashy, and beneath the light ground color is whiter or less buffy, the dark markings duller. These differences may be due to season . . . , however there is a marked difference in size, Mr. Frazar's besides being smaller with decidedly shorter slenderer bills." I have had under examination a much larger series of birds with considerable fresh material, the collecting dates covering all seasons of the year. Although there are undoubtedly some minor changes of color due to season, these do not account for all the dissimilarities and certainly not for the disparity in size. The type specimen was collected on May 15th by the author as it was clinging beside a hole to the under side of a large Sabina tree and its testes were greatly enlarged. I have compared it with three specimens, also collected in the middle of May, from La Laja in Jalisco. These Jalisco specimens have chins and throats much more buffy, all the lighter markings of the under-parts and head somewhat more buffy and the background of the crown and nape a lighter more snuff brown. Three specimens from Carmen in northern Chihuahua, collected in December and January, are slightly more buffy and the tail and exposed culmen average somewhat larger. Birds from farther south in Chihuahua at Mina Abundanci and Hacienda de San Rafael, although varying slightly, approximate true *umbrosus*.

It is unwise with the present paucity of data on the faunal areas of Sinaloa and states farther south to attempt to define precisely the limits of the range of this species. The author is assembling extensive new collections from this area with the expectation of publishing a report on distribution, which it is hoped will determine the faunal areas. Meanwhile it can be presumed that the range of the new race extends south along the Sierras probably as far as Nayarit and at altitudes ranging from

2000 to at least 6500 feet. Jalisco (and possibly Nayarit) seems to be an area of intermediates. The twenty-three specimens from Jalisco represent considerable individual variation, between the two forms, but none of them are true *umbrosus*. A specimen from Bolanos in northern Jalisco, although possessing a much longer bill, has the wing measurement of *umbrosus*, whereas specimens from Los Masos and one from Zapotlan in eastern Jalisco have very long wings, measuring 7 to 8 mm. longer than the type from Sonora. As would be expected, the Vera Cruz bird is the largest, possessing a wing 10 mm. longer than the type and a tail 11 mm. longer. Most of the birds from Colima, Michoacan and Guerrero are true *leucogaster*, but one or two are intermediate. The only juvenile in the sixty-six specimens of the two races examined, is a specimen taken by a collector at Santa Gertrudis in northeastern Sinaloa May 27, 1933. This bird has well-developed wings but a tail and bill only half the length of the adults. It is described above.

MALES	Wing	Tail	Exposed culmen	Tarsus	Middle toe minus claw
Breeding adult from Sonora Type of *umbrosus*	110.9	88.7	30.8	19.2	14.1
Thirteen adults from Sonora, Sinaloa, Chihuahua (*umbrosus*)	110.7	91.4[4]	31.1[5]	19.4	15.
Four adults from Temascaltepec, Mexico City, Puebla, Vera Cruz (*leucogaster*)	118.7	101.5[6]	35.2[7]	20.[8]	16.2[6]
FEMALES					
Twelve adults from Sonora, Sinaloa, Chihuahua (*umbrosus*)	107.3	85.3	32.4	19.8	15.2
Two adults from Temascaltepec, Tenango del Valle (*leucogaster*)	116.8	98.3	37.[8]	20.4	15.3

[4]Seven specimens.
[5]Twelve specimens.
[6]Two specimens.
[7]Three specimens.
[8]One specimen.

Vol. 47, pp. 91–92 April 2, 1934

PROCEEDINGS
OF THE
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BIRDS NEW TO THE KINGDOM OF SIAM OR OTHERWISE NOTEWORTHY.

BY CHARLES H. ROGERS AND HERBERT G. DEIGNAN,
Princeton Museum of Zoölogy, Princeton, N. J.

These records are all of specimens recently collected in far northern Siam by the junior author for the Princeton Museum of Zoölogy.

This first group is of forms which, so far as we know, have never before been recorded from the Kingdom.

Nyroca nyroca nyroca, ♂ im., Chiengmai, 1000 feet, 22.11.1931.
Accipiter gentilis schvedowi, ♂ im., Chiengmai (nailed to barn).
Fulica atra atra, ♂ ad., Chiengmai, 17.11.31.
Capella nemoricola, ♂, Doi Angka, 4300 feet, 13.4.31.
Delichon urbica whiteleyi, ♂ im., Chiengmai, 20.3.31.
Spizixos canifrons, ♂, Doi Chiengdao, 5000 feet, 22.12.31.
Pomatorhinus erythrogenys imberbis, ♂, ♀, Doi Chiengdao, 6800 and 4700 feet, 23 and 25.12.31.
Actinodura ramsayi ramsayi, ♀, Doi Angka, 6500 feet, 24.4.31.
Napothera brevicaudata (probably *N. b. venningi*), 2♂, juv. ♀, Doi Angka, 4900–5500 feet, 22–26.4.31.
Brachypteryx cruralis, 3♂ ad., 1♂ juv., 1♀, Doi Angka, 8400 feet, 8–24.4.31.
Geocichla sibirica sibirica, ♂ im., Doi Angka, 4400 feet, April 1931.
Muscicapula superciliaris astigma, ♂, Doi Sutep, 4200 feet, 26.2.32.
Chelidorhynx hypoxanthum, ♀, Doi Angka, 8400 feet, 24.4.31.

The following records are of forms given by E. C. Stuart Baker in "The Fauna of British India" as reaching Siam, but we know of no records of specimens taken there:

Siva strigula castanicauda, ♂, Doi Angka, 8400 feet, 8.4.31.
Rhyacornis fuliginosa fuliginosa, ♀, Doi Angka, 2800 feet, 6.4.31.
Niltava macgrigoriae, ♂, Doi Angka, 4400 feet, 6.4.31.

The following species have been known as occurring in Peninsular or southern Siam, but are new for the north:

Nettion crecca, ♀, Chiengmai, 5.12.31. (Actually the first for Siam, as the one recently recorded by Riley from Klong Rangsit, central Siam, was killed 23 days later.)

Rallina superciliaris superciliaris, ♀, Doi Angka, 4500 feet, 14.4.31.

Erolia subminuta, ♂, Chiengmai, 30.1.32.

Collocalia innominata, ♂, ♀, Doi Angka, 4400 feet, 20.4.31.

Pellorneum tickelli (apparently *P. t. olivaceum*), ♀, Doi Angka, 4400 feet, 19.4.31.

Urophlexis squameiceps, ♂, ♀, Doi Sutep, 3500 feet, 12.12.31, and 5.3.32.

Hemichelidon cinereiceps, ♂, Doi Angka, 4500 feet, 13.4.31.

P. S.—Since this paper went to press, Mr. Rodolphe Meyer deSchauensee has published (Proc. Acad. Nat. Sci. Phil., LXXXVI, p. 3, 8 March 1934) as "new to the fauna of Siam" three of the species (the *Pomatorhinus*, the *Niltava*, and the *Chelidorhynx*) we have listed above, from specimens collected by him in 1933.

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PROCEEDINGS
OF THE
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A NEW LISTROCHELUS INJURING PINUS PONDEROSA LAWSON IN THE ROCKY MOUNTAIN REGION. (COLEOPTERA: SCARABAEIDAE).

BY EDWARD A. CHAPIN.

The following species, apparently undescribed, has been twice reported as injuring the foliage of *Pinus ponderosa* Lawson. It is here characterized upon the request of Mr. C. J. Sorenson, of the Utah Agricultural Experiment Station, Logan, Utah.

Listrochelus langeri, n. sp.

Reddish castaneous, elytra with a white powdery bloom on fresh specimens. Superficially resembles *L. pulcher* Linell but has different secondary sex characteristics. Head moderately coarsely, densely and confluently punctured, transverse ridge on vertex not strongly elevated but sharply defined, clypeus moderately concave, its outer fourth sharply reflexed, very feebly sinuate at middle of anterior margin. Antenna ten-segmented. Pronotum strongly transverse, width across anterior angles noticeably less than that across posterior angles, greatest width just behind the middle, where the side margins are broadly and roundly produced. Marginal bead complete, that across anterior margin broad, that along lateral margins crenulate, surface finely and rather densely punctured except for a small median longitudinal area which is puncture free. Elytra strongly pruinose, sparsely set with short, erect hairs, very finely and sparsely punctured. Sutural interval tumid, discal costae very feeble. Underparts of thorax very densely and very finely punctured, closely set with long, silky hairs.

Male.—Antennal club half again as long as the first segment. Third visible abdominal sternite strongly swollen at middle, fourth and fifth sternites slightly concave, posterior margin of fifth with a broad V-shaped notch at middle, sixth sternite with a narrow median longitudinal groove, its posterior margin nearly straight. Pygidium sparsely and finely punctured, strongly convex, slightly depressed at middle of base, apical margin

transverse for a short distance and slightly lipped. Anterior tibia tridentate, tarsal claws slender, slightly curved, very finely serrulate, with a minute tooth near basal third.

Female.—Antennal club slightly longer than first segment. Abdominal sternites convex, not noticeably modified, sixth sternite moderately large, rounded at apex. Pygidium finely but more densely punctured than in male, convex but not strongly so, apex rounded and slightly lipped. Anterior tibia tridentate, tarsal claws with a moderately strong tooth near basal third, finely serrulate between tooth and base.

Length.—15 mm.

Type.—U. S. N. M. Cat. No. 50461.

Material examined.—Type (male) and two paratypes (females) from Uintah Mountains, 14 miles northwest of Neola, Utah, on *Pinus ponderosa* Laws., C. J. Langer; four paratypes (males) from Larkspur, Colorado, July 27, 1914, on *Pinus ponderosa* Laws., W. D. Edmonston, Hopkins U. S. No. 10957b; one paratype (male) from Luna, New Mexico, June, 1916, J. G. Crick; one paratype (male) from Colorado, without further locality, Snow, Belfrage collection; one paratype (male) from New Mexico, without further locality.

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PROCEEDINGS
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TWO NEW TERMITES FROM COSTA RICA.

BY THOMAS E. SNYDER,
Bureau of Entomology, U. S. Department of Agriculture.

Early in January, 1934, Ferd. Nevermann, of San José, Costa Rica, sent me some additional collections of termites. Two species appear to be new, which is somewhat surprising in view of Mr. Nevermann's previous intensive collecting. Descriptions of the new species, together with a list of the known termites of Costa Rica, are given herewith.

Kalotermes (Glyptotermes) bilobatus, n. sp.

Soldier.—Head light yellow, darker (yellow-brown) anteriorly, front nearly vertical, slightly concave, a deep U-shaped incision at front, with lobes prominent, elevated, and roughened. Eye spot hyaline. Two transverse rows of hairs on head. Gula narrow in middle.

Mandibles piceous, broad; left mandible with two pointed teeth near apex and a third near middle; right mandible with two larger teeth near base.

Antennae with 12 to 13 segments, third segment smaller than second or fourth, fourth and second subequal or, where antennae are 13-segmented, fourth segment shorter than second.

Pronotum about same color as head, concave anteriorly and shallowly emarginate posteriorly, posterior margin slightly serrate, with long hairs on margins.

Abdominal tergites white, with a row of long hairs at base of each tergite.

Measurements:

Length of entire soldier	8.00–9.00 mm.
Length of head with mandibles	3.50
Length of head without mandibles	2.40
Length of left mandible	1.10
Length of pronotum	0.80
Length of hind tibia	0.95
Width of head	1.50–1.60
Width of pronotum	1.50–1.60

The two elevated lobes at the front of the head are the distinguishing characters of this termite. This species is lighter in color, larger, and has more segments in the antennae, and has more prominent head lobes than *marlatti* Snyder.

Type locality.—Hamburg Farm, Costa Rica. Described from three soldiers collected with nymphs in dry log at the type locality, 1, V, 1933, by F. Nevermann.

Cotypes.—Soldiers, U. S. National Museum, Catalog no. 50213.

Anoplotermes (Anoplotermes) pyriformis, n. sp.

Winged adult.—Head castaneous brown, with dense long hairs. Fontanelle large, hyaline, pear-shaped, not quite so large as an ocellus. Postclypeus yellow-brown, three times as broad as long. Eyes black, not round, close to lateral margin of head. Ocelli hyaline, suboval, projecting, separated from eye by a distance less than the diameter of an ocellus.

Mandibles reddish brown at margin.

Antennae with 15 segments, third segment shorter than second or fourth.

Pronotum slightly lighter in color than head, shallowly emarginate posteriorly, with dense long hairs.

Wings gray, costal area yellow-brown, tisue finely punctate and hairy, in fore wing median branches to apex, slightly above center of wing, nearer to cubitus than to subcosta.

Abdominal tergites gray-brown, with dense long hairs.

Measurements:

Length of entire female winged adult	10.50–11.00 mm.
Length of entire male winged adult	10.00–10.50
Length of entire female dealated	6.00
Length of entire male dealated	5.00– 5.50
Length of head	1.20
Length of left mandible	0.60
Length of pronotum	0.60
Length of hind tibia	1.00
Length of anterior wing of female	9.00
Long diameter of eye	0.25
Width of head (at eyes)	0.95– 1.00
Width of pronotum	0.70
Width of anterior wing of female	3.20

The hyaline, large, pear-shaped fontanelle characterizes this termite. The fontanelle is larger than in *punctatus* Snyder.

Type locality.—Hamburg Farm, Costa Rica. Described from a series of winged adults collected at light, 25, IX, 1930, by F. Nevermann.

Cotypes.—Winged adults, U. S. National Museum, catalog no. 50214.

List of Termites from Costa Rica.

Family Kalotermitidae.
- *Kalotermes:*
  - (*Neotermes*):
    - *brevinotus* Snyder.
    - *castaneus* Burm.
    - *holmgreni* Bks.
  - (*Kalotermes*):
    - *contracticornis* Snyder.
    - *snyderi* Light.
  - (*Rugitermes*):
    - *costaricensis* Snyder.
    - *kirbyi* Snyder.
  - (*Calcaritermes*):
    - *asperatum* Snyder.
    - *emarginicollis* Snyder.
    - *fairchildi* Snyder.
  - (*Cryptotermes*):
    - *brevis* Walker.
    - *cavifrons* Bks.
    - *dudleyi* Bks.
  - (*Glyptotermes*):
    - *angustus* Snyder.
    - *bilobatus* Snyder.
    - *marlatti* Snyder.
    - *nevermani* Snyder.
    - *planus* Snyder.
    - *suturis* Snyder.

Family Rhinotermitidae.
- *Heterotermes tenuis* Hagen.
- *Coptotermes niger* Snyder.
- *Prorhinotermes molinoi* Snyder.

Family Termitidae.
- *Cornitermes* (*Cornitermes*) *acignathus* Silv., subsp. *costaricensis* Snyder.
- *Armitermes:*
  - (*Armitermes*) *chagresi* Snyder.
  - (*Rhynchotermes*) *major* Snyder.
- *Nasutitermes* (*Nasutitermes*):
  - *columbicus* Holmgren.
  - *cornigera* Motsch.
  - *ephratae* Holmgren.
  - *pilifrons* Holmgren.
  - *rotundatus* Holmgren.
- *Anoplotermes* (*Anoplotermes*):
  - *linearis* Snyder.
  - *pyriformis* Snyder.
- *Cylindrotermes macrognathus* Snyder.
- *Mirotermes* (*Mirotermes*) *panamaensis* Snyder.
- *Capritermes* (*Neocapritermes*) *centralis* Snyder.
- *Microcerotermes* sp.

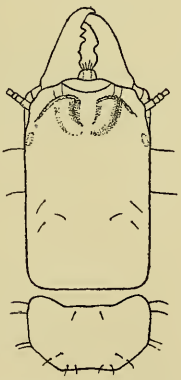

Fig. 1. *Kalotermes* (*Glyptotermes*) *bilobatus* Sny. *Soldier.* Dorsal view of head and pronotum to show the two elevated lobes. Enlarged 12 times. Drawn by Mr. H. B. Bradford.

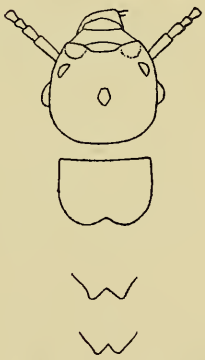

Fig. 2. *Anoplotermes* (*Anoplotermes*) *pyriformis* Sny. Winged adult. Dorsal view of head and thorax. Enlarged 18 times. Drawn by Mr. H. B. Bradford.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW GENUS AND SPECIES OF DUNG-INHABITING SCARABAEIDAE FROM PUERTO RICO, WITH NOTES ON THE COPRINAE OF THE GREATER ANTILLES (COLEOPTERA).

BY EDWARD A. CHAPIN.

Until 1930, when the writer described as new a small member of the Coprinae, Puerto Rico was not known to harbor a single species of this subfamily of the Scarabaeidae. Since that time, through the interest and labors of Mr. R. G. Oakley, two further species of this group from the same island are now available for study. These two species, one apparently new, are congeneric, though rather dissimilar in general appearance. There seems to be no available genus for their reception.

Canthochilum, new genus.

Related to both *Canthon* Hoffmansegg and *Bdelyrus* Harold and differentiated from either of these by the formation of the labial palpi; further, from the first by the elevation of the seventh elytral stria into a sharp carina which is lateral in position, and from the second by the structure of the head and lateral portion of the elytron. In both *Canthon* and *Bdelyrus* the first segment of the labial palp is noticeably larger, both in length and breadth, than the second. In *Bdelyrus* the carina of the seventh stria is complete to the apical angle and the carina of the eighth is short and curved, ending before the middle of the length. In *Canthochilum* the carina of the seventh ends abruptly at the apical fourth and it is the carina of the eighth that reaches the apex.

Clypeus quadridentate, the teeth small and acute, the central interval slightly greater than either of the lateral intervals. Superior portion of eye comparatively large. Antenna nine-segmented. Terminal segment of maxillary palp elongate fusiform. Labial palp with second segment nearly as broad as long and larger than either first or third, third (terminal) segment cylindro-acuminate. Pronotum with marginal bead strong laterally and exceedingly fine both anteriorly and posteriorly, posterior

angles evident but obtuse. Prothoracic pleura with strong transverse carina, excavate before this carina for the reception of the anterior femora. Scutellum not visible. Elytra faintly but distinctly striate, striae strongly impressed apically, intervals flat, seventh stria cariniform and lateral, eighth (?) stria cariniform and located on the apparently broad epipleura. Anterior tibia broadened apically, minutely serrulate along external margin, apex truncate as in *Caccobius* Thoms., lateral teeth three in number, spur blunt at tip, somewhat curved, as long as anterior tarsus. Middle and posterior tarsi slender but gradually enlarged as in most *Canthon* Hoffm., middle with two spurs, posterior with one. Tarsi strongly compressed, fifth segment elongate, claws small, simple and strongly curved.

Genotype.—Canthochilum oakleyi, n. sp.

This genus is also suggestive of *Deltochilum* Eschscholz in the way that the elytral striae terminate in pits at the apex of the elytron and in the very faint indication of a median discal boss on each elytron in one species.

Canthochilum oakleyi, n. sp.

Black, legs dark castaneous, antennae and mouth-parts pale piceous. Upper surface minutely shagreened, head and pronotum set with very fine punctures (visible on strong light with magnification of 20 diameters) sparsely but regularly distributed. Clypeus with four acute teeth, the inner pair longer than outer, each with a fine tuft of hairs above and below. Front angle of each gena also acute, as in the sexdentate species of *Canthon*. Superior portion of eyes large, separated by more than twice their greatest diameters. Pronotum transverse, broadly curved at base, sides parallel in basal two thirds, apical thirds strongly converging, anterior margin deeply and semicircularly cut out for reception of head, on under side deeply excavated in anterior half for reception of front femora, the excavation bounded posteriorly by a strong carina. Elytra more strongly shagreened, closely adjusted to the posterior border of the pronotum, finely striate, the first four striae (from suture) ending in deep pits at apex of elytron, seventh stria complete and margined in basal three-fourths by the lateral cariniform margin. Eighth stria also complete and located on the inflexed portion and margined by a carina which is complete to apical angle of elytron. Under surface nearly smooth, abdominal sternites closely crowded together along the median line, third and fourth each with a low, shining tubercle near lateral margin, pygidium subtriangular, strongly beaded along margin, basal margin feebly angulate adjacent to termination of elytral suture, apical margin very broad. Femora stout, anterior with a narrow ala along front margin which fails to reach apex, middle with an arcuate emargination on posterior margin near apex. Tibiae slender, somewhat bent and suddenly enlarged in apical fourth, the enlarged portion bearing three lateral teeth and a single stout tooth on under side just above the insertion of the tarsus, middle and posterior tibiae slightly bent and gradually enlarged. Anterior tarsus nearly bare, middle and posterior densely setose. Length 7.5 mm.

Type.—U. S. N. M. Cat. No. 50519.

Type locality.—Adjuntas, Puerto Rico.

Material examined.—Two specimens, apparently males, collected by Mr. R. G. Oakley at Principi Finca, Adjuntas, Jan. 19, 1934, under dung.

Canthochilum histeroides (Harold).

Canthon histeroides Harold, 1868, Coleop. Hefte, vol. 4, p. 80.

Lately Mr. Oakley has collected at Ponce and Adjuntas a series of a second dung-inhabiting scarab that satisfies in every particular the short description of *Canthon histeroides* Har. His collections are as follows: One specimen from Adjuntas, Mar. 24, 1933, one from the same place Apr. 18, 1933, four from Pietri Finca, Adjuntas, Jan. 4, 1934, and twenty-five from Wersching Finca, Ponce, Jan. 23, 1934, all in or under dung. Harold's description, though brief, makes a point of the broad elytral epipleura with a single longitudinal carina. That is a fair description of the condition which obtains in *Canthochilum* but does not at all fit any species of *Canthon* known to the writer.

This species, with two others, *gundlachi* and *pygmaeus*, were described by Harold as coming from Cuba. No collector is mentioned so it is impossible to state definitely that they reached Harold through Gundlach. So far as I am able to ascertain, no one of the three has since been collected in Cuba. In 1930, the writer described as *Canthonella parva*, new genus and new species, a series of individuals from Puerto Rico and at that time compared it with *Canthon pygmaeus* Harold. Certain differences between the specimens at hand and the original description of *C. pygmaeus* were pointed out as justification for a new name.

Canthochilum gundlachi (Harold).

Canthon gundlachi Harold, 1868, Coleop. Hefte, vol. 4, p. 80.

Though I have seen nothing that at all favorably compares with the description, I do not hesitate to refer this species to *Canthochilum*. Thus the list of *Canthonides* from the Greater Antilles now stands:

Canthon callosus Harold	Haiti.
" *signifer* Harold	Haiti.
" *violaceus* Olivier	Haiti.
Canthonella parva Chapin	Puerto Rico
" *pygmaea* (Harold)	Cuba.
Canthochilum oakleyi, n. sp.	Puerto Rico.
" *histeroides* (Harold)	Cuba, Puerto Rico.
" *gundlachi* (Harold)	Cuba.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW PIKA (MAMMALIAN GENUS OCHOTONA) FROM CENTRAL NEVADA.

BY E. RAYMOND HALL.

(*Contribution from the Museum of Vertebrate Zoology, University of California.*)

Study of specimens of the genus *Ochotona* from the higher mountain ranges of central Nevada shows the existence there of a new subspecies which may be named and characterized as follows:

Ochotona princeps tutelata, new subspecies.

Type.—Male, adult, skin and skull; no. 58519, Mus. Vert. Zool.; Monitor Mountains, Greenmonster Canyon, 8150 feet, Nye County, Nevada; July 15, 1933; collected by W. C. Russell; original no. 3101.

Range.—Monitor, Toquima and Toyabe mountains in central Nevada.

Diagnosis.—Size: Medium (see measurements). Coloration: Intermediate between that of *Ochotona princeps muiri* and *Ochotona princeps cinnamomea.* Skull: Small; deep; dorsal outline highly arched in longitudinal axis; nasals straight sided; palatal bridge short.

Comparisons.—*O. p. tutelata* is structurally more similar to *O. p. cinnamomea* and *O. p. muiri* than to other described races of *Ochotona.* Compared with topotypes of *cinnamomea* on the one hand and *muiri,* from Heather Lake, Eldorado County, California, on the other, *tutelata* is found to be exactly intermediate when in fresh July pelage and nearer *muiri,* by a slight degree, when in worn winter pelage. From each of these two races, *tutelata* differs in having a skull of greater depth, lesser average length and breadth and, save in specimens from the Toyabe Mountains, a shorter palatal bridge. This greater depth of the skull, as measured perpendicularly to a plane touching the tips of the incisors and ventral margins of the tympanic bullae, amounts to more than 39 per cent of the occipitonasal length in each of the three populations of *tutelata* and less than 39 per cent in *muiri* and *cinnamomea.* The greater longitudinal convexity of the dorsal outline of the skull of *tutelata* is a feature constantly

separating it from *muiri* and *cinnamomea* when specimens of equal age are relied upon.

From *O. p. cinnamomea*, *tutelata* differs also in having the lateral margins of the nasals straight rather than constricted near the middle and in having the foramen magnum smaller and the supraoccipital bone of correspondingly greater depth. Stated in another way, in *cinnamomea* the foramen magnum is larger, relative to the area of the occiput, and the supraoccipital bone is reduced in size.

Remarks.—In his "Revision of the American Pikas" (N. Amer. Fauna no. 47, p. 47, 1924) Howell has identified specimens from the Toyabe Mountains of central Nevada as *Ochotona schisticeps cinnamomea*—as I see it, a justifiable identification considering the limited amount of material then available to him of the geographic race now named *tutelata*. The use here of the specific name *princeps* rather than *schisticeps* is in accord with the conclusions arrived at by Borell (Jour. Mammalogy, vol. 12, p. 307, 1931).

The pikas in each of the three mountain ranges from which *tutelata* is known are isolated from those in each of the other ranges, and probably have been so isolated for a long period of time. On this account one might expect to find considerable difference between these three populations, but actually they are closely similar. It is true that the animals from the Toyabe Mountains have a broader (anteroposteriorly) palatal bridge than those from the Monitor and Toquima mountains. However, the other differences noted are of an "average" sort and are of slight amount.

Specimens examined.—Total number, 40, all from Nye County, Nevada, as follows: *Monitor Mountains:* Greenmonster Canyon, 8100 to 8200 ft., 10. *Toquima Mountains:* S. W. slope Mt. Jefferson, 8700 ft., 15; 9500 ft., 1; 10600 ft., 2; 11000 ft., 1. *Toyabe Mountains:* Arc Dome, 5 (coll. U. S. Biol. Surv.); South Twin River, 4 (coll. U. S. Biol. Surv.); Mohawk Cañon, 2.

Average, minimum and maximum measurements, in millimeters, of *Ochotona princeps tutelata.*

Locality	Total length	Length of hind foot	Occipitonasal length	Zygomatic breadth	Breadth of brain case	Interorbital breadth	Breadth of palatal bridge	Length of nasals	Number of adults averaged
Monitor Mts.	170	28.7	40.3	19.8	17.1	5.1	1.4	12.9	9
	155–190	28–30	38.1–41.8	19.3–20.7	16.5–17.8	4.8–5.5	1.2–1.7	12.4–13.4	
Toquima Mts.	171	28.4	41.5	20.1	17.4	5.1	1.5	13.5	17
	160–181	26–30	39.9–42.6	19.5–20.6	16.6–18.0	4.6–5.4	1.4–1.8	13.1–14.3	
Toyabe Mts.	181	28.0	41.5	20.4	17.3	5.0	2.0	13.9	6
	173–185	27.5–29	40.9–42.0	20.2–20.6	16.5–17.5	4.8–5.1	1.8–2.1	13.6–14.1	

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW RICE RAT (*ORYZOMYS*) FROM SONORA, MEXICO.[1]

BY WILLIAM HENRY BURT.

A collection of mammals made by Mr. Chester C. Lamb in Sonora, Mexico, and recently acquired by the California Institute of Technology, contains a small series of rice rats which are quite unlike any previously known form. With due consideration of the amount of variation found in this group of rodents the Sonora specimens were compared with series of *Oryzomys couesi mexicanus* Allen and *O. peninsulae* Thomas from Escuinapa, Sinaloa, and San José del Cabo, Lower California, respectively, and were found to differ appreciably from both of these forms. It is a pleasure to perpetuate the name of Mr. Lamb in this well-marked race as slight recognition of the valuable contributions he has made, as a collector, to our knowledge of the vertebrates of northwestern Mexico. The Sonora rice rat may be known as

Oryzomys couesi lambi, subsp. nov.

Type.—Female adult, skull and skin; no. 51024, collection of California Institute of Technology; San José de Guaymas, Sonora, Mexico; January 20, 1933; collected by Chester C. Lamb; original no. 17198.

Measurements.—Type: total length, 225 mm.; tail vertebrae, 112; hind foot, 28. Skull: greatest length, 30.4; zygomatic breadth, 16.3; interorbital constriction, 4.6; width of brain case, 11.7; nasals, 12.1; anterior palatine foramina, 6.4; palatal bridge, 5.6; upper molar series, 5.0. Average measurements of four adults, including type: skin, 227; 113; 29. Skull: 30.4; 16.3; 4.6; 11.6; 11.9; 6.2; 5.4; 4.8.

Characters.—A short-tailed, dark-colored rice rat with weak jugals. General color of upperparts grayish brown lightly interspersed with warm buff on back and rump; cheeks grayish; underparts white, hairs plumbeous at bases even on chin and throat; tail brown above, slightly paler below

[1] Contribution from the California Institute of Technology.

near base. Skull light with weak jugals. Differs from *O. c. mexicanus* in dark grayish brown instead of ochraceous-buff coloration, in actually and relatively much shorter tail, weaker jugals, and more widely spreading pterygoids. Differs from *O. peninsulae* in smaller size (proportion of tail and body about the same), darker coloration, less angular skull with weaker jugals and lateral wings of parietals not extending as far below temporal ridges.

Remarks.—Aside from the extreme difference in coloration, the chief morphological character distinguishing *lambi* from *mexicanus* is the relatively shorter tail. In four specimens of *lambi* and ten specimens of *mexicanus* the average lengths of head and body are the same, 114 mm., but the average lengths of the tail vertebrae are 113 mm. in *lambi* and 137.4 mm. in *mexicanus*. Taking the length of head and body as 100 per cent we get a value of 99.12 per cent for the tail in *lambi* and 120.5 per cent for the tail in *mexicanus*.

This extends the known range of the genus *Oryzomys* northward along the Pacific Coast of the mainland of Mexico over 400 miles. The northern record previously published being Mazatlan, Sinaloa (Goldman, North Am. Fauna, no. **43**, 1918 : 35).

For loan of comparative material I wish to thank those in charge of the collections at the American Museum of Natural History and the Museum of Vertebrate Zoology.

Specimens.—Four, all from the type locality and all adults with well worn teeth.

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TWO NEW WOODRATS FROM LOWER CALIFORNIA, MEXICO.

BY ROBERT T. ORR,
Museum of Vertebrate Zoology, Berkeley, California.

A study of the genus *Neotoma* as represented by specimens in the collection of the Museum of Vertebrate Zoology convinces the writer of the existence of two well-marked geographic forms which have not heretofore been recognized. One of these is a race of *Neotoma* (*Neotoma*) *lepida* Thomas, the other a race of *Neotoma* (*Homodontomys*) *fuscipes* Baird. The measurements here given are to be compared with those given by Goldman (N. Amer. Fauna, no. 31, 1910).

Neotoma lepida egressa, new subspecies.

Type.—Adult male, skin and skull; no. 50142, Mus. Vert. Zool.; one mile east of El Rosario, 200 feet altitude, Lower California, Mexico; collected December 26, 1930, by Chester C. Lamb; original no. 13344.

Range.—Coastal region of northwestern Lower California from latitude 31° N. south at least to El Rosario, latitude 30° 03′ N.

Diagnosis.—Size, large in comparison with *Neotoma l. intermedia* or *N. l. felipensis;* color, varying from that of *intermedia* to a tone somewhat paler; skull large with a relatively long slender rostrum and large auditory bullae.

Measurements and weights.—The average and extreme measurements in millimeters of ten adult males from El Rosario, Socorro and San Telmo are as follows: Total length, 344.7 (325–360); tail vertebrae, 157.3 (145–171); hind foot, 34.5 (32–36); basilar length, 37.2 (35.7–39.0); zygomatic breadth, 23.4 (22.2–24.4); interorbital breadth, 5.7 (5.4–5.9); length of nasals, 17.4 (16.6–18.7); length of incisive foramina, 9.6 (9.1–10.5); length of palatal bridge, 7.7 (7.2–8.1); alveolar length of upper molar series, 8.9 (8.4–9.4).

The average and extreme weights in grams of the above ten adult males are 203.5 (117.5–239.0).

Remarks.—The outstanding feature distinguishing *egressa* from all

bordering races is its large size. The specimens from El Rosario are most typical and possess extremely long slender rostra, a character which is not so strongly marked in specimens from farther north along the coast. In respect to color *egressa* may be looked upon as showing evidence of intergradation between the dark coastal *intermedia* and the pallid desert subspecies *felipensis*, although it most nearly resembles the former, equalling it sometimes in dark coloration.

Specimens examined.—A total of 30 from the following localities in Lower California: Colnett, latitude 31° N., 4; San Telmo, 600 feet, 10; San Ramón, mouth of Santo Domingo River, 1; Santo Domingo, 25 feet, 1; Arroyo Nuevo York, 200 feet, 15 miles south of Santo Domingo, 4; Socorro, 20 miles south of San Quintín, 4; 1 mile east of El Rosario, 200 feet, 6.

Neotoma fuscipes martirensis, new subspecies.

Type.—Adult male, skin and skull; no. 35850, Mus. Vert. Zool.; Valladares, altitude 2700 feet, Sierra San Pedro Mártir, Lower California, Mexico; collected April 15, 1925, by A. E. Borell and C. C. Lamb, original no. 1419 A. E. B.

Range.—The Sierra San Pedro Mártir region of Lower California and adjacent west coast north approximately to latitude 32° N.

Diagnosis.—Size small; color similar to that of *N. f. macrotis* but with greater amount of ventral pigmentation; skull lacking angularity; rostrum not noticeably arched, although depressed; when viewed from the side, dorsal outline of diastema relatively straight; auditory bullae large.

Measurements and weights.—The average and extreme measurements in millimeters of seven adults from the Sierra San Pedro Mártir of Lower California are as follows: Total length, 362.1 (335–390); tail vertebrae, 170.9 (156–190); hind foot, 36.0 (33–39); basilar length, 37.1 (36.1–38.8); zygomatic breadth, 23.1 (22.3–24.3); interorbital breadth, 5.6 (5.4–5.8); length of nasals, 17.8 (16.6–19.2); length of incisive foramina, 9.7 (9.3–10.3); length of palatal bridge, 7.8 (7.5–8.4); alveolar length of upper molar series, 8.6 (8.1–9.1).

The average and extreme weights in grams of the above seven specimens are 220.9 (186–260).

Comparison.—When compared with a series of topotypes of *Neotoma fuscipes macrotis*, *martirensis* is seen to differ in the following respects: Size smaller; extent of ventral pigmentation greater, with the terminal bands of the hairs nearest Light Vinaceous-Cinnamon (after Ridgway's Color Standards and Color Nomenclature, 1912) rather than buffy; skull smaller and less angular; rostrum less arched; highest part of skull, at anterior parietal region rather than at naso-frontal junction; incisor slightly more procumbent; outline of diastema relatively straight rather than arched; auditory bullae proportionately larger. [See figs. 1, 2.]

Remarks.—Specimens from Las Cruces, east of Ensenada, resemble *martirensis* as regards ventral pigmentation, small size, absence of angularity of skull, and in possession of proportionally large bullae. However, the rostrum in these individuals is slightly more elevated and rounded, and the

incisors are more incurved than in specimens from the San Pedro Mártir region. Four juvenals from the Sierra Juárez appear, in cranial characters, to be intermediate between *macrotis* and *martirensis*, but in coloration approach nearer to topotypes of *macrotis* of similar age. Hence these specimens are tentatively placed with *macrotis*.

Specimens examined.—A total of 23 from the following localities in Lower California: Valladares, 2700 feet, 3; Aguaje del Sauce, 2600 feet, 6 miles northwest of Valladares, 2; La Grulla, 7200–7500 feet, Sierra San Pedro Mártir, 8; Vallecitos, 8500 feet, Sierra San Pedro Mártir, 1; San José, latitude 31° N., 2300–2500 feet, 5; Concepción, 6000 feet, Sierra San Pedro Mártir, 1; Santo Domingo, 25 feet, 1; Las Cruces, 2600 feet, 20 miles east of Ensenada, 2.

Fig. 1. *Neotoma fuscipes macrotis*, adult male, no. 3132, Mus. Vert. Zool.; San Diego, San Diego Co., Calif. ×1

Fig. 2. *Neotoma fuscipes martirensis*, type, adult male, no. 35850, Mus. Vert. Zool.; Valladares, 2700 feet altitude, Sierra San Pedro Mártir, Lower California. ×1

Note in *martirensis* the straighter outline of rostrum and diastema, the highest part of the skull at the anterior parietal region, and the more procumbent incisors, as compared with *macrotis*.

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NOTES ON PHILARONIA ABJECTA UHLER (HOMOPTERA: CERCOPIDAE).

BY E. D. BALL,
University of Arizona, Tucson.

Stearns in 1923 reported this species for N. C., but upon later request could not remember the source of the material. The writer in reviewing the group (1928) in view of the lack of known material suggested that this reference was probably based upon erroneous determination of *Lepyronia angulifera* Uhl., a similarly colored species occurring in the southeastern region. Recently in an attempt to straighten out distribution in a related group, the writer, through the kindness of Dr. Z. P. Metcalf, was able to examine two examples of this species, from the collection of the N. C. St. Dept. of Agr. One was a typical female labeled Linville Falls, N. C., E. June 1910 (4000 ft. F. Sherman). The other a male of var. *provana* Ball, labeled Blowing Rock, N. C. 9–10–1912. These two examples definitely establish the occurrence of this species in at least one area in this region.

In 1929 Walley described as *Philaenus canadensis* n. sp. an insect from Ontario that from the description is certainly *Philaronia abjecta* var. *provana* Ball. This species was known to be sparingly distributed from Alaska to Northern Arizona and eastwards through Colorado and the Black Hills region to Montana. These later records establish its occurrence in Ontario and in an isolated area in the mountains of North Carolina and suggest that it should be looked for in favorable situations in the northeastern region, especially in the Adirondacks and White Mountains.

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ONE NEW GENUS AND THREE NEW RACES OF BIRDS FROM THE MALAY REGION.

BY J. H. RILEY.[1]

While working on Dr. Hugh M. Smith's Siamese collections, I have reached the conclusion that the following genus and three races of birds should be separated from the forms with which they have been associated. They may be known from the following descriptions:

Chalcocomus, gen. nov.

Type and only species.—*Acomus inornatus* Salvadori.

Similar to *Houppifer* Gúerin-Méneville (type *Phasianus erythropthalmus* Raffles), but the bare skin on the sides of head more restricted and not produced into an erectile flap in front; upper tail-coverts extending nearer to the tip of the tail; wing tip shorter; feet slenderer; middle toe and claw proportionally longer. Coloration quite distinct; males entirely black with metallic purplish blue tips to the feathers of the upper parts and chest; females chestnut with tawny-olive or buffy brown centers to the feathers. Confined to the island of Sumatra.

Harpactes erythrocephalus chaseni, subsp. nov.

Type, adult male, U. S. National Museum, no. 149749, Semangko Pass, 2700–4000 feet, Selangar-Pahang Border, February 14, 1904.

Similar to *Harpactes erythrocephalus erythrocephalus* of northern Siam, but smaller and darker above; the red on the pileum and throat darker and duller and on the remainder of the lower parts less intense; wing coverts duller. Wing 136; tail 163; culmen 19 mm.

Remarks.—While I have had for examination only a male and female from the mountains of the Federated Malay States for examination, the series from northern Siam has been ample, consisting of seven males and one female. Chasen and Kloss (Journ. Siam Soc. Nat. Hist. Suppl., vol. 8, no. 4, 1932, p. 234) have noticed the above differences also, but erroneously supposed the Malay States form represented *erythrocephalus.* Gould

[1] Published with the Permission of the Secretary of the Smithsonian Institution.

described *Trogon erythrocephalus* from Rangoon, Burma, and northern Siamese specimens would logically belong to it rather than to a race hundreds of miles away with unsuitable intervening country between for the species to inhabit. Specimens of *Harpactes erythrocephalus flagrans* from Sumatra, I have not seen, but Robinson (Birds Malay Peninsula, vol. 2, 1928, p. 75) says it is smaller and brighter than the mainland bird.

Cyanops franklini trangensis, subsp. nov.

Type, adult female, U. S. National Museum, no. 160236, Kao Nom Plu, 3000 feet, Trang, Peninsular Siam, February 22, 1897. Collected by Dr. W. L. Abbott.

Similar to *Cyanops franklini ramsayi* of northern Siam, but with a larger, heavier bill; the crown spot and throat a more golden yellow; the supra-auriculars, auriculars, sides of neck and jugulum darker and duskier; above and below a darker green. Wing 98; tail 60; culmen 28 mm.

Remarks.—Dr. Abbott collected two males and three females from the mountains of Trang. These have been compared with six males and ten females from northern and western Siam. There does not appear to be any difference in the sexes in color or size, except in the series measured the females have on the average slightly larger bills.

The two males and three females from Trang measure: wing 98–101 (99); tail 55–61 (59); culmen 26–28 (27).

Six males and nine females from northern and western Siam measure: wing 97–105.5 (100); tail 55–63 (59.5); culmen 22–27 (24.5).

Cyanops franklini minor Kloss and Chasen of the Federated Malay States is smaller than *ramsayi* and consequently smaller than *trangensis.* Two males and one female of *minor* in the United States National Museum measure: wing 88–93.5 (91); tail 59.5–64 (61.5); culmen 20.5–21.5 (21).

It seems strange that a form coming from an intermediate locality should have a larger bill than either that to the north or south of it.

Anthreptes rhodolaema aenea, subsp. nov.

Type, adult male, United States National Museum, no. 182,632, Labuan Klambu, Dutch East Borneo, June 25, 1913. Collected by H. C. Raven (original no. 883).

Similar to *Anthreptes rhodolaema rhodolaema* from the Malay Peninsula, but head and mantle a bright coppery green without any lilac purple reflections; the cheeks, the median and greater wing coverts and the scapulars with more pronounced morocco red edgings. Wing 70; tail 44.5; culmen 17 mm.

Remarks.—Captain G. E. Shelley described *Anthreptes rhodolaema* (*Monograph nectariniidae,* part 7–8, June, 1878, p. 313) from Malacca and Sumatra. I would designate Malacca as the type locality of the species. Dr. W. L. Abbott collected two males of this form in Trang, Peninsular Siam. Mr. H. C. Raven collected six males and three females at Labuan Klambu, Dutch East Borneo. The two Trang males have a strong lilac purple iridescence to the head and mantle; this is entirely lacking in

the Bornean series, except in two and in these it is faint and lacking from the crown and forehead. The series from Trang is too small to show whether there is an average difference in size. The three females from Borneo I am unable to compare with this sex from the Malay Peninsula. I do not believe Shelley's description of the female is correct. The three Bornean females are quite different from the same sex of *A. celebensis*. They are more yellowish above (light yellowish olive) and the tails are not so dark and are more strongly edged with the color of the rump; the Bornean females below are a much deeper yellow, with a yellowish citrine wash on the chest and flanks and becoming citron yellow on the middle of the abdomen.

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A NEW TRUMPETER FROM BRAZIL.

BY H. B. CONOVER.

A few months ago I received a collection of birds from the Rio Tapajós. Among this lot were a number of specimens of *Psophia* from both sides of the river. The examples from the right bank, however, proved to be quite different from those taken on the left side, and also different from a specimen from Utinga near Belem, which should be typical of *Psophia obscura*. One of those from the right bank of the Tapajós was sent to Dr. C. E. Hellmayr in Austria, who kindly compared it with the type and two other specimens of *obscura* in the Vienna Museum, as well as with two specimens of *viridis* from the Rio Madeira. He reported that the specimen from the right bank of the Rio Tapajós was quite different, and undoubtedly a new form.

As far as known, these are the first specimens of *Psophia* to be recorded from the region between the Tocantins and the Tapajós. The birds from the left bank of the Tapajós have been compared with specimens from the Rio Madeira and prove to be typical *P. viridis*. The new form, however, has some characteristics in common with *viridis* and others with *obscura*. Therefore, these two can no longer be maintained as species.

A single bird in the writer's collection from the Rio Cumarapy (Camaraipi), Pará, while closer to *obscura* than to the new form, shows the transition between the two. The elongated scapulars and tertials are considerably lighter brown than in *obscura* and lack the greenish reflections. They lack also the dusky vermiculations of the new subspecies. The apical spots on the greater upper wing coverts are blue as in *obscura*.

The new form may be known as

Psophia viridis dextralis, subsp. nov.

Type from Tauary, Rio Tapajós, Pará, Brazil (right bank about 40 miles above Santarem). No. 10480 adult male in the Conover Collection, Field Museum of Natural History. Collected December 2, 1932, by A. M. Olalla.

Characters.—Has the dark colored bill and feet of *obscura*, but the shape and proportions of the bill of *viridis* (bill longer, upper mandible less elevated and the culmen less arched than in *obscura*). Upper back (mantle) is darker brown (clove brown) lacking the violaceous shade of *obscura*. The elongated scapulars and tertials are conspicuously lighter (near Ridgway's saccardo olive) and vermiculated with dusky (in *obscura* dark brown and the vermiculations barely suggested here and there by some obsolete "watermark"-like markings). The apical spots on the greater upper wing coverts are golden green (not blue as in *obscura* and *viridis*) but almost obsolete. From *viridis* it differs in having the elongated scapulars and tertials light brown, not bright green. The purplish gloss on the foreneck is less extensive than that of *viridis*, but more extensive than in *obscura*.

Description.—Head and neck black. Mantle clove brown. Elongated scapulars and tertials saccardo olive (Ridgway) conspicuously vermiculated with dusky. Lower back, rump and tail black. Bastard wing, primary coverts and quills blackish. Underparts black, except for scale-like feathers at base of foreneck, which are tipped with dull purple. Feet and bill blackish brown (in dried skins). Wing (flat) 286, tail 140, culmen (exposed) 34, tarsus 142, middle toe (with claw) 79 mm.

Range.—South side of the Amazon from the right bank of the Rio Tapajós, east probably to the Xingu. Between the Rio Xingu and the Rio Tocantins it probably intergrades with *P. viridis obscura*.

I am indebted especially to Dr. C. E. Hellmayr for his kindness in comparing this new bird with the type of *P. obscura* in the Vienna Museum. I am also indebted to Mr. J. F. Zimmer of the American Museum of Natural History for the loan of specimens.

Specimens Examined.

Psophia viridis viridis.—Rio Madeira: Igarape Auará (right bank) 6; Lago Sampaio, Rasarinho (left bank) 1. Rio Tapajós: Boim (left bank) 5.

Psophia viridis dextralis.—Rio Tapajós: Tauary (right bank) 4; Caxiricatuba (right bank) 2. Rio Cumarapy (Camaraipi) 1.

Psophia viridis obscura.—Pará: Utinga 1.

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ON THE TAXONOMIC STATUS OF THREE SPECIES OF LIZARDS OF THE GENUS SCELOPORUS FROM MEXICO AND SOUTHERN UNITED STATES.

BY HOBART M. SMITH,
University of Kansas, Lawrence, Kansas.

The study of the lizards of the genus *Sceloporus* in the collection which Dr. Edward H. Taylor and myself[1] secured in Mexico during the summer of 1932 has revealed the presence of a number of extremely interesting forms, three of which are discussed in this paper. *Sceloporus jalapæ* Günther, which has in the past been synonymized with *graciosus*, is found to be valid. *Sceloporus marmoratus* Hallowell is shown to be a distinct northern subspecies of *Sceloporus variabilis* Wiegmann. A striking sexual dimorphism, not hitherto noted, has been discovered in *S. couchii* Baird, and the external morphology of this species has given a very interesting clue to the relationship of *Sceloporus* to *Uta*. These points are discussed in detail in the following.

Sceloporus jalapæ Günther.

Text Fig. 1.

Sceloporus gratiosus Boulenger 1885, pp. 230–231 (*part*).
Günther 1890, p. 71 (*part*).
Boulenger 1897, pp. 507–508 (*part*).
Sceloporus graciosus Cope 1885, p. 379 (*non* Baird and Girard).
Cope 1900, pp. 386–389 (*part*).
Sceloporus jalapæ Günther 1890, p. 74.

Nine specimens of this rare species were collected, in the following localities: two (nos. 3160, 3161) about 10 miles south of Cañada de Morelos,

[1] Unless otherwise indicated, the catalogue numbers refer to specimens in this collection. Those numbers preceded by KU refer to specimens in the collection of the Dyche Natural History Museum of the University of Kansas.

Puebla, on July 24, 1932; one (no. 3120) 10 miles northeast of Tehuacán, Puebla, on July 23; three (nos. 3207, 3208, 3319) near Zapotitlán, Puebla, on July 27; two (nos. 3213, 3214) near Chazumba, Oaxaca, on July 28; one (no. 3339) near Tehuacán, Puebla, on July 30; all collected by Edward H. Taylor and Hobart M. Smith.

The specimens represented in this series agree perfectly, aside from minor discrepancies due to the much discolored specimen which Günther described, with the type description of *jalapæ* except in two respects, both of which were mistakes made by Günther, and which were satisfactorily corrected by Boulenger (1897, p. 508). The former author, contrary to the general procedure, counted the dorsal scales "from a line connecting the two lateral collar-folds to one connecting the hinder side of the thighs." By this method he counted 38, while Boulenger (*loc. cit.*) counted 52, beginning at the occiput.

In the second point, Günther states that the two series of femoral pores meet in the median line. Boulenger corrects this also by stating that they are separated by one scale.

Thus modified, the description of *jalapæ* is in exact accord with the character of our own specimens.

Aside from the specimen from Jalapa, collected by Höge, which is the type of *jalapæ*, there are two other specimens mentioned by Boulenger (*loc. cit.*) and also synonymized by him with *gratiosus* (=*graciosus*), which I have considered as *jalapæ*. These are from Puebla, obtained from Boucard. Judging from the similarity in scale counts and measurements of these two specimens and the type of *jalapæ*, and from the differences exhibited between these three and the other specimens of *gratiosus* in Boulenger's table, they are the same as *jalapæ*.

How Günther disposed of these two specimens in Biologia is difficult to state. Probably they are the specimens from Putla, obtained from Boucard, placed under *gratiosus*. This author mentioned also under this species specimens from Matamoros Izucar (Puebla) and Jalapa (Vera Cruz), collected by Ferrari-Perez. These records are undoubtedly based upon Cope's (1885, p. 379), derived from the specimens in the collection of the Comision Cientifica. This author also considered them as *graciosus*. He mentioned the specimens again in his work of 1900 (p. 388), where he remarks, in the discussion of *graciosus*, "I have observed a slight variety of it from near the city of Jalapa, Mexico, in the collection of the Comision Geographica et Exploradora of Mexico."

In spite of certain resemblances of *jalapæ* to *graciosus*, it is beyond all reason that the same species should exist in two isolated localities separated by a thousand miles or more. There is, moreover, on the basis of differences in scalation, very definite evidence available of their separate identity, as shall be shown later.

Since accurate and complete descriptions of *jalapæ* are not available, the following descriptions are in order:

Diagnosis.—A small *Sceloporus*, maximum snout to vent measurement 51.0 mm.; head shields weakly striated or keeled, or nearly smooth; frontal usually transversely divided (entire in one); two canthals; dorsal scales

from occiput to base of tail 52 to 62; dorsals much larger than ventrals, in longitudinal rows slightly diverging posteriorly, strongly keeled and mucronate; ventrals smooth; laterals intermediate in size between ventrals and dorsals, keeled, arranged in oblique rows, and usually somewhat differentiated from the dorsals; length of 4th toe from base of 5th approximately equal to distance from snout to lateral cervical fold; scales on anterior border of ear very large, the median much larger than the others and extending completely across ear opening; femoral pores 17 to 20, the two series meeting in the median ventral line or separated by one to three scales.

Description of a representative male (no. 3161).—Cephalic scales in prefrontal and anterior supraorbital region weakly striated or keeled, the remainder smooth or slightly rugose; frontal transversely divided; two frontoparietals, in contact in front of occipital, separating the frontal from the parietals and occipital; four small parietals on each side of occipital; 5–6 enlarged supraoculars, bounded medially by a row of small scales, and separated from the superciliaries by at least one row of scales; scales in anterior third of supraorbital region small, extending posteriorly next to the superciliaries beyond the third supraocular; a pair of large internasals, in contact with rostral and nasal scutes, and bounded posteriorly by another pair of scales nearly as large; nasals contacting rostral; two canthal scales, much broader than long; one to two rows of flattened, keeled scales bordering the upper labials above; three or four suboculars, the median much longer than the others, followed anteriorly by a more or less triangular subocular which contacts the posterior canthal and a small square loreal; 5–6 upper and 7 lower labials, weakly keeled; a series of about three enlarged postmentals, the anterior pair in contact medially; temporal scales small, keeled; ear bordered anteriorly by about five large, elongate, smooth scales, the median much the largest and extending completely across the ear opening; lateral cervical fold rather weak, the scales between it and the ear and the shoulder small, almost granular except immediately above the fold; no indication of a posterior gular fold such as exists in *couchii;* scales above insertion of foreleg granular, those in and immediately behind axilla smooth, flat, squamous and quite small; lateral scales keeled and mucronate, larger than ventrals, smaller than dorsals, directed upward in oblique rows; ventrals smooth, those on the posterior portion of the body weakly notched at apex; scales in groin small but squamous; dorsal scales of limbs about as large as median laterals, keeled and slightly mucronate; ventral scales of limbs, except on feet, smooth; ventrals on femur about equal in size to those on belly; ventrals on tibiæ as large as its dorsals; ventrals on foreleg small, somewhat larger on forearm; posterior femorals granular, extending almost halfway across dorsal surface of femora; no dermal fold behind insertion of hind leg; scales above and behind insertion of hind leg granular; ventral scales on base of tail behind anus smooth; dorsal caudals somewhat larger than dorsals on body, mucronate and strongly keeled; postanals enlarged; lamellæ under the 1st to the 5th toes 9–11–17–22–13 respectively.

Head light blue above and on sides; a broad lateral dark band beginning above tympanum and extending above foreleg to upper groin; an indistinct

white line bordering the lateral dark band below axilla and groin; a black spot on shoulder, extending narrowly a short distance onto the upper arm; a bright white line beginning at upper edge of tympanum, bordering the lateral dark band below, separating it from the black spot on shoulder, terminating above the anterior border of the insertion of the foreleg; black spot on shoulder connected with lateral black band above insertion of foreleg; a broad light blue band bordering the dark band above; a broad light blue median dorsal band, slightly darker than the lateral light blue bands bordering it; about 12 rounded black spots situated on the sides of the median dorsal band, in a series beginning above the lateral cervical folds and terminating at the base of the tail, each spot connected with the lateral dark band by a narrow, black line curved anteriorly; sides of abdomen, between fore and hind legs, blue, darker on the median ventral border; ventral surfaces of limbs, breast, tail and a median ventral abdominal line three to eight scales wide, whitish; anterior part of gular region closely stippled with light blue and black; dorsal surfaces of limbs grayish blue; posterior surfaces of femora with a few distinctly outlined, white spots.

Variations.—The prefrontal scales are extremely variable; the frontal in one is entire; in another the posterior frontal is in contact with the occipital; the parietals are usually three on each side. The keeling of the cephalic scales is also variable. In some specimens, all the scales are quite smooth except those bordering the supraoculars. These are keeled or striated in all nine specimens. The scales in the nasal region are quite constant in their relation to each other. Each nasal is extended to the rostral, and between these are two large internasals which broadly contact the rostral.

The coloration of the males varies but little from the above description. The females, however, are quite different. The general color is brownish, with a lighter band beginning at the posterior border of the orbit and passing to the base of the tail. Crossing this light band, and extending medially for a short distance, but separated from the series on the opposite side by several scale rows, is a series of 12 or 13 narrow, undulating, dark brown cross bars, sometimes bordered behind by lighter brown; the limbs are very dark, banded with alternate light and dark brown; the ventral surfaces of the limbs and abdomen are whitish, and sometimes, on abdomen, with a light bluish suffusion; the anterior part of the gular region is very dimly marked with light blue. There is no black spot on the shoulder.

The ventral scales in front of the anus and on the base of the tail of females are smooth.

Relationships.—The females bear a remarkable resemblance to certain specimens of *æneus*, although the males do not. The species differs markedly from *æneus* and *scalaris*, however, in the smaller number of dorsal scales, presence of large scales on the anterior border of the ear, less rugose head shields, obliquely arranged rows of laterals, much different character of the scales in the nasal region, longer hind limbs (with respect to *æneus*), much longer 4th toe, different coloration in the males, and numerous other characters. The scales in the nasal region bear further mention.

In *æneus* and *scalaris* the nasals and internasals are small and are separated from the rostral by a row of two or four narrow scales, while in *jalapæ* they contact the rostral.

It is possible that *jalapæ* is related to the *variabilis* group, as indicated by the slightly rugose head shields, small laterals differentiated from the dorsals, large number of dorsals from the occiput to the base of the tail, femoral pores meeting or nearly meeting on the median ventral line, etc., but the relationship is not close. The dermal fold behind the insertion of the hind leg, it may be noted in this connection, is absent in *jalapæ*.

Since numerous authors have confused this species with *graciosus*, the following comparisons are offered. In *graciosus* there is a series of scales separating the nasals and internasals from the rostral; the head shields are smooth; there are five or six somewhat enlarged scales on the anterior border of the ear; the femoral pores do not extend onto the preanal region; the females resemble the males quite closely except in ventral markings. In *jalapæ* the nasals and internasals contact the rostral; the head shields are keeled or striated; there are only two or three scales on the anterior border of the ear, and these are very large, the largest extending across the tympanum; the femoral pores extend far onto the preanal region and are separated by none or only from one to three small scales; the females appear quite different from the males.

The most conspicuous point of resemblance of these two species to each other is in the color pattern. The scale counts from occiput to base of tail are approximately the same also, and the adult specimens are of about the same size, although *jalapæ* apparently is somewhat smaller.

Measurements and Scale Counts of *Sceloporus jalapæ* Günther.

Number	3160	3319	3208	3161	3120	3207	3213	3214	3339
Snout to vent	42.0	43.0	44.0	44.5	45.0	46.5	47.5	47.5	51.0
Tail	—	68.0	—	58.0	71.0	—	55.0	68.0	65.0
Snout to occiput	8.5	9.5	8.5	9.5	9.25	8.5	9.5	—	9.5
Snout to ear	10.0	11.5	10.5	11.0	11.5	10.5	11.0	—	12.0
4th toe	10.5	15.5	13.0	12.5	14.0	13.0	12.0	15.0	13.0
5th toe	4.5	6.75	5.0	5.5	6.0	6.0	5.5	7.5	6.0
Tibia	8.5	11.0	9.0	9.5	10.0	9.5	10.0	11.0	10.0
Dorsals	57	52	62	61	52	59	58	58	59
Scales about body	56	58	54	64	57	59	54	59	55
Scales to shielded part of head	14	13	13	14	13	12	10	—	12
Femoral pores	?	17–17	?	19–20	20–20	?	?	19–21	20–20
Scales between series of pores	1	3	?	0	0	?	?	1	2
Sex	♀	♂	♀	♂	♂	♀	♀	♂	♂

Sceloporus variabilis marmoratus (Hallowell).

A series of 51 *variabilis* are in the collection, from Mexico. All but one of these are typical *variabilis variabilis*, and were collected in the tropical or subtropical areas of Mexico, but the other (No. 4620, from 31 miles south

of Sabinas Hidalgo, Nuevo León, September 1, 1932) is comparable to the *variabilis* of the semi-arid regions of southern United States, which may be distinguished as *variabilis marmoratus.*

Sixty-five specimens of *v. marmoratus*, all from Texas save the one mentioned above, have been available for comparison with the southern Mexico form. A number of obvious differences, as in color and size, are discernible upon gross examination. Scale counts of 30 specimens of each subspecies have revealed a number of other differences of importance.

V. marmoratus may be diagnosed as follows: A *Sceloporus* with rugose or keeled cephalic plates; a deep fold at posterior margin of insertions of hind legs; lateral scales smaller than either dorsals or ventrals, in oblique rows; ventrals of about the same size as dorsals, or slightly smaller; 15 to 21, average 16.7, rows of enlarged dorsals; 62–68, average 65.0, dorsal scales from the occipital to base of tail at posterior margins of hind legs; maximum length, snout to vent, 52.5 mm. in males, 49.5 mm. in females; dorsal markings of adult males and females not greatly different, most distinct in males; adult males with a pink area on each side of belly, bordered anteriorly and posteriorly by dark blue.

V. marmoratus differs from *v. variabilis* as follows: dorsal scales smaller, averaging 10.7 scales more from occiput to base of tail (48 to 60, average 54.3 in *v. variabilis*); number of longitudinal rows of dorsals at middle of body greater, averaging 2.64 more (12–15, average 14.06 in *v. variabilis*); lesser maximum length from snout to vent, a 16.5 mm. difference in males, 13.5 mm. in females (69.0 mm. in males, 63.0 mm. in females, of *v. variabilis*); much less total bulk of body, a male of maximum size of *v. marmoratus* being less than half the total maximum of *v. variabilis.* In *v. marmoratus*, adults of the two sexes closely resemble each other in dorsal color pattern. The most conspicuous difference is in the lateral stripes, which are much more distinct in males; the lateral cross-bars, however, are equally distinct in the two sexes. In *v. variabilis* much the same dimorphism takes place, except that adult males lose the lateral cross-bars almost entirely, so that the dorsum, between the bright lateral stripes, is almost uniform brown, with sometimes a lighter median streak.

There is considerable variation in the number of rows of enlarged dorsals in the northern subspecies, largely due to the occasional lack of sharp differentiation between the laterals and the dorsals. In these occasional specimens, of either sex, the rows of laterals are not so obliquely placed as in others, and the individual scales gradually enlarge dorsally. Such an occasional lack of sharp differentiation between laterals and dorsals apparently does not occur in *v. variabilis.*

V. marmoratus is typical of semi-arid regions, where it frequents the limbs of mesquite and other scrubby trees. Strecker (1922) remarks that he has found it on limestone bluffs, and that it occurs also on *Opuntia.* They are usually shy, wary creatures difficult to collect. *V. variabilis*, however, is native to tropical or subtropical regions, and is quite bold and noisy in movement.

The following distributional records of *v. marmoratus* are available.

TEXAS.

Bandera County (Strecker, 1915).
Bexar County:
  Helotes (Stejneger, 1891; KU 11005–11008; EHT & HMS, 5 spec.).
  San Antonio (Hallowell, 1854; Stejneger, 1891).
  Somerset (KU 15355).
Duval County:
  San Diego (Cope, 1888).
  20 miles W. of San Diego (EHT & HMS, 3 spec.).
El Paso County:
  El Paso (KU 15572).
Frio County:
  Near Dilley (KU 12468, 15192–15198).
  Near Pearsall (EHT & HMS, 225–226).
Jim Wells County:
  36 miles N. of Falfurrias (EHT & HMS, 4 spec.).
  11 miles N. of Falfurrias (EHT & HMS, 3 spec.).
La Salle County:
  15 miles N. of Encinal (KU 15204–15206).
Live Oak County (Strecker, 1915):
  Near George West (EHT & HMS, 1 spec.).
Medina County (Baird, 1859b).
Nueces County:
  Near Corpus Christi (Cope, 1888).
Starr County:
  Redmond's Ranch (Baird, 1859b; Stejneger, 1891).
  Near Rio Grande City (EHT & HMS 4787–4795, 4905–4912; KU 12467, 15199–15203, 15354).

MEXICO.

The only specimen in our collection from Mexico is number 4620, from a locality 31 miles S. of Sabinas Hidalgo, Nuevo León. On the basis of geographical probabilities, it may be assumed for the present that the following locality records are based upon specimens of *v. marmoratus:*

Chihuahua:
  30 miles S. of El Paso (Strecker, 1915).
Coahuila (Boulenger, 1897).
Nuevo León:
  China (Stejneger, 1891; Cope, 1900).
  Monterey (Cope, 1885).
  San Diego (Stejneger, 1891).
Tamaulipas:
  Matamoros (Stejneger, 1891).
  Charco Escondido (Cope, 1900).

From the above data it appears that *v. marmoratus* is confined to the semi-arid region on either side of the Rio Grande as far west as El Paso, and on the east as far south as Monterey. *V. variabilis* probably occurs

nearly to Matamoros on the coast, following the sub-tropical vegetation, but apparently it has been taken no farther north than Antiguo Morelos, Tamaulipas (EHT & HMS).

A structural character of much importance in the identification of *variabilis*, but apparently overlooked in previous publications, is a deep skin-fold back of the insertions of the hind legs. It is well pronounced in both subspecies of *variabilis* and also in *couchii*.

Scale Counts of *Sceloporus variabilis marmoratus* (Hallowell).

Number	226	4620	4787	4788	4789	4790	4791	4792	4793	4794	4795
Dorsals	67	60+	62	65	64	64	67	68	67	64	64
Rows dorsals	18	17	15	17	18	17	18	15	16	18	18
Snout to vent	46.0	36.0	44.5	44.3	46.0	39.0	35.5	41.5	38.3	49.0	29.0
Sex	♂	♂	♂	♀	♂	♂	♀	♀	♂	♀	♂

											KU
Number	4903	4904	4905	4906	4907	4908	4909	4910	4911	4912	15204
Dorsals	64	65	65	65	67	64	63	65	65	65	68
Rows dorsals	19	19	16	19	22	17	15	16	18	18	16
Snout to vent	43.0	49.0	42.0	41.0	38.0	39.3	35.0	37.5	41.5	33.5	50.5
Sex	♂	♂	♂	♂	♂	♀	♀	♂	♂	♀	♂

	KU	KU	KU	KU	KU	KU	KU	KU
Number	15354	15355	11005	11006	11007	11008	12467	12468
Dorsals	65	62	64	65	63	68	69	64
Rows dorsals	18	16	16	17	19	17+	18	16
Snout to vent	48.0	47.5	46.5	52.5	45.5	49.5	50.0	47.0
Sex	♂	♀	♂	♂	♀	♀	♂	♀

Sceloporus variabilis variabilis Wiegmann.

The locality records for *variabilis variabilis* in the collection are as follows:

Hidalgo:

4 miles S. of Jacala, June 16 (512, 514, 516).

Puebla:

Near Zapotitlán, July 27 (3209).

San Luis Potosi:

5 miles S. of Valles, June 13 (457, 458, 460, 461, 464–466, 544–549).

Tamaulipas:

South of Antiguo Morelos, June 12 (407–417, 419, 420).

Vera Cruz:

5 miles E. of Jalapa, July 16 (2099).

Tierra Colorada, July 15 (2220–2225, 2227, 2229–2230, 2418–2420).

Puente Nacional, July 14 (2231–2236).

1½–2 miles E. of Acultzingo, July 22 (3162).

Near Totalco, July 19 (2555).

Specimens were frequently found on palmettos, as frequently on the

fallen logs as on the standing trees. All were found in regions distinctly tropical or subtropical.

Apparently *v. variabilis* has not been reported from the states of Hidalgo and San Luis Potosi.

The specimens from Antiguo Morelos were apparently taken somewhat farther north than the species has before been reported, although it may be expected to extend farther north in reality.

Scale Counts of *Sceloporus variabilis variabilis* Wiegmann.

Number	408	409	410	417	457	458	461	465	466	512
Dorsals	56	54	56	55	51	54	54	48	57	56
Rows dorsals	15	13	14	14	14	14	15	14	14	14
Snout to vent	64.0	55.5	62.0	58.0	51.5	52.0	65.0	41.5	36.0	63.0
Sex	♂	♀	♂	♀	♀	♀	♂	♀	♂	♂

Number	514	516	546	547	2220	2221	2222	2223	2224	2225
Dorsals	58	57	49	51	57	57	60	51	54	49
Rows dorsals	15	15	13	12	14	14	15	15	13	14
Snout to vent	51.0	60.5	65.0	63.0	53.0	67.0	56.0	59.0	50.0	69.0
Sex	♀	♂	♂	♀	♀	♂	♂	♂	♀	♂

Number	2229	2230	2231	2232	2233	2234	2235	2236	2419	3162
Dorsals	55	55	56	55	53	52	60	56	55	53
Rows dorsals	14	13	14	13	14	14	15	15	15	15
Snout to vent	51.0	67.0	68.0	63.5	61.0	67.0	69.0	65.5	50.0	61.0
Sex	♀	♂	♂	♂	♂	♂	♂	♂	♀	♂

Sceloporus couchii Baird.

Seventy-four specimens of this rare species were collected in the hills about five miles southwest of Sabinas Hidalgo, Nuevo León, Mexico, on June 8–9, and September 1, 1932 (nos. 287–305, 307, 309–311, 313, 314, 316, 317, 319–321, 438, 439, 441–443, 445, 4623–4657). They were collected for the most part on rocks and cliffs and to almost the highest elevations in the mountains. Females were much less wary than males.

The sexual dimorphism in this species with regard to color is most remarkable. The females are uniform olive gray or bluish above, with a series of seven or eight rounded dark spots on each side of the median dorsal line. The spots anteriorly are very small, but they gradually enlarge posteriorly, reaching their maximum size at the base of the tail. There is a dim, slightly darker, broad stripe extending on each side from the upper edge of the tympanum to the base of the tail. The ventral surfaces are tinged with blue, sometimes with dim white oblique stripes on the chin. In a few specimens the dorsal spots on the body are nearly obsolete, but those on the base of the tail and immediately preceding it are constant.

In some specimens there are numerous flecks of black in addition to the two dorsal rows of spots.

In males the dorsal spots, if indicated at all, are very dim; the back, however, is not uniformly colored, but flecked with much black, so it appears quite dull; the lateral dark stripe is black, very prominent, and bordered above by a definite white streak which fades medially into the dorsal gray-blue. A perpendicular blue line passes from a point in front of the insertion of the foreleg to, or nearly to, the dorsolateral light line, and is followed posteriorly by another perpendicular light blue line passing toward the dorsolateral line, but not reaching it; a narrow black line separates the two perpendicular light lines; in front of the anterior light line is a large, rounded, deep black spot, enclosing a small, rounded, bright blue spot; the limbs are banded, the anterior limbs more distinctly so than the posterior; the anterior dark band on the foreleg is very distinct; a longitudinal light band is present on the posterior surface of the femur, bordered above and below by an incomplete narrow dark band (present also in females). The entire ventral surfaces are tinged with bluish; a darker blue area, the anterior fourth and posterior edge of which are very dark, is present on each side of the belly, extending from the axilla to the groin, and is bordered medially by a slightly darker band; the anterior part of the gular region is marked with oblique white lines passing from the labial region posteriorly to the median ventral line.

A structural character remarkably dimorphic in the two sexes, previously noted by Cope (1900), is the length of the 4th toe, which is several millimeters shorter in females than in males (see table below).

A peculiar structural character which *couchii* bears in common with *variabilis et al.* is a small dermal fold behind the insertion of the hind leg.

Other locality records for *couchii* are from places not far distant from Sabinas Hidalgo: Duval County, Texas (Cope, 1888); Santa Catarina, Nuevo León (Baird, 1859a); Pesquiera Grande, Nuevo León (Baird, 1859b); Monclova, Coahuila (Garman, 1887).

Boulenger (1897) remarks that a gular fold is frequently present in *couchii* and also in *variabilis*. Since the presence of a gular fold is the chief character distinguishing *Uta* from *Sceloporus*, such a remark is apt to be misleading. The so-called "gular fold" of certain Scelopori is formed by continuations of the lateral cervical folds, and it is never modified by the presence of granular scales, except on the sides of the neck in the pouch formed by the overlapping of the fold. In *variabilis*, *couchii* and *merriami* there is a series of granular scales, continuous with those of the lateral pouches, intercalated between the large scales in front of the humerus three or four rows behind the anterior edge of the lateral pouch. This rudimentary fold represents the only indication of the gular fold that occurs in *Uta*. It is visible only in a very few Scelopori, and at best only in front of the shoulder. So far as I am aware, it is most distinct in *couchii* and *merriami*.

Based upon the appearance of this rudimentary fold in these species of Scelopori, it is logical to assume that they approach *Uta* in actual relationships. It may be noted that the dorsal scales are greatly reduced in size

in all the species concerned, approaching the granular condition found in *Uta*.

MEASUREMENTS (IN MM.) AND SCALE COUNTS OF *Sceloporus couchii* Baird.

Number	288	290	293	303	304	307	310	313
Snout to vent	47.0	48.0	48.5	47.5	49.5	45.5	47.0	50.0
Tail	81.5	84.0	72.5	89.0	70.0	78.0	82.0	93.5
Snout to occiput	9.5	10.0	10.25	10.0	10.5	10.5	10.5	11.0
Snout to ear	11.5	12.0	11.5	11.5	13.0	11.5	12.0	12.5
4th toe	14.0	14.0	14.0	13.5	14.0	13.5	13.5	17.0
5th toe	6.5	6.5	6.5	6.0	7.0	7.0	6.5	8.0
Tibia	10.5	11.0	11.0	10.5	11.0	10.5	10.75	13.0
Dorsals	80	71	69	77	74	70	73	74
Scales about body	83	78	80	85	81	76	89	89
Scales to shielded part of head	18	17	17	18	19	18	19	18
Femoral pores	15–16	17–18	16–17	16–18	16–16	16–?	17–17	16–16
Sex	♀	♀	♀	♀	♀	♀	♀	♂

Number	317	319	320	438	4623	4625	4628	4629
Snout to vent	50.0	57.5	55.0	47.0	55.0	48.5	56.5	56.0
Tail	103.0	88.0	101.0	65.0	91.0	100.0	100.0	119.0
Snout to occiput	11.5	11.0	11.5	9.5	11.5	11.0	12.0	11.5
Snout to ear	14.5	14.0	14.0	12.0	14.0	13.0	14.0	14.0
4th toe	16.5	17.5	16.5	13.5	18.0	14.7	17.0	18.0
5th toe	8.0	8.0	7.5	6.5	8.5	7.0	8.5	8.5
Tibia	13.0	13.0	13.0	10.5	14.0	12.5	13.0	13.5
Dorsals	82	80	75	77	73	77	77	74
Scales about body	84	82	81	86	90	92	92	83
Scales to shielded part of head	20	18	19	19	20	21	17	18
Femoral pores	15–17	15–16	16–17	16–?	17–18	15–?	14–16	17–17
Sex	♂	♂	♂	♀	♂	♂	♂	♂

Dr. Edward H. Taylor has been of constant aid in many ways while I have been studying these lizards, and I here express my greatest appreciation to him for his efforts. Mr. C. D. Bunker, curator of the Dyche Natural History Museum of the University of Kansas, has been extremely kind in the loan of specimens for comparisons.

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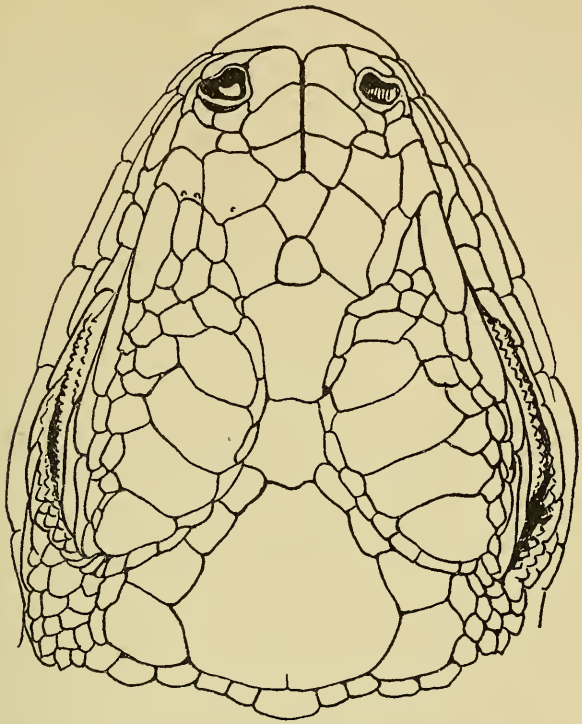

Text fig. 1. *Sceloporus jalapœ* Günther. Dorsal view of cephalic scales of female (no. 3160). Actual length of figured portion 9 mm.

Vol. 47, pp. 135–154 June 13, 1934

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

REVISION OF THE POCKET GOPHERS OF THE GENUS CRATOGEOMYS.

BY E. W. NELSON AND E. A. GOLDMAN.

Nearly 40 years have elapsed since the pocket gophers of the genus *Cratogeomys* were revised by Merriam (North Amer. Fauna, No. 8, pp. 150–162, Jan. 31, 1895). No species or subspecies have hitherto been added to those listed by him. The known range of the genus has, however, been extended east to near the mouth of the Rio Grande and in other directions; and much more ample material is now available for study.

The general range of the genus reaches from southeastern Colorado southward through the Great Plains and over the Mexican tableland region, east of the continental divide. Near the southern end of the Mexican Plateau the genus is carried upward by the land surface and reaches its most varied development in the high valleys and on the upper slopes of some of the highest mountains of the continent. The territory embraced by the genus *Cratogeomys* in general dispersal is shared, in different parts, with the genera *Geomys*, *Thomomys*, and *Platygeomys*. While different genera may occur in similar situations in close proximity, no two appear to inhabit the same local terrain. Merriam (supra cit.) referred to the occurrence of *Cratogeomys castanops* in "isolated areas." More or less interrupted distribution resulting in isolation has no doubt been an important factor in the formation of the 25 geographic races that it now seems desirable to recognize. Of the number of races mentioned 16 are described as new.

In describing color, Ridgway's "Color Standards and Color Nomenclature," 1912, has been utilized, supplemented by other terms that seem more accurate and applicable to some of the

blended tones and details. Specimens examined, unless otherwise indicated, are in the U. S. National Museum.

For the loan of specimens for study our thanks are due to Dr. Thomas Barbour and Dr. Glover M. Allen, of the Museum of Comparative Zoology.

List of Species and Subspecies.

Cratogeomys castanops Baird.

[References under subspecies.]

Distribution.—Isolated areas on the high plains and lower mountain slopes from southeastern Colorado southward through eastern New Mexico, western Texas, Chihuahua, Coahuila, Nueva Leon, northern Tamaulipas, eastern Durango, eastern Zacatecas to central southern San Luis Potosi.

Cratogeomys castanops castanops (Baird).

Pseudostoma castanops Baird, Report Stansbury's Exped. to Great Salt Lake, p. 313, June, 1852. Type from "Prairie road to Bent's Fort," near the present town of Las Animas, Colorado.

Geomys castanops Leconte, Proc. Acad. Nat. Sci. Philadelphia, vol. 6, p. 163, 1852.

Cratogeomys castanops Merriam, North Amer. Fauna, No. 8, p. 159, January 31, 1895.

Distribution.—Great Plains region in the Arkansas River Valley, Colorado, and south into northeastern New Mexico (Chico Springs).

Cratogeomys castanops perplanus, subsp. nov.

Type.—From Tascosa, Oldham County, Texas (altitude 3,000 feet). No. 97171, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Vernon Bailey, June 5, 1899. Original number 6941.

Distribution.—Plains region from the Canadian River Valley, northwestern Texas and northeastern New Mexico, south to the upper Colorado River Valley, in the central western part of Texas.

General characters.—Closely allied to *C. c. castanops* of southeastern, Colorado; size and color about the same; differing in cranial details, especially the decidedly greater breadth and flatness of the braincase.

Color.—Type: Upper parts near cinnamon buff, purest on sides, slightly darkened on head and over back by dusky-tipped hairs; forearms and thighs like sides; under parts overlaid with pinkish buff; ears blackish; fore feet brownish; hind feet whitish; tail thinly clothed with buffy hairs.

Skull.—Very similar to that of typical *castanops*, but braincase lower and decidedly broader and flatter; squamosals projecting farther over auditory meatus; premaxillae usually reaching farther beyond posterior

ends of nasals; nasals long and lachrymals small and inconspicuously mortised into maxillae as in *castanops;* dentition about the same.

Measurements.—Types: Total length, 285 mm.; tail vertebrae, 84; hind foot, 40. An adult female topotype: 282; 89; 38. *Skull* (type): See table, p. 153.

Remarks.—In *C. c.* perplanus the long nasals and the small lachrymals set inconspicuously into the maxillae show close relationship to *castanops.* The braincase is rather high, but lower and flatter than in *castanops* and the lateral expansion of the squamosals is pronounced.

Specimens examined.—Total number, 7, as follows:

New Mexico: Cuervo, 1.

Texas: Big Spring, 1; Hale Center, 1; Stanton, 1; Tascosa (type locality), 3.

Cratogeomys castanops lacrimalis, subsp. nov.

Type.—From Roswell, Chaves County, New Mexico (altitude 3,500 feet). No. 119071, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by James H. Gaut, September 13, 1902. Original number 476.

Distribution.—Pecos River Valley in southeastern New Mexico, and the Pecos and the northern side of the Rio Grande Valley in western Texas.

General characters.—Similar in size and color to typical *C. c. castanops* of southeastern Colorado, but important cranial characters, notably the lower, flatter braincase and larger lachrymals quite distinctive. Differing from *C. c. perplanus* of the plains region to the eastward in combination of salient cranial details, including the larger lachrymals.

Color.—Type: Upper parts pinkish buff on anterior half of body, becoming cinnamon buff on posterior half, slightly darkened on head and back by dusky-tipped hairs; under parts overlaid with pinkish buff; ears dusky; fore feet pale buffy; hind feet whitish; tail thinly clothed with pale buffy hairs, becoming dusky at tip.

Skull.—Similar in general to typical *castanops;* braincase similar in width, but much lower and flatter; nasals shorter, broader anteriorly; lachrymals much heavier, projecting more prominently into orbits and more broadly overlapping frontals as viewed from above; auditory bullae less fully inflated, less bulging below level of basioccipital; upper incisors usually more strongly recurved. Compared with that of *perplanus* the skull is similar in general size, but braincase narrower, lower and flatter; nasals shorter, broader anteriorly; lachrymals heavier; auditory bullae less inflated, less bulging below level of basioccipital; upper incisors usually more strongly recurved.

Measurements.—Type: Total length, 299 mm.; tail vertebrae, 99; hind foot, 36. Two adult male topotypes: 300, 309; 97, 105; hind foot, 37, 38. Two adult female topotypes: 265, 268; 81, 76; 35, 38. *Skull* (type): See table, p. 153.

Remarks.—C. c. lacrimalis closely resembles typical *castanops* and *perplanus* in color, but the cranial characters pointed out are quite constant

and distinctive in specimens from localities within the general range of the subspecies as outlined.

Specimens examined.—Total number, 45, as follows:

New Mexico: Ancho, 1; Carlsbad, 2; Eddy, 3; Fort Sumner, 1; Parker Lake (east of Organ Mountains), 4; Roswell (type locality), 7; Roswell (35 miles north), 1; Santa Rosa, 1; Tularosa, 2; Weed, 2.

Texas: Alpine, 1; Boquillas, 2; Davis Mountains (15 miles southwest of Toyahvale), 1; El Paso, 2; Fort Lancaster, 1; Howard Springs (5 miles south), 1; Kent, 1; Langtry, 1; Marathon, 5; Marfa, 3; Sierra Blanca, 1; Valentine, 1; Van Horn, 1.

Cratogeomys castanops hirtus, subsp. nov.

Type.—From Albuquerque, New Mexico (altitude 5,000 feet). No. 58325, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by J. A. Loring, January 17, 1894. Original number 1558.

Distribution.—Upper part of Rio Grande River Valley, north-central New Mexico.

General characters.—A dark-colored subspecies, with long, dense pelage. Closely allied to *C. c. lacrimalis* of the Pecos River Valley, but upper parts more heavily mixed or overlaid with black, and cranial features divergent. Similar in general to typical *castanops*, but upper parts more profusely mixed with black and combination of cranial characters distinctive.

Color.—*Type* (fresh winter pelage): Upper parts near cinnamon buff, purest along lower part of sides, the middle of face, top of head and back rather heavily mixed with black; under parts in general overlaid with pinkish buff, varying to cinnamon buff across throat and chest; outer sides of forearms like sides; ears encircled with black; fore feet dusky; hind feet white; tail rather well-haired, light brownish above, somewhat paler below, becoming white toward tip all around.

Skull.—Very similar to that of *lacrimalis*, but braincase rather narrow; zygomata less widely spreading, more strongly decurved, shorter along outer sides; jugals shorter, more extensively overlapped above by maxillae and squamosals (maxillae and squamosals more widely separated in *lacrimalis*); premaxillae broader; lachrymals similar, but less prominent and less projecting into orbits; dentition about the same. Contrasting with typical *castanops* as follows: Braincase lower and flatter; nasals shorter; frontals reaching farther along median line anteriorly, and lateral extensions broader between maxillae and premaxillae; zygomata narrower, more decurved anteriorly, shorter along outer sides; jugals shorter, more extensively overlapped above by maxillae and squamosals; lachrymals larger, crossing fronto-maxillary suture and more broadly overlapping frontals as viewed from above; auditory bullae large, but less bulging below plane of basioccipital; dentition similar, but upper incisors more strongly recurved.

Measurements.—*Type:* Total length, 278 mm.; tail vertebrae, 88; hind foot, 34. An adult female topotype: 251; 71; 34. *Skull* (type) see table, p. 153.

Remarks.—*C. c. hirtus* is distinguished externally by its darker upper parts, owing to the heavier admixture of black, as compared with the related forms. It is probably restricted in range to the upper part of the Rio Grande Valley.

Specimens examined.—Three, all from the type locality.

Cratogeomys castanops angusticeps, subsp. nov.

Type.—From Eagle Pass, Texas. No. 24503/31908, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Clark P. Streator, November 11, 1890. Original number 434.

Distribution.—Northern side of Rio Grande River Valley, from near mouth of Pecos River at least to Eagle Pass.

General characters.—Similar to *C. c. lacrimalis* of the Pecos Valley, New Mexico, in external appearance; color about same; size smaller; skull narrower, and of much slenderer proportions. Color about as in *C. c. perplanus* of northwestern Texas, but size much smaller, and cranial details divergent.

Color.—*Type* (acquiring fresh pelage): Upper parts near cinnamon buff, purest along sides, the top of head and back moderately overlaid with black; throat, chest, and forearms pinkish buff; abdominal region buffy whitish; ears black but inconspicuous; fore feet blackish, except digital bristles which are white; hind feet and tail thinly clothed with mixed grayish and dusky hairs.

Skull.—Similar to that of *lacrimalis,* but smaller, narrower, slenderer, less arched; upper longitudinal profile usually straighter; zygomata slenderer, less expanded at antero-external angle, the orbital margin of maxilla descending in a more nearly even curve to jugal; jugal narrower, less broadly spatulate anteriorly; auditory bullae and mastoids rather fully inflated, the latter tending to protrude more prominently below ends of squamosal processes; dentition similar. Compared with that of typical *perplanus* the skull is much smaller, relatively narrower, less angular and heavy; braincase lower; rostrum narrower and shorter; nasals shorter, scarcely reaching plane of anterior ends of lateral processes of frontals (usually passing well beyond this plane in *castanops*); zygomata more slender, less expanded at antero-external angle; jugal narrower, less broadly spatulate, less deeply inserted in maxilla anteriorly; lachrymals larger and usually more evenly joined to both frontal and maxilla as viewed from above (tending to articulate mainly with maxilla in *perplanus*); basioccipital with sides parallel between auditory bullae as in *perplanus;* dentition lighter.

Measurements.—*Type:* Total length, 274 mm.; tail vertebrae, 85; hind foot, 37. Average of three adult male topotypes: 267 (250–280); 83 (79–85); 36 (35–37). Average of five adult female topotypes: 254 (244–265); 78 (74–86); 34.5 (33–36). *Skull* (type): See table, p. 153.

Remarks.—This rather well-marked subspecies appears to be limited to the northern side of the Rio Grande. It exhibits a departure in cranial details from forms inhabiting the southern side and indicates the effectiveness of the river as a barrier along its lower course. Specimens from near

the mouth of the Pecos River have somewhat heavier skulls and grade toward *lacrimalis*.

Specimens examined.—Total number, 13, all from Texas, as follows:

Texas: Eagle Pass (type locality), 9; Juno, 1; Samuels, 1; Langtry, 1; Sanderson, 1.

Cratogeomys castanops clarkii Baird.

Geomys clarkii Baird, Proc. Acad. Nat. Sci. Philadelphia, vol. 7, p. 332, April, 1855. Type from Presidio del Norte, on the Rio Grande, at or near the present town of Ojinaga, Chihuahua, Mexico.

Distribution.—Mexican side of Big Bend section of Rio Grande Valley, in northeastern Chihuahua and northern Coahuila, Mexico.

Remarks.—This form, described many years ago and referred by authors to the synonymy of typical *castanops* is still imperfectly known, but warrants subspecific recognition as shown by comparison of the type, an adult female, with material from many localities within the general range of the species. It is similar to typical *castanops* in size and probably in color (type faded and original color no longer clearly discernible), but differs in cranial details as follows: Braincase decidedly lower and flatter; nasals shorter; lachrymals heavier, the external ends more recurved and projecting farther into orbit; mastoids smaller; auditory bullae narrower, less inflated, more compressed laterally; dentition lighter. The skull is similar in size and general features to that of *lacrimalis* which inhabits the adjacent northern side of the Rio Grande, but the mastoids are smaller, the auditory bullae narrower, more compressed laterally, the molariform teeth narrower, and the incisors less strongly recurved. A specimen from near the Rio Grande, northern Coahuila, opposite Samuels, Texas, is light in color, the general tone near pinkish buff, the dark-tipped hairs on dorsum inconspicuous. The skull is somewhat more elongated and not so flat as in the type; but owing to agreement in other cranial details the specimen is assigned to *clarkii*.

Cratogeomys castanops consitus, subsp. nov.

Type.—From Gallego, Chihuahua, Mexico (altitude 5,500 feet). No. 50924, ♂ young adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Clark P. Streator, December 16, 1892. Original number 2416.

Distribution.—Elevated plains of Chihuahua, east of the Sierra Madre.

General characters.—Similar to *C. c. clarkii*, of the southern side of the Rio Grande Valley near the "Big Bend," but decidedly smaller; cranial characters distinctive. Contrasting strongly in smaller size with *C. c. lacrimalis* of southeastern New Mexico and western Texas; skull also differing in detail.

Color.—Type (fresh winter pelage): Upper parts cinnamon buff, purest along sides, the top of head and back thinly overlaid with black; forearms and thighs like sides; under parts pinkish buff; ears dusky, but not distinctly encircled by black; fore feet pale buffy; hind feet whitish; tail rather well

haired, pale buffy on basal half all around, becoming brownish on terminal portion, except for a few whitish hairs on extreme tip.

Skull.—Very similar to *clarkii*, but smaller and of slenderer proportions; maxillary arm of zygoma relatively narrower, as viewed from above; jugal more slender, less expanded anteriorly at point of insertion in maxilla; mastoid process of squamosal projecting outward and downward, the posterior border less curved forward; mastoids more swollen and bulging posteriorly; auditory bullae, more rounded, less compressed laterally; maxillary toothrows shorter. Contrasted with that of *lacrimalis*, the skull is much smaller and lighter in structure; maxillary arm of zygoma relatively slenderer; auditory bullae bulging farther below level of basioccipital; maxillary toothrows shorter.

Measurements.—Type: Total length, 225 mm.; tail vertebrae, 68; hind foot, 31. An adult female topotype: 242; 82; 33. *Skull* (type): See table, p. 153.

Remarks.—C. c. consitus is a well-marked geographic race occupying the high plains region of Chihuahua. While closely allied to *clarkii*, it is readily distinguished by the smaller size and weaker cranial development.

Specimens examined.—Total number, 8, all from Chihuahua, as follows: Gallego (type locality), 2; Samalayuca, 2; Santa Rosalia, 4.

Cratogeomys castanops tamaulipensis, subsp. nov.

Type.—From Matamoros, Tamaulipas, Mexico. No. 116535, ♀ adult, skin and skull, U. S. National Museum (Biological Survey collection, collected by Nelson and Goldman, February 8, 1902. Original number 14885.

Distribution.—Plains of northern Tamaulipas, northern Nuevo Leon, and east-central Coahuila.

General characters.—A medium-sized subspecies characterized by broad, flat braincase, broad, truncately wedge-shaped basioccipital, inflated mastoids and narrow auditory bullae. Similar in size and color (except conspicuous black ear patches) to *C. c. clarkii* of northeastern Chihuahua and *C. c. angusticeps* of Eagle Pass, Texas, but pelage shorter and thinner; skull broader and differing in detail, especially the broader, more tapering or wedge-shaped basioccipital and more inflated mastoids. Smaller than typical *castanops* of southeastern Colorado; pelage shorter and thinner; color similar, but black auricular patches larger; cranial characters distinctive.

Color.—Type (Fresh winter pelage): Upper parts between pinkish buff and cinnamon buff, purest along sides and across lower part of rump, the top of head moderately mixed with black; under parts overlaid with light buff; ears black and encircled by conspicuous black patches; fore feet, except whitish digital bristles, dark brownish; hind feet whitish; tail light buffy at base, the hairs becoming brownish and more scanty on terminal two-thirds.

Skull.—Similar to those of *clarkii* and *angusticeps* but braincase broader, the squamosal shelves more extended laterally over auditory meatus; supraoccipital region more deeply excavated, leaving more strongly up-

turned lateral ridges overlapping mastoids; basioccipital decidedly broader, more wedge-shaped (sides of basioccipital nearly parallel between bullae in *clarkii*); mastoids larger, more fully inflated; molariform teeth larger. Compared with that of typical *castanops* the skull is smaller, with shorter rostrum and nasals, and broader, flatter braincase; squamosal shelves more extended laterally over auditory meatus; zygomata less expanded at antero-external angle; jugal less broadly spatulate anteriorly; lachrymals larger; supraoccipital region more excavated between mastoids; mastoids larger, more fully inflated; basioccipital decidedly broader, more wedge-shaped (sides of basioccipital nearly parallel between bullae in *castanops*); bullae narrower anteriorly, more compressed laterally; dentition similar, but incisors narrower.

Measurements.—Type: Total length, 270 mm.; tail vertebrae, 83; hind foot, 35.5 A young adult male topotype: 275; 86; 38. Average of three adult female topotypes: 258 (253–261); 75 (74–77); 37 (35–39.5). *Skull* (type): See table, p. 153.

Remarks.—The record of specimens taken at Matamoros extends the known range of the species along the southern side of the Rio Grande Valley to near the coast of the Gulf of Mexico. The genus *Cratogeomys* is not known to occur north of the Rio Grande in southern Texas, that general region being occupied by representatives of the genus *Geomys*. Specimens from Monclova, Coahuila, have longer, denser pelage than topotypes, and in cranial details, especially the narrower basioccipital, grade toward *clarkii*.

Specimens examined.—Total number, 14, as follows:

Coahuila: Monclova, 2.

Nuevo Leon: Montemorelos, 6.

Tamaulipas: Matamoros (type locality), 6.

Cratogeomys castanops convexus, subsp. nov.

Type.—From seven miles east of Las Vacas, Rio Grande Valley, Coahuila, Mexico (opposite Del Rio, Texas). No. 127356, ♀ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by James H. Gaut, June 9, 1903. Original number 1469.

Distribution.—Southern side of Rio Grande Valley in vicinity of type locality, northeastern Coahuila.

General characters.—Similar to *C. c. clarkii* of the region to the westward, and to *C. c. tamaulipensis* of the lower Rio Grande, but under parts paler than either, the hairs white to roots across abdomen; skull characters, especially convexity in upper longitudinal profile, distinctive. Similar to *C. c. angusticeps* of Eagle Pass region, northern side of Rio Grande, but under parts paler; skull broader, more massive and differing in detail.

Color.—Type (summer pelage): Upper parts nearly uniform pale cinnamon buff; underparts white to roots of hairs across abdomen, becoming pale buffy, underlaid with plumbeous on chest; forelimbs pale buffy; hind feet whitish; tail pale buffy at base all around, thinly clothed with whitish hairs toward tip.

Skull.—Most closely resembling that of *tamaulipensis*, but more massive, and much more strongly and evenly convex in upper longitudinal outline, the highest point near middle of frontal region; rostrum and nasals more decurved anteriorly; nasals shorter, scarcely reaching anterior plane of zygomata; premaxillae broader, the posterior ends more broadly rounded; lambdoid crest more depressed; mastoids similarly inflated and squamosal shelves similarly extended over auditory meatus; supraoccipital region excavated, leaving a strongly upturned lateral ridge overlapping mastoids, much as in *tamaulipensis;* basioccipital narrower, but similarly wedge-shaped; auditory bullae more inflated; incisors broader. Similar to those of *clarkii* and *angusticeps*, but broader and more massive than either; longitudinal profile above more strongly and evenly convex; rostrum broader, more decurved anteriorly; nasals shorter; premaxillae broader, the posterior ends more broadly rounded; interorbital region broader; lambdoid crest more depressed near middle; mastoids more inflated, causing a distinct bulging of squamosals over auditory meatus; supraoccipital region more excavated between mastoids; basioccipital wedge-shaped (sides of basioccipital nearly parallel between bullae in *clarkii* and *angusticeps*); incisors broader.

Measurements.—Type: Total length, 255 mm.; tail vertebrae, 80; hind foot, 34. *Skull* (type): See table, p. 153.

Remarks.—C. c. convexus is based upon a single specimen representing a combination of characters that appear to warrant the recognition of a new race in northeastern Coahuila. It appears to be more nearly related to *clarkii* and to *tamaulipensis* than to *angusticeps*, which inhabits the opposite side of the Rio Grande Valley. The contrast between the two indicates that the Rio Grande, below the "Big Bend," has been an effective barrier to the passage of these animals for a long time.

Cratogeomys castanops excelsus, subsp. nov.

Type.—From San Pedro, 10 miles west of Laguna de Mayran, Coahuila, Mexico. No. 246533, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by E. A. Goldman, March 28, 1926. Original number 23561.

Distribution.—Arid interior basin in southwestern Coahuila and northeastern Durango.

General characters.—Distinguished from *C. c. consitus* of central Chihuahua, *C. c. clarkii* of northeastern Chihuahua, *C. c. goldmani* of northern Zacatecas, and *C. c. tamaulipensis* of northern Tamaulipas, by much larger size and paler color; cranial details in combination also different.

Color.—Type (summer pelage): Dorsal area in general between pinkish buff and cinnamon buff, slightly darkened by black-tipped hairs, becoming clear pinkish buff along sides and across lower part of rump; throat and chest pale pinkish buff, rest of underparts buffy whitish; feet and tail thinly clothed with dull whitish hairs. *Young* (in first pelage): Similar to adults but fore feet black, except digital bristles, which are silvery white.

Skull.—Similar to those of *consitus, clarkii,* and *goldmani,* but much

larger, more angular than any of these; nasals relatively longer. Compared with that of *tamaulipensis* the skull is much larger and heavier; rostrum and nasals longer; braincase less flattened; supraoccipital region less excavated between mastoids; sides of basioccipital more nearly parallel between auditory bullae (more wedge-shaped in *tamaulipensis*); mastoids less inflated, and squamosals therefore less bulged upward; dentition similar.

Measurements.—Type: Total length, 320 mm.; tail vertebrae, 101; hind foot, 42.5. An adult female topotype: 298; 96; 39.5. *Skull* (type): See table, p. 153.

Remarks.—C. c. excelsus is the largest of the known forms that appear to be assignable subspecifically to *castanops*. It is probably restricted in range to the interior basin or sink that occupies southwestern Coahuila and northeastern Durango.

Specimens examined.—Total number, 6, as follows:

Coahuila: San Pedro (type locality), 3.

Durango; Tlahualilo, 3.

Cratogeomys castanops subsimus, subsp. nov.

Type.—From Jaral, southeastern Coahuila, Mexico. No. 51048, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Clark P. Streator, January 14, 1893. Original number 2555.

Distribution.—Known only from the type locality in the upper part of the Salinas River Valley.

General characters.—Closely allied to *C. c. excelsus*, but smaller, color darker, and cranial characters distinctive. Similar in color to *C. c. tamaulipensis*, but black auricular patches smaller; pelage longer and denser; skull more massive and differing in important details.

Color.—Type (winter pelage): Upper parts from top of head to rump near cinnamon, thinly mixed with black, becoming cinnamon buff along sides; under parts buffy whitish, passing into light pinkish buff on throat, chest, and forearms; feet and tail thinly clothed with mixed whitish and brownish hairs.

Skull.—Similar to that of *excelsus*, but somewhat smaller; rostrum shorter, flatter and relatively broader; nasals shorter, flatter, and broader anteriorly; frontal region more broadly channelled between upturned supraorbital ridges along median line at frontoparietal suture, the ridges turning more abruptly inward at this point; ascending branches of premaxillae broader; basioccipital with sides parallel between bullae as in *excelsus;* dentition about the same. Compared with that of *tamaulipensis* the skull is more massive, the rostrum and nasals decidedly broader and flatter; basioccipital with sides parallel between bullae (not wedge-shaped as in *tamaulipensis*); supraoccipital region rising nearly perpendicularly (not deeply excavated between mastoids and tending to incline forward to lambdoid crest as in *tamaulipensis*); mastoids less inflated and squamosals less bulging upward and over them; auditory bullae less compressed laterally, more inflated anteriorly; dentition heavier.

Measurements.—Type: Total length, 304 mm.; tail vertebrae, 88; hind

foot, 40. An adult male topotype: 295; 104; 40. An adult female topotype: 272; 84; 38.5. *Skull* (type): See table, p. 153.

Remarks.—*C. c. subsimus* is closely allied to the neighboring form, *excelsus*, but the cranial peculiarities combined with the differential color seem to justify subspecific recognition.

Specimens examined.—Five, all from type locality.

Cratogeomys castanops goldmani Merriam.

Cratogeomys castanops goldmani Merriam, North Amer. Fauna, No. 8, p. 160, January 31, 1895. Type from Cañitas, Zacatecas, Mexico.

Distribution.—Known only from the type locality on the elevated plains of northern Zacatecas.

Cratogeomys castanops subnubilus, subsp. nov.

Type.—From Carneros, Coahuila, Mexico (altitude 6,800 feet). No. 79482, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Nelson and Goldman, August 12, 1896. Original number 10018.

Distribution.—Elevated plains and high mountains of southeastern Coahuila.

General characters.—A small, dark-colored subspecies, allied to *C. c. goldmani* of Zacatecas, but very much smaller and color darker. Similar to *C. c. tamaulipensis* of northern Tamaulipas, but much smaller; color darker; pelage longer and denser; skull differing in detail. Contrasting strongly with a geographic neighbor, *C. c. subsimus*, of Jaral, Coahuila, in much smaller size, darker coloration, and cranial features.

Color.—*Type* (acquiring fresh pelage): Upper parts cinnamon buff, purest along sides, the top of head and back rather profusely mixed with black; under parts pinkish buff, becoming somewhat lighter in tone across abdomen; fore feet dusky on toes; hind feet white; tail with mixed grayish and brownish hairs, rather well clothed for a member of this group. Summer pelage less mixed with black, as shown by other specimens.

Skull.—Small, with relatively broad braincase, and zygomata tending to stand out squarely anteriorly. Closely resembling that of *goldmani* in general proportions, but much smaller; rostrum relatively narrower; auditory bullae more inflated. Similar to that of *tamaulipensis*, but much smaller; braincase similarly broad but squamosals less inflated or bulged upward over auditory meatus; supraoccipital region rising more perpendicularly from foramen magnum to lambdoid crest, the lateral margins overlapping mastoids less upturned; pterygoids broader; basioccipital truncately wedge-shaped as in *tamaulipensis*, but relatively narrower; auditory bullae more rounded and fully inflated, less compressed laterally; dentition similar. Compared with that of *subsimus* the skull is very much smaller, with relatively slenderer, less flattened rostrum and broader braincase; zygomata usually more squarely spreading anteriorly; frontal region flatter, the supraorbital ridges less upturned; pterygoids broader;

basioccipital wedge-shaped (sides of basioccipital nearly parallel in *subsimus*); dentition lighter.

Measurements.—Type: Total length, 244 mm.; tail vertebrae, 72; hind foot, 34. Two adult male topotypes: 247, 226; 86, 70; 34, 33. Two adult female topotypes: 213, 210; 64, 63; 31, 31. *Skull* (type): See table, p. 153.

Remarks.—C. c. subnubilus is distinguished by small size and dark coloration. It presents a striking contrast in size, color, and cranial details to its near geographic neighbor, *subsimus*.

Specimens examined.—Total number, 23, all from Coahuila, as follows: Carneros (type locality), 7; La Ventura, 16.

Cratogeomys castanops planifrons, subsp. nov.

Type.—From Miquihuana, southern Nuevo Leon, Mexico (altitude 5,000 feet). No. 93942, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Nelson and Goldman, June 9, 1898. Original number 12527.

Distribution.—Elevated plains in southern Nuevo Leon.

General characters.—A medium-sized, dark-colored form, closely allied to *C. c. subnubilus* of southeastern Coahuila; color slightly darker and richer; size decidedly larger; cranial details different. Similar to *C. c. goldmani* of Zacatecas, but smaller, and color darker, the upper parts more extensively mixed with black; skull of lighter proportions. Smaller than *C. c. tamaulipensis* of northern Tamaulipas; color more cinnamon buffy and more heavily mixed with black; black auricular patches smaller; pelage longer and denser; cranial characters also distinctive.

Color.—Type (summer pelage): Upper parts between cinnamon buff and cinnamon, purest along sides, the top of head and back rather heavily mixed with black; entire under parts overlaid with pinkish buff; fore feet dull buffy to toes, which are dusky; hind feet whitish; tail clothed with mixed whitish and brownish hairs. *Young* (in first pelage): Upper parts pinkish buff, heavily mixed with black over dorsum; under parts very thinly overlaid with pale buff, the under color deep plumbeous; fore feet buffy, becoming abruptly deep black on toes, except digital bristles which are silvery white; hind feet whitish; tail clothed with blackish hairs, becoming abruptly white at tip in one individual.

Skull.—Of medium size with broad, flattened braincase and narrow rostrum; sagittal and lambdoid crests thin and trenchant. Closely resembling that of *subnubilus*, but distinctly larger; sides of frontals slightly upturned even in old males, and braincase broad and flattened as in *subnubilus;* interorbital constriction relatively narrower; pterygoids narrower; palatines narrower, the lateral margins more excised near posterior plane of last molars; molariform teeth heavier. Similar to that of *goldmani*, but smaller, with rostrum relatively narrower and zygomata less widely spreading anteriorly; molariform teeth similar, but relatively rather heavy. Compared with that of *tamaulipensis* the skull is smaller, with similarly broad braincase, but squamosals less distended over auditory meatus;

supraoccipital region less deeply excavated, rising more nearly perpendicularly from foramen magnum, the lateral margins less projecting posteriorly along line of contact with mastoids; basioccipital narrower; auditory bullae more inflated, less compressed laterally; dentition about the same.

Measurements.—Type: Total length, 268 mm.; tail vertebrae, 80; hind foot, 37. Average of five adult male topotypes: 264 (255–280); 81 (76–85); 35 (33–37). Average of four adult female topotypes: 251 (245–260); 72 (65–75); 33.5 (32–35). *Skull* (type): See table, p. 153.

Remarks.—This subspecies combines medium size with rather weak cranial development, although the braincase is relatively broad. The frontal region is flat or with sides very slightly upturned, even in old adults. The sagittal and lambdoid crests exhibited by the older adults are thinner and more trenchant than in most of the nearly related forms.

Specimens examined.—Total number, 20, all from Nuevo Leon as follows: Doctor Arroyo, 1; Miquihuana, 19 (9 in Mus. Comp. Zool.).

Cratogeomys castanops rubellus, subsp. nov.

Type.—From Soledad, near San Luis Potosi, San Luis Potosi, Mexico (altitude 6,400 feet). No. 20507, ♂ adult, skin and skull, Museum of Comparative Zoology (Sanford Collection), collected by W. W. Brown, August 1, 1923.

Distribution.—Elevated plains region of southwestern San Luis Potosi.

General characters.—Closely allied to *C. c. goldmani* of Zacatecas, but smaller; general color of upper parts darker, near cinnamon instead of cinnamon buff, thinly and inconspicuously overlaid with black; cranial characters distinctive. Similar to *C. c. planifrons* of southern Nuevo Leon, but general color above deeper cinnamon, much less heavily overlaid with black; skull differing in proportions.

Color.—Type (acquiring fresh pelage): Upper parts near cinnamon, the top of head and back thinly overlaid with black; throat and chest pinkish buff; abdominal region pale pinkish buff; fore feet blackish, except digital bristles, which are silvery white; hind feet blackish on toes and edges of soles, becoming brownish on upper surface of metatarsus; tail thinly clothed with dark brownish hairs.

Skull.—Very similar to that of *goldmani,* but smaller and relatively narrower throughout; braincase decidedly narrower; basioccipital slightly wedge-shaped as in *goldmani.* Similar in general to that of *planifrons,* but with narrower braincase and broader rostrum; nasals and premaxillae decidedly broader; zygomata usually narrower, but more squarely spreading anteriorly; basioccipital narrower; auditory bullae larger, more fully inflated; dentition similar.

Measurements.—Type: Total length, 280 mm.; tail vertebrae, 80; hind foot, 35. Average of five adult males from Morales (near type locality): 265 (255–285); 75 (70–78); 34 (32–36). Average of four adult females from Morales: 240 (240–245); 66 (65–67); 32 (31-33). *Skull* (type): See table, p. 153.

Remarks.—C. c. rubellus appears to be more closely allied to *goldmani*

than to any other known form but is distinguished by the darker, nearly uniform reddish tone of upper parts and the relatively narrower skull.

Specimens examined (Mus. Comp. Zool.).—Total number, 41, all from the State of San Luis Potasi as follows: Morales, 35; San Luis Potosi, 1; Soledad (type locality), 5.

Cratogeomys castanops peridoneus, subsp. nov.

Type.—From Rio Verde, San Luis Potosi, Mexico (altitude 3,000 feet). No. 82049, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Nelson and Goldman, January 10, 1897. Original number 10423.

Distribution.—Arid plains in the valley of the Rio Verde, forming an eastern terrace of the tableland region in central southern San Luis Potosi.

General characters.—A small, dark colored subspecies; upper parts extensively mixed with black; hind feet and tail blackish. Resembling *C. c. planifrons* of southern Nuevo Leon in external appearance, but smaller; color still darker, the upper parts more heavily mixed with black, auricular patches, feet and tail blacker; pelage shorter; skull more angular. Similar in general to *C. c. rubellus* of the higher plateau region near the city of San Luis Potosi, but smaller; upper parts much more heavily mixed with black; ears, feet and tail blacker; pelage shorter and thinner; skull differing in detail.

Color.—Type (winter pelage): Upper parts between pinkish buff and cinnamon, purest along sides, the top of head and back heavily mixed with black; under parts thinly overlaid with pinkish buff, the under color deep plumbeous and showing through; black auricular patches large; fore feet blackish, the tufts of silvery bristles at posterior edge of soles conspicuous in contrast with dark tone of wrists; hind feet blackish to toes, the toes white; tail blackish, becoming white all around at tip. *Young* (in first pelage): Similar to adults, the back heavily mixed with black.

Skull.—Similar to that of *planifrons*, but more angular, although smaller; rostrum relatively broader; nasals broader, less tapering posteriorly; frontals broader anteriorly between premaxillae; outer surface of jugal narrower, less spatulate anteriorly; squamosal arm of zygoma more projecting anteriorly above level of jugal in adult males (anterior end of squamosal arms more evenly confluent with jugal in *planifrons*); basioccipital narrower, slightly wedge-shaped; molariform teeth smaller. Compared with that of *rubellus* the skull is smaller, shorter and relatively broader; auditory bullae less inflated; molariform teeth relatively smaller.

Measurements.—Type: Total length, 245 mm.; tail vertebrae, 71; hind foot, 31.5. Average of three adult male topotypes: 245 (236–253); 76 (74–78); 33 (32–35). An adult female topotype: 240; 73; 31. *Skull* (type): See table, p. 153.

Remarks.—C. c. peridoneus is a well-marked subspecies with a rather isolated range on an eastern terrace of the Mexican tableland region. It is the smallest and darkest of the known forms of *C. castanops.*

Specimens examined.—Eleven, all from the type locality.

Cratogeomys merriami (Thomas).

[References under subspecies.]

Distribution.—Mexican highlands in the general vicinity of the Valley of Mexico, from an altitude of 5,400 feet in the drainage of the Rio Balsas up to 11,500 feet on Mount Ixtaccihuatl.

Cratogeomys merriami merriami (Thomas).

Geomys meriami Thomas, Ann. Mag. Nat. Hist., ser. 6, vol. 12, p. 271. October, 1893. Type from "southern Mexico," probably in the Valley of Mexico.

Cratogeomys merriami Merriam, North Amer. Fauna, No. 8, p. 152, January 31, 1895.

Distribution.—Valley of Mexico (7,600 feet), Valley of Toluca and adjacent mountain slopes up to 11,000 feet in altitude.

Cratogeomys merriami oreocetes Merriam.

Cratogeomys oreocetes Merriam, North Amer. Fauna, No. 8, p. 156, January 31, 1895. Type from Mount Popocatepetl, Mexico, Mexico (altitude 11,000 feet).

Distribution.—High slopes of Mount Popocatepetl, above range of *C. m. merriami.*

Cratogeomys merriami peregrinus Merriam.

Cratogeomys peregrinus Merriam, North Amer. Fauna, No. 8, p. 158, January 31, 1895. Type from Mount Ixtaccihuatl, Mexico, Mexico (altitude 11,500 feet).

Distribution.—High slopes of Mount Ixtaccihuatl, above range of *C. m. merriami.*

Cratogeomys merriami saccharalis, subsp. nov.

Type.—From Atlixco, Puebla, Mexico (altitude 5,400 feet). No. 55347, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Nelson and Goldman, July 29, 1893. Original number 5279.

Distribution.—Valleys drained by upper affluents of the Rio Balsas in southwestern Puebla.

General characters.—A large subspecies, closely allied to *C. m. merriami* of the Valley of Mexico, but smaller; color paler; pelage shorter and sparser; cranial details distinctive. Similar in size to *C. m. oreocetes* of Mount Popocatepetl and *C. m. peregrinus* of Mount Ixtaccihuatl, but differing widely in cinnamon coloration and cranial characters.

Color.—Type: Upper parts near cinnamon, the face, top of head and back moderately mixed with black, becoming paler, the dark hairs thinning out, and passing into cinnamon buff on lower part of sides, forearms and thighs; under parts overlaid with cinnamon buff, the under color pale plumbeous; ears encircled by black patches; feet brownish; tail very thinly clothed basally with light brownish hairs, becoming naked all around at tip.

Skull.—Large, angular and massive much as in *merriami*, but smaller, shorter, flatter, and relatively broader; zygomata widest near middle in adult males (widest anteriorly in *merriami*); maxilla articulating about equally with frontal and premaxilla along a convex line as viewed from above (articulating mainly with premaxilla along a straighter line in *merriami*); frontal region shorter, less extended anteriorly between premaxillae; premaxillae narrower, more tapering posteriorly, the ends more pointed instead of bluntly rounded; bullae slightly more fully inflated; molariform teeth smaller. Similar in size and general form to that of *oreocetes*, but frontal region shorter, narrower anteriorly between premaxillae; nasals narrower posteriorly, the ends more deeply emarginate; premaxillae narrower, more tapering posteriorly, the ends more pointed instead of bluntly rounded; dentition similar. Compared with that of *peregrinus* the skull is similar in general size, but braincase narrower, the squamosals more constricted over auditory meatus; maxillary arm of zygoma more convex along line of contact with premaxillae and frontals, as viewed from above; premaxillae narrower, more tapering posteriorly; supraoccipital region rising more nearly perpendicularly from foramen magnum (inclined forward to lambdoid crest in *peregrinus*); dentition similar, but grooves in upper incisors narrower.

Measurements.—Type: Total length, 338 mm.; tail vertebrae, 92; hind foot, 48. Two adult male topotypes: 327, 330; 89, 95; 47, 46. Average of three adult female topotypes: 298 (285–318); 90 (84–102); 45 (42–48). *Skull* (type): See table, p. 153.

Remarks.—C. c. saccharalis represents an extension of the range of *merriami* as a species into the lower, warmer belt along the southern border of the Mexican tableland. At the type locality this pocket gopher lives in cultivated fields and is so destructive to sugarcane and other crops that a bounty is paid by some of the hacienda owners. The tails are presented as evidence that animals have been killed.

Specimens examined.—Eight, all from type locality.

Cratogeomys merriami irolonis, subsp. nov.

Type.—From Irolo, Hidalgo, Mexico (altitude 7,600 feet). No. 53494, ♀ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Nelson and Goldman March 30, 1893. Original number 4520.

Distribution.—Elevated Plain of Apam, southern Hidalgo, probably ranging to the eastward over the plains of Tlaxcala and Puebla.

General characters.—A very large, rufescent subspecies with a broad massive skull. Closely allied to *C. m. merriami* of the Valley of Mexico; color similar to *merriami* in buffy phase, but somewhat richer, more rufescent; skull shorter and relatively broader. Similar to *C. m. saccharalis* of southwestern Puebla, but larger; color darker and richer; skull larger, more massive, and differing in detail.

Color.—Type: Upper parts near mikado brown, purest along sides, the top of head and back moderately mixed with black; under parts overlaid

with cinnamon; forearms and thighs about like under parts; auricular patches deep black; fore feet brownish; hind feet whitish; tail scantily clothed with brownish hairs above, white below.

Skull.—Very large, angular and massive. Very similar to *merriami*, but shorter and broader; rostrum shorter; braincase broader, the squamosal shelves more projecting laterally; mastoids larger, more inflated and bulging posteriorly, less produced laterally; auditory bullae broader; angle of mandible narrower antero-posteriorly; maxillary toothrow shorter; last upper molar shorter, the posterior lobe less produced. Similar to that of *saccharalis*, but larger; braincase less flattened; premaxillae broader posteriorly; frontals less extended anteriorly between maxillae and premaxillae, the maxillae articulating mainly with premaxillae (articulating about equally with premaxillae and frontals in *saccharalis*), as viewed from above.

Measurements.—Type: Total length, 318 mm.; tail vertebrae, 88; hind foot, 42. Two adult female topotypes: 333, 320; 95, 90; 43, 43. *Skull* (type): See table, p. 153.

Remarks.—The differential characters presented by the specimens upon which the present form is based were pointed out by Merriam (North Amer. Fauna, No. 8, p. 152, Jan. 31, 1895), but the specimens were not separated from typical *merriami*.

Specimens examined.—Three, all from the type locality.

Cratogeomys perotensis Merriam.

[References under subspecies.]

Distribution.—Higher slopes of the Cofre de Perote and adjacent eastern border of Mexican plateau region in western Vera Cruz.

Cratogeomys perotensis perotensis Merriam.

Cratogeomys perotensis Merriam, North Amer. Fauna, No. 8, p. 154, January 31, 1895. Type from Cofre de Perote, Vera Cruz, Mexico (altitude 9,500 feet).

Distribution.—Known only from the higher slopes of the Cofre de Perote, western Vera Cruz.

Cratogeomys perotensis estor Merriam.

Cratogeomys estor Merriam, North Amer. Fauna, No. 8, p. 155, January 31, 1895. Type from Las Vigas, Vera Cruz (altitude 8,000 feet).

Distribution.—Known only from the type locality at the extreme eastern border of the high plateau region, east of the Cofre de Perote in western Vera Cruz.

Cratogeomys fulvescens Merriam.

[References under subspecies.]

Distribution.—Open plains of the high plateau region from the western base of Mount Orizaba in eastern Puebla north to the western base of the Cofre de Perote in western Vera Cruz.

Cratogeomys fulvescens fulvescens Merriam.

Cratogeomys fulvescens Merriam, North Amer. Fauna, No. 8, p. 161, January 31, 1895. Type from Chalchicomula, Puebla, Mexico (altitude 8,200 feet).

Distribution.—Open, elevated plains near western base of Mount Orizaba, eastern Puebla.

Cratogeomys fulvescens subluteus, subsp. nov.

Type.—From Perote, Vera Cruz, Mexico (altitute 7,800 feet). No. 54300, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Nelson and Goldman, June 3, 1893. Original number 4929.

Distribution.—Open, elevated plains near western base of Cofre de Perote, western Vera Cruz.

General characters.—Closely allied to *C. f. fulvescens*, of the high plains at the west base of Mount Orizaba, but general color more yellowish or light ochraceous buffy instead of cinnamon buffy; skull differs in detail. Contrasts strongly with the near geographic neighbor, *C. perotensis estor*, of Las Vigas in light ochraceous buffy, instead of mikado brownish upper parts, absence of black auricular patches, and in important cranial proportions.

Color.—*Type* (acquiring fresh pelage): Upper parts near light ochraceous buff, purest on cheeks, sides, forearms and thighs; the top of head and back finely and rather heavily mixed with black; under parts overlaid with light ochraceous buff; ears inconspicuous, without trace of encircling black patches; muzzle blackish; fore feet brownish buff, the digital bristles brownish; right hind foot brownish, left hind foot whitish; tail thinly clothed with mixed brownish and whitish hairs.

Skull.—Very similar to *fulvescens*, but less arched; braincase lower, more flattened; lambdoid crest less elevated near middle; auditory bullae shorter, somewhat truncate anteriorly, more inflated than usual in *fulvescens;* molariform teeth slightly smaller. Contrasted with *estor* the skull differs as follows: Rostrum broader, more swollen near base of incisors; braincase narrower; lambdoid crest more abruptly decurved, as viewed in profile from behind; maxillary arm of zygoma broader and heavier; postorbital ridges along fronto-premaxillary suture less developed; premaxillae less extended posteriorly, not reaching plane of lachrymals as in *estor;* jugal much broader anteriorly where set into a broad expansion of maxilla; mastoids and auditory bullae more inflated; molariform teeth smaller.

Measurements.—*Type:* Total length, 304 mm.; tail vertebrae, 97; hind foot, 41. A young adult female topotype: 272; 75; 35. *Skull* (type): See table, p. 153.

Remarks.—*C. c. subluteus* is distinguished externally by peculiar grizzled yellowish coloration. Merriam (North Amer. Fauna, No. 8, p. 162, Jan. 31, 1895) referred the material upon which this subspecies is based to *fulvescens*, but remarked: "Specimens from Perote are more yellowish and less fulvous than those from Chalchicomula." The new form requires close comparison only with *fulvescens*.

Specimens examined.—Two, from type locality.

CRANIAL MEASUREMENTS OF TYPE SPECIMENS (ALL MEASUREMENTS IN MILLIMETERS).

Name	Locality	Number	Sex	Greatest length (median line)	Zygomatic breadth	Width across squamosals (over mastoids)	Interorbital constriction	Length of nasals	Maxillary tooth-row (alveoli)	Upper incisors (width of cutting edge)
Cratogeomys castanops perplanus	Tascosa, Texas	97171	♂	56.9	38	32.7	7	21.1	10.3	7.4
Cratogeomys castanops lacrimalis	Roswell, New Mexico	119071	♂	56	37	32.9	7.3	19	9.5	6.4
Cratogeomys castanops hirtus	Albuquerque, New Mexico	58325	♂	52.4	34.9	30.2	7.7	18.3	10.4	7
Cratogeomys castanops angusticeps	Eagle Pass, Texas	24503	♂	52.8	34	28.3	7.1	18.2	9.7	6.2
		31908								
Cratogeomys castanops consitus	Gallego, Chihuahua	50924	♂	46.2	30	26.3	6.7	16	8.4	5.7
Cratogeomys castanops tamaulipensis	Matamoros, Tamaulipas	116535	♀	48.1	31	27.8	6.9	16.3	10.3	5.6
Cratogeomys castanops convexus	Las Vacas, Coahuila	127356	♀	47.9	32.2	28	8	15.5	9.3	6.1
Cratogeomys castanops excelsus	San Pedro, Coahuila	246533	♂	61.8	41.7	34.8	8.2	22	10.8	7
Cratogeomys castanops subsimus	Jaral, Coahuila	51048	♂	56.2	34.5	32.3	7.7	20	10.4	6.7
Cratogeomys castanops subnubilus	Carneros, Coahuila	79482	♂	46.4	31.2	28.2	7.2	15.4	8.7	5.6
Cratogeomys castanops planifrons	Miquihuana, Nuevo Leon	93942	♂	49.4	33.3	29.8	7	16.5	9.2	6.4
Cratogeomys castanops rubellus	Soledad, San Luis Potosi	20507[1]	♂	48.4	29.5	26.5	7.8	14.9	8.8	5.4
Cratogeomys castanops peridoneus	Rio Verde, San Luis Potosi	82049	♂	45.8	31	26.7	7.2	14.8	7.8	5.6
Cratogeomys merriami saccharalis	Atlixco, Puebla	55347	♂	65	45.2	33.3	9.5	24.6	11	9.7
Cratogeomys merriami irolonis	Irolo, Hidalgo	53494	♀	59.2	40.3	38	8.3	21.3	11.7	9.2
Cratogeomys fulvescens subluteus	Perote, Vera Cruz	54300	♂	57	38.3	30.3	7.8	20.9	10.8	7.6

1 Mus. Comp. Zool.

Vol. 47, pp. 155–156 July 23, 1934

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW FLYCATCHER FROM SOUTHEASTERN SIAM.

BY J. H. RILEY.[1]

In the winter of 1929–30, Dr. Hugh M. Smith visited a mountain range in southeastern Siam, extending eastward into Cambodia, the culminating peak of which is Kao Sabab, a little over 3000 feet in altitude, but south of the main range and more or less isolated. Five forms of birds were named by the present author from collections made there or on Kao Kuap, another mountain east of Krat and nearer the Cambodian border.[2] Last fall he paid another visit to Kao Sabab, securing additional specimens of *Arborophila diversa* and a male and female *Gennaeus lewisi*. *Oriolus mellianus* was found to be not uncommon, but hard to collect as it frequented the highest trees. This visit also resulted in the discovery of the following remarkable flycatcher which may be known as:

Terpsiphone sababensis, sp. nov.

Type.—Male, U. S. National Museum, no. 334037, Kao Sabab, southeastern Siam, November 21, 1933. Collected by Hugh M. Smith (original number 6722).

Similar to *Terpsiphone periophthalmica* (Grant) of the northern Philippines, but smaller, the tail less graduated, the center feathers only 6 mm. longer than the next pair.

Description.—Wholly dull black with a bluish sheen in certain lights; belly white; under tail coverts white, the longer ones centered broadly with light grayish olive, and the basal ones with wood brown; under wing coverts black; thighs black. Wing, 86.5; tail, 95; culmen, 16 mm.

Remarks.—Dr. Smith only secured a single specimen of this remarkable bird. The tail is little graduated; the center feathers only 6 mm. longer than the next pair, and the outer feathers only 27 mm. shorter than the central pair. There is no fleshy eye-ring. There are two or three russet

[1] Published by permission of the Secretary of the Smithsonian Insitution.

[2] Proc. Biol. Soc. Wash., vol. 43, 1930, 189–191; vol. 46, 1933, 155–156.

feathers in the scapulars on the right side, showing that the immature and probably the female have a brown plumage like most of the genus. Whether this species ever develops the long central tail feathers, it would be impossible to say.

Terpsiphone atrocaudata atrocaudata of Japan winters to some extent in Siam, but this species has a dark maroon-purple mantle and both the breast and belly are white.

Vol. 47, pp. 157–168 October 2, 1934

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

REVIEW OF THE SUBSPECIES OF THE AFRICAN SCRUB-ROBIN, *ERYTHROPYGIA LEUCOPHRYS* (VIEILLOT).

BY W. WEDGWOOD BOWEN.

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The forms of the African Scrub-Robin having a conspicuous white patch on the wing have heretofore been considered a distinct species under the name *Erythropygia leucoptera*. Besides the character of this white wing-patch, they differ from the *leucophrys* group in having the breast only indistinctly marked with brown, and the top of the head grayish in contrast with the reddish brown of the back, whereas in *leucophrys* the breast is conspicuously streaked with brownish black, and the top of the head is more uniform with the back.

In the region of Lakes Magadi and Natron, on the Kenya-Tanganyika border, there occurs, however, a form, *brunneiceps*, which has the white wing-patch of *leucoptera*, as well as the well-defined breast streaks and brownish head of *leucophrys*. The allocation of this form to one or other of these two groups is thus largely a matter of opinion, since there are no grounds for supposing that the white wing-patch is of any more taxonomic importance than are the streaked breast and brownish head. *E. brunneiceps* constitutes, in fact, a geographical as well as a taxonomic link between the two groups, which are here believed to be conspecific. Intergradation between *brunneiceps* and *vulpina* (*leucoptera* group) in the south Ukamba district of Kenya Colony has already been recorded, thus proving that they are subspecifically related. That *brunneiceps* intergrades also with a member of the *leucophrys* group in the South Guaso Nyiro district is indicated by the following two specimens:

U. S. Nat. Mus., no. 214411, ad. male, S. N'guasso Nyiro River, June, collected by Dr. E. A. Mearns, which agrees in size with *brunneiceps*, but has only a slight indication of a white wing-patch, and in the color of the upper parts more nearly matches an adjoining race of the *leucophrys* group.

Acad. Nat. Sci. Phila., no. 96772, ad. female, S. Eusso Nyiro, July,

A. B. Percival coll., which is rather small for *brunneiceps*, but has a well defined white wing-patch.

The apparent occurrence of members of both groups together in certain parts of Africa (cf. Grote, Orn. Monatsber. XXXV, 1927, p. 102–104), does not necessarily mean that they are specifically distinct, since in a case like this, where the character usually stressed is the presence, or absence, of a white wing-patch, any indication of white in the wing, no matter how reduced it may be, is likely to lead to the assignment of that specimen to the *leucoptera* group. In actual fact, moreover, the white in the wing of *leucoptera* consists merely of the rather wide white margins of the tertials, secondaries, and greater coverts. In *leucophrys*, on the other hand, these feathers are margined with pale brown, which is distinctly variable in shade, and is sometimes so pale as to be almost white. The supposed specific character of *leucoptera* is thus merely the absence of brown pigment in the margins of these feathers.

Forms with conspicuous white wing-patches have been described from widely separated districts, thus: *leucoptera* and *vulpina* in the Somali district, *brunneiceps* in southern Kenya Colony, *sclateri* in central Tanganyika Territory, and *ovamboensis* in Ovampoland and southern Angola. It is a noteworthy fact that these areas are all of a rather arid nature. *E. l. makalaka* links *ovamboensis* with *zambesiana* and *pectoralis; munda* links *ovamboensis* with *ruficauda;* a specimen from the Ikoma district of Tanganyika Territory (A. N. S. Phila. no. 89225, breeding male, Serronea R., July, W. W. Bowen), has some traces of white in its wings, and is, perhaps, intermediate between *sclateri* and a race of the *leucophrys* group. *Leucoptera* and *vulpina* are, as we have already seen, linked to the *leucophrys* group by intergrades in the South Guaso Nyiro district.

Erythropygia leucophrys—including both the white and brown winged forms—is distributed mainly in the eastern part of Africa, but it ranges also, by way of the Zambesi Valley, to Angola and the Congo Basin. Its choice of habitat is somewhat catholic, for it may be found in arid scrublands (*leucoptera, ovamboensis*), savannas (*vansomereni, zambesiana, munda*), or in second growth forest (*ruficauda*). It is a bird of the tropical zone, ranging upwards to the transition zone, and perhaps also to the lower limits of the subtropical zone. Of interest from an ecological point of view is the fact that *leucophrys* and *pectoralis*, both inhabitants of the cooler transition zone, have blackish tails, while *ovamboensis*, an inhabitant of cool arid districts, has both a blackish tail and white wing patches.

The following review is based upon a study of the material in the United States National Museum, supplemented by specimens borrowed from the Academy of Natural Sciences of Philadelphia, the American Museum of Natural History, and the Museum of Comparative Zoology. To the authorities of these institutions I am indebted for permission to study this material. Altogether a series of 102 skins has been assembled.

Erythropygia leucophrys leucoptera (Rüpp.).

Salicaria leucoptera Rüppell, Syst. Uebers. p. 38, pl. 15, 1845: Shoa district.

Characters.—Top of head grayish, contrasting with the russet of the upper parts; wing-coverts and secondaries edged with white; breast only faintly streaked with brownish gray; tail russet, tipped with blackish brown and white.

Measurements.—Eight males from Abyssinia (U. S. N. M., Childs Frick coll., Dire Daoua, Dec., Gidabo River, March, Anole village, May, Sagon River, May, Bodessa, May, and Turturo, June); wing 69.0 to 73.5 (73.0[1]) mm.; tail, 65.0 to 73.0 (71.2) mm.; culmen, from base of skull, 16.0 to 18.0 (17.6) mm.; tarsus, 22.5 to 26.0 (25.0) mm. Eleven females from Abyssinia (U. S. N. M., Childs Frick coll., Dire Daoua, Nov.–Dec., Gato River, Apr., Anole village, May, Sagon River, May, Bodessa, May, Tertale, June); wing, 67.0 to 73.0 (69.8) mm.; tail, 64.0 to 74.0 (68.7) mm.; culmen, from base of skull, 16.5 to 18.0 (17.4) mm.; tarsus, 23.0 to 26.0 (24.2) mm.

Range.—Southern Abyssinia and British Somaliland, up to about 6000 or 7000 feet, south to the country around Lake Rudolf, and northern Kenya Colony where intergradation with the next race occurs.

Remarks.—Specimens from the lake district of southern Abyssinia (Lake Abaya to Lake Stefanie) and from Lake Baringo in Kenya Colony average browner on the mantle (i. e. the russet of the rump distinctly contrasts with the browner mantle) than examples from the Hawash Valley (Dire Daoua), but this difference is not entirely constant and therefore is not worthy of nomenclatural recognition. Examples from northern Kenya Colony (U. S. N. M., Childs Frick coll., near Lake Rudolf, July, Indunumara Mts., July, Endoto Mts., July, Malele, July, and 25 miles N. of Guaso Nyiro R.; A. N. S. P., A. B. Percival coll., Lorian Swamp, and N. Uaso Nyiro) average smaller—wing, male 64–70, female, 66–67 mm.—and are a shade paler, and thus approach the next race.

Dr. van Someren (Nov. Zool. 1922, p. 237) states that examples from Meuressi, Turkwell, Kerio and Rudolf are paler than *leucoptera*, and these also should probably be regarded as intermediates, but I have seen no specimens from this area. Specimens from Nyeri, Meru, and Nairobi (A. N. S. P., Percival coll.) and the upper Tana River (U. S. N. M., Frick coll.) are slightly smaller—wing 66–68 mm—but very similar in color to *leucoptera*. They have distinctly grayish heads (except in young birds, which have a brownish wash) and are therefore not *vulpina*. They are too small to be identified as *ukambensis* (wing 3.0 ins. = 76 mm.) and are probably best identified as *leucoptera* inclining towards *vulpina*, or *eluta*.

Erythropygia leucophrys eluta, subsp. nov.

Type.—Acad. Nat. Sci. Phila., no. 96796, adult male, Kismayu, Jubaland, 27 Nov. 1919, collected by N. P. Fenwick (A. B. Percival coll.).

Characters.—Nearest to *leucoptera*, but with a shorter wing, paler upper parts, and with the streaking on the breast even less distinct.

Measurements.—Three males from Jubaland and the lower Tana River (A. N. S. P., Percival coll.); wing 64.0 to 69.0 (67.0) mm.; tail, 63.0 to 72.0 (67.7) mm.; Culmen from base of skull, 16.5 to 17.5 (17.2) mm.; tarsus,

[1] Averages in parentheses.

23 mm. Three females from Jubaland and the Lower Tana River (A. N. S. P., Percival coll.); wing 62.0 to 65.0 (63.5) mm.; tail, 62.0 to 65.0 (63.5) mm.; culmen from base of skull, 16.5 to 17.0 (16.8) mm.; tarsus, 23.5 to 24.0 (23.7) mm.

Range.—Jubaland and the country about the lower Tana River, from sea-level to about 1000 feet altitude. Intergrading with *leucoptera* in the Northern Provinces of Kenya Colony.

Erythropygia leucophrys vulpina Reichw.

Erythropygia vulpina Reichenow, Journ. f. Orn., p. 62, 1891; Ndi, Teita district.

Characters.—Differs from *leucoptera* in having the top of the head browner, less gray, the mantle more chestnut, less russet, and a shorter wing. From *eluta* it is distinguished by its browner head, darker back, and more distinctly marked breast.

Measurements.—Seven males from Tsavo and Voi, Teita district (A. N. S. P., Percival coll.); wing, 64.0 to 69.0 (66.6) mm.; tail 62.0 to 72.0 (67.9) mm.; culmen from base of skull, 16.0 to 18.0 (16.9) mm.; tarsus, 23.5 to 25.0 (24.1) mm. Two females from Tsavo (A. N. S. P. Percival coll.); wing 64.0 to 65.0 mm.; tail, 61.0 to 62.0 mm.; culmen from base of skull, 17.0 mm. (tip of one broken).

Range.—The Teita and south Ukamba districts of Kenya Colony, from about 1000 to 4000 feet altitude, extending to adjacent parts of northeastern Tanganyika Territory; intergrading with *brunneiceps* in northwestern Ukamba (Simba).

Remarks.—Dr. Van Someren (Nov. Zool. 1922, p. 237) has already called attention to the intergradation of *vulpina* and *brunneiceps* at Simba. A Simba specimen (A. N. S. P., Percival coll.) is nearly typical *brunneiceps*, but four birds from Makindu (A. N. S. P., Percival coll.), 20 miles to the southeast, are much nearer *vulpina*.

Erythropygia leucophrys brunneiceps Reichw.

Erythropygia brunneiceps Reichenow, Journ. f. Orn., p. 63, 1891: Nguruman, nr. Lake Natron.

Erythropygia ukambensis Sharpe, Bull. Brit. Orn. Cl., xi, p. 28, 1900: Ukambani.

Characters: Top of head dark grayish brown; mantle olive brown, contrasting strongly with the russet of the rump and tail; breast conspicuously streaked with dark brown; tail broadly tipped with black and white; size large.

Measurements.—One male from Simba, one female from Magadi (A. N. S. P., Percival Coll.); wing, ♂, 73.0, ♀, 77.0 mm.; tail, ♂, 75.0, ♀, 72.0 mm.; culmen from base of skull, ♂, 18.0, ♀, 20.0 mm.; tarsus, ♂, 27.0, ♀, 29.0 mm.

Range.—the dry, low country (below 5000 feet) about Lake Natron, north to the Kidong Valley, west to the Ukamba where intergradation with *leucoptera* and *vulpina* occurs; south to Lake Manyara, and possibly

to Lake Eyasi and the low country south of Lake Victoria (Reichenow, Vög. Afr., iii, p. 774, 1905, lists Kageji in its range).

Remarks.—Dr. van Someren (Nov. Zool., p. 237, 1922) upholds *ukambensis* as a valid race ranging from Ukamba to the Kikuyu Hills and Naivasha, but Sclater (Syst. Av. Aethiop., p. 483, 1930), on Neumann's authority, makes it a synonym of *brunneiceps*. Judging from Sharpe's description, this would appear correct. Nairobi exambles, as stated above, are practically indistinguishable from *leucoptera* and, although I have seen no specimens from the north Ukamba and Naivasha districts, I have no doubt that *ukambensis* is merely the intergrade between *brunneiceps* and *leucoptera*, rather nearer to the former (cf. wing, 3.0 ins=76 mm.). Examples from south Ukamba (Simba) are, as van Someren (l. c.) states, intermediate between *brunneiceps* and *vulpina*.

Two specimens from the South Guaso Nyiro district are intermediate between *brunneiceps* and *jungens*. One, a male (U. S. N. M., Mearns coll.) agrees in size (wing, 72.5 mm., tail, 66.0 mm., culmen from base of skull, 17.0 mm., tarsus, 24.5 mm.) with *brunneiceps*, and in color of the upper parts with *jungens*, but it has traces of white edgings to the secondaries. The other, a female (A. N. S. P., Percival coll.), is rather small for *brunneiceps* (wing, 67.0 mm., tail, 60.0 mm., culmen from base of skull, 18.5 mm., tarsus, 24.0 mm.), but has well developed white edges to the secondaries.

Erythropygia leucophrys soror Reichw.

Erythropygia brunneiceps soror Reichenow, Vög. Afr., iii, p. 774, 1905: Klein Aruscha (cf. Sclater, Syst. Av. Aethiop., p. 483, 1930.).

Erythropygia ruficauda iodomera Grote, Orn. Monatsber., xxxv, p. 104, 1927: Usegua, Tanganyika Territory.

Characters.—Top of head scarcely any darker or browner than the back, which gradually shades into the russet of the rump and tail; secondaries edged with pale brown, not white; white tips to rectrices narrower than in *brunneiceps;* streakings on breast distinct, but pale brown in color; size small.

Measurements.—Two from Mombasa (U. S. N. M., Jackson coll.); wing, ♂, 64.0, ♀, 61.0 mm., tail, ♂, 58.0, ♀, 54.0 mm., culmen from base of skull, ♂, 16.0, ♀, 16.0 mm., tarsus, ♂, 23.5, ♀, 23.0 mm.

Range.—Coastal parts of East Africa, from the mouth of the Tana River to Dar es Salaam, inland to Aruscha and Usegua.

Remarks.—In describing this race Reichenow compared it with *brunneiceps*, and the fact that he did not mention the secondaries would lead one to suppose that these feathers are edged with white, as in *brunneiceps*. However, Sclater (Bull. Brit. Orn. Cl. xlix, p. 62, 1929, and Syst Av. Aethiop., p. 483, 1930), who has examined the type, groups it with the forms without white in the wings, and states that it is "near *vansomereni*, but with more black on the tail."

In the absence of material from Aruscha I can only identify these two Mombasa birds provisionally. Dr. Grote writes me that in his opinion Mombasa birds should be called *iodomera*, which is "smaller than *soror*

from inland Kenya Colony, and on the underside (flanks) distinctly more brownish." Reichenow, however, clearly states that *soror* is smaller than *brunneiceps* (wing 58–65 mm., as against 65–77 mm.), and inasmuch as these two birds fit these measurements, as well as the description of *soror*, I can not see how *iodomera* is separable. Sclater (l. c.), moreover, writes that he has examined the type of *iodomera* and believes it to be identical with that of *soror* (also examined). Van Someren records *soror* from the mouth of the Tana River, where he says it frequents scrub and the edges of the forests. Intergradation between it and *eluta* must occur thereabouts, since the latter ranges to Dakacha and Korokoro on the lower Tana.

Judging by these two Mombasa birds, the difference in the amount of black in the tail by which Sclater distinguishes *soror* from *vansomereni* is a very poor character. The chief differences between the Mombasa examples and a topotypical example of *vansomereni* lie in the more grayish brown backs, and browner, less black streaks on the breasts of the former. In size they are alike.

Erythropygia leucophrys sclateri Grote.

Erythropygia leucoptera sclateri Grote, Bateleur, ii, p. 14, 1930 : Iringa, Uhehe, Tanganyika Territory.

Characters.—nearest to *brunneiceps*, but more rufous on the upper side and light brown on the head. Wing, 72 mm.

Range.—the Iringa district, and perhaps also the whole central Tanganyika Plateau.

Remarks.—I have seen no specimens from near Iringa, but this is doubtless a good race. An adult breeding male from the Ikoma district of Tanganyika (A. N. S. P., Bowen coll.) agrees with the description of *sclateri* in being distinctly more rufous above than *brunneiceps*, but the white on the wing is poorly developed. It differs from *jungens* in being paler rufous above and less heavily streaked on the breast. It has a wing length of 71.0 mm., and is provisionally identified as an intermediate between *sclateri* and *jungens*.

Erythropygia leucophrys jungens, subsp. nov.

Type.—U. S. Nat. Mus., no. 217480, adult male, Kabelolot Hill, Sotik District, Kenya Colony, 7 May 1911, collected by E. Heller (Rainey Expedition).

Characters.—Nearest to *vansomereni*, but larger. From *soror* it may be distinguished by its larger size and blacker streaks on the breast. Top of head hardly any darker or browner than the back; secondaries edged with pale brown; tail more widely tipped with black and white than in *soror* and *vansomereni*.

Measurements.—Two males, one from Sotik (U. S. N. M., Heller coll.), the other from Loita (A. N. S. P., Percival coll.); wing, 68.0 to 69.0 mm., tail, 65.0 to 66.0 mm.; culmen from base of skull, 17.0 to 18.0 mm.; tarsus, 24.0 to 25.5 mm. One female from Loita (A. N. S. P., Percival coll.); wing, 67.0 mm.; tail, 61.0 mm. (molting); culmen, 18.0 mm.; tarsus,

23.5 mm. Three not sexed from Loita (A. N. S. P., Percival coll.); wing, 67.0 to 71.5 (69.5) mm.; tail, 63.0 to 67.0 (65.0) mm.; culmen from base of skull, 16.5 to 17.0 (16.7) mm.; tarsus, 22.5 to 23.5 (22.8) mm.

Range.—The Sotik and Loita districts of Kenya Colony, at elevations of about 5000 to 6000 feet; south to the Ikoma district of Tanganyika Territory where intergradation with *sclateri* appears to occur; east to the South Guaso Nyiro River where it intergrades with *brunneiceps.*

Remarks.—Sclater, in his review of these birds (Bull. Brit. Orn. Cl., xlix, pp. 62–63, 1929) states that *soror* ranges to the Loita Plains, but birds from this area are too large to be identified thus. Reichenow definitely stated when describing *soror* that it is smaller than *brunneiceps* (wing 58–65, as against 68–77 mm.). Birds from the Loita district fall thus within the size limits of *brunneiceps* (although they average slightly smaller) and can not, therefore, be identified as *soror.* Sclater gives no measurements for *vansomereni,* but three specimens seen by me are smaller, and have somewhat narrower black and white tips to the rectrices.

Erythropygia leucophrys vansomereni Sclater.

Erythropygia leucophrys vansomereni Sclater, Bull. Brit. Orn. Cl., xlix, p. 62, 1929 : Mokia, Ruwenzori, 3400 feet.

Characters.—Very similar to *soror,* but with back somewhat redder, and with the streaking on the throat and breast heavier and blacker.

Measurements.—One male from Ruwenzori, 3400 feet (U. S. N. M.); wing, 65.5 mm.; tail, 59.0 mm.; culmen from base of skull, 16.5 mm.; tarsus, 24.5 mm. Two from Kavirondo (A. N. S. P., Percival coll.); wing, ♂, 64.0, ♀, 66.5 mm.; tail, ♂, 59.0 mm., ♀ (molting); culmen from base of skull, ♂, 15.0, ♀, 17.0 mm.; tarsus, 24.5 mm.

Range.—Uganda, including the slopes of Ruwenzori, east to the Kavirondo, north to the southern Bahr el Ghazal.

Remarks.—Besides the three listed above, I have examined a young male in process of molt to adult plumage from Rangu, southern Bahr el Ghazal (A. N. S. P.). The Kavirondo female, in its slightly larger size, may possibly indicate a tendency towards intergradation with *jungens.*

Erythropygia leucophrys ruficauda Sharpe.

Erythropygia ruficauda Sharpe, Proc. Zool. Soc., 1882, p. 589, pl. 54, fig. 1; Malimbe, Portuguese Congo.

Erythropygia ruficauda saturata Neumann, Jour. f. Orn., 1920, p. 83; Yambuya, Aruwimi River, Belgion Congo.

Characters.—Similar to *vansomereni,* but with the back browner, less rufous, and the streaking on the breast narrower. Inner webs of middle rectrices faintly washed with dark brown.

Measurements.—Two males from Avakubi, Belgian Congo (A. M. N. H., Chapin coll.); wing, 65.0 to 66.5 mm.; tail, 59.0 to 60.0 mm.; culmen from base of skull, 15.0 to 16.0 mm.; tarsus, 21.5 to 22.0 mm.

Range.—Portuguese Congo, east through the Belgian Congo to the Uele.

Erythropygia leucophrys makalaka Neumann.

Erythropygia makalaka Neumann, Journ. f. Orn., 1920, p. 83 : Makalakaland, S. Rhodesia.

Erythropygia leucophrys limpopoensis Roberts, Ann. Transv. Mus. xv, p. 30, 1932 : Bubye River, S. Rhodesia.

Characters.—Very close to *ruficauda*, but slightly redder on the back; with slightly more blackish wash on the inner webs of the middle rectrices, and slightly wider tips to the outer rectrices; streaking on the breast somewhat more restricted; flanks not streaked.

Measurements.—One male from Wedza Movat, S. Rhodesia (A. M. N. H): wing, 65.0 mm.; tail, 59.0 mm.; culmen from base of skull, 16.0 mm.; tarsus, 23.0 mm. One male from Marungu, 3800 ft., Belgian Congo (A. M. N. H.); wing, 67.0 mm.; tail, 58.0 mm.; culmen, 17.0 mm., tarsus, 24.0 mm.

Range.—From the middle part of the Limpopo Valley north through Southern Rhodesia: also, apparently, the upper Zambesi Valley, and Marungu, Belgian Congo.

Remarks.—With only one Rhodesian specimen before me, I am unable to decide whether the Marungu bird really is identical, but the two are very close. This race is in many respects intermediate in characters, as well as geographically, between *ovamboensis*, *zambesiana*, and *pectoralis*. The type locality of Roberts' *limpopoensis* is so nearly the same as that of *makalaka* that I do not hesitate to synonymize it, although possibly it represents an intermediate stage between *makalaka* and *pectoralis*.

Erythropygia leucophrys zambesiana Sharpe.

Erythropygia zambesiana Sharpe, Proc. Zool. Soc., 1882, p. 588, pl. 45, fig. 2 : Tete, lower Zambesi.

Erythropygia ruficauda iubilaea Grote, Orn. Monatsb., xxxv, p. 103, 1927 : Mikandini, south Tanganyika Territory.

Characters.—Very similar to *soror*, but upper parts a trifle paler and more rufous, especially on the rump and tail.

Measurements.—Two from Lumbo, Portuguese East Africa (M. C. Z., Loveridge coll.); wing, ♂, 67.5, ♀, 69.0 mm.; tail, ♂, 63.0, ♀, 65.0 mm.; culmen from base of skull, ♂, 16.5, ♀, 17.5 mm.; tarsus, ♂, 23.5, ♀, 23.5 mm.

Range.—Coastal districts (sea-level to about 1000 feet) of Portuguese East Africa from the lower Limpopo Valley north to Mikindani in southern Tanganyika Territory, inland to Tete, and the Shire Valley.

Remarks.—The two Lumbo birds agree exactly with Sharpe's plate and description. This race has been recorded from many localities in the middle Zambesi and Katanga districts (e. g. Victoria Falls, Kafue R., Dikulwe R., Lufira R., Lufupa R., Chambesi R., Etc.), but I am not satisfied that these records should not be referred to *makalaka*, which is easily distinguishable by its darker, and more widely white tipped tail.

Erythropygia leucophrys munda (Cab.).

Thamnobia munda Cabanis, Orn. Centralb., 1880, p. 143 : Malandge, Angola (cf. Reichenow, Vög. Afr. iii, p. 771).

Erythropygia ansorgii O..—Grant, Bull. Brit. Orn. Cl., xxxiii, p. 134, 1914 : Malandje, Angola.

Characters.—Top of head grayish brown; mantle reddish brown; rump and upper tail-coverts russet; inner secondaries edged with light brown; breast streaked with brownish black; flanks uniform; middle rectrices dark brown, reddish towards their bases.

Measurements.—One male from Boma, Belgian Congo (A. M. N. H.); wing, 67.0 mm.; tail 62.0 mm.; culmen from base of skull, 16.5 mm.; tarsus, 23.0 mm. Two from Luluabourg, Belgian Congo (A. M. N. H.); wing, ♂, 64.0, sex ?, 63.0 mm.; tail, ♂, 59.0, sex ?, 57.0 mm.; culmen, ♂, 15.0, sex ?, 15.5 mm.; tarsus, ♂, 23.0, sex ?, 22.5 mm. One male from Quanza River, Angola (A. N. S. P.); wing 69.0 mm.; tail, 66.0 mm.; culmen, 16.0 mm.; tarsus, 25.0 mm.

Range.—Northern Angola, north to the Congo mouth, inland to the Luluabourg district.

Remarks.—The two Luluabourg birds have browner heads, slightly less brown tails, and seem to approach *makalaka*, which appears to range northward to the southeastern Congo. The Quanza River bird approaches *ovamboensis* in its slightly larger size, more rusty flanks, and paler edges to the secondaries.

Erythropygia leucophrys ovamboensis Neumann.

Erythropygia munda ovamboensis Neumann, Jour. f. Orn., 1920, p. 83: Ombongo, Ovampoland.

Erythropygia leucoptera permutata Grote, Orn. Monatsb., 1930, p. 187: Huxe, Benguella, Angola.

Characters.—Similar to *munda*, but larger, paler above, more rusty on the flanks, less streaked on the breast; secondaries distinctly edged with whitish; rectrices broadly tipped with white.

Measurements.—One male from Capelongo, Angola (A. M. N. H.); wing, 70.5 mm.; tail, 68.0 mm.; culmen from base of skull, 18.5 mm tarsus, 25.5 mm. Two from Chobe River, Bechuanaland (A. N. S. P., de Schauensee coll.); wing, ♂, 75.0, ♀, 68.0 mm.; tail, ♂, 68.0, ♀, 64.0 mm.; culmen from base of skull, ♂, 18.0, ♀, 18.5 mm.

Range.—Southern Angola, through Ovampoland to the Lake Ngami region.

Remarks.—The Angola specimen should be *permutata*, but I can find no appreciable difference between it and the Chobe R. (northeast of Lake Ngami) examples. One of these latter specimens has slightly more red in the tail, and may indicate intergradation with *makalaka* thereabouts.

Erythropygia leucophrys pectoralis Smith.

Erythropygia pectoralis A. Smith, Rep. Exped. C. Afr., p. 46, 1836 : between Orange River and Kurrichane.

Characters.—Similar to *leucophrys*, but more rufous above.

Measurements.—One male from "Cape of Good Hope" (A. N. S. P); wing, 70.0 mm.; tail, 66.0 mm.; culmen, 17.0 mm.; tarsus, 25.0 mm.

Erythropygia leucophrys leucophrys (Vieill.)

Sylvia leucophrys Vieillot, N. Dict. d'Hist. Nat., xi, p. 191, 1817 : Gamtoos River, eastern Cape Province.

Characters.—Head and back distinctly more grayish brown than reddish; inner secondaries edged with pale brown; breast and flanks conspicuously streaked with dark brown; tail brownish black, tipped with white.

Measurements.—One, sex ?, from Port Natal (A. N. S. P.); wing, 70.0 mm.; tail, 68.0 mm.; culmen from base of skull, 17.0 mm.; tarsus, 26.0 mm. One, sex ?, from Etchowe, Zululand (A. N. S. P.); wing, 70.0 mm.; tail, 67.0 mm.; culmen, 17.5 mm.; tarsus, 26.5 mm.

Range.—Eastern Cape Province, from the Gamtoos River north to Natal and southern Portuguese East Africa (Coguno).

Key to Subspecies of Erythropygia Leucophrys.

I. Central rectrices mostly rufous.
  A. Secondaries conspicuously edged with white; top of head grayish.
    a1. Breast only faintly streaked.
      a2. Top of head gray, contrasting with russet of back.
        a3. Larger (wing 67–74) and darker.....*leucoptera*
        b3. Smaller (wing 62–69) and paler.....*eluta.*
      b2. Top of head brownish gray, back more chestnut; wing 64–69 mm.....*vulpina.*
    b1. Breast distinctly streaked; wing 68–77 mm.
      c2. Upper parts browner.....*brunneiceps.*
      d2. Upper parts more rufous.....*sclateri.*
  B. Secondaries edged with brown.
    c1. Central rectrices rufous, tipped with blackish.
      e2. Breast heavily streaked with blackish.
        c3. Larger (wing 67–71.5 mm.); tail broadly tipped with white.....*jungens.*
        d3. Smaller (wing 64–66.5 mm.); tail more narrowly tipped with white.....*vansomereni.*
      f2. Breast streaks browner and less sharply defined.
        e3. Upper parts darker and browner.....*soror.*
        f3. Upper parts paler and redder.....*zambesiana.*
    d1. Inner webs of middle rectrices washed with brownish black.
        g3. More rufous above; inner web of middle rectrix more washed with black.....*makalaka.*
        h3. Browner above; inner web of middle rectrix less washed with black.....*ruficauda.*

II. Central rectrices mostly blackish or dark brown.
  C. Top of head distinctly grayer than the back; flanks not streaked.
    e1. Smaller (wing 63–69 mm.), darker above, flanks less rusty, secondaries edged with pale brown.....*munda.*
    f1. Larger (wing 68–75 mm.), paler above, flanks more rusty, secondaries edged with whitish.....*ovamboensis.*
  D. Top of head brownish, like the back; flanks streaked.
    g1. Back more rufous.....*pectoralis.*
    h1. Back more grayish brown.....*leucophrys.*

Vol. 47, pp. 169–172 October 2, 1934

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW SALAMANDER FROM OREGON, WITH NOTES ON RELATED SPECIES.

BY SHERMAN C. BISHOP.

Among some salamanders recently received alive from Oregon are six adults of a large Plethodon quite distinct from any described species. The specimens came from Eagle creek, Clackamas County, near Portland, and from a locality just outside the city limits of Portland itself. The same general region also supplied several individuals of *Ambystoma gracile*, *Ensatina eschscholtzi* and the Plethodon which has been known as *P. intermedius* Baird.

Plethodon dunni, n. sp.

Description.—This is a rather long and slender species with the head only moderately broad in the female but distinctly widened above the angle of the jaws in the male. The eyes are large and prominent with the iris tinged with brassy. In five specimens, the costal grooves are 15, counting one each in the axilla and groin. In one there are 14 on one side and 15 on the other. The groove immediately anterior to the groin is incompletely developed in all specimens and sometimes joins the one in the groin. If this one is left out of consideration, the count is 14. There are 3–3¾ intercostal spaces between the appressed toes.

The vomerine series is long in the female, the teeth varying in number from 8 to 13. The series originate behind the middle of the inner nares and curve inward and backward, separated posteriorly and from the parasphenoid patches by a distance about equal to the diameter of a naris. In the type, the vomerine teeth of the left side are nearly or quite continuous with the parasphenoids; in the other specimens they are distinctly, though narrowly separated. In the male the vomerine teeth are fewer in number, 6 to 8 in each series.

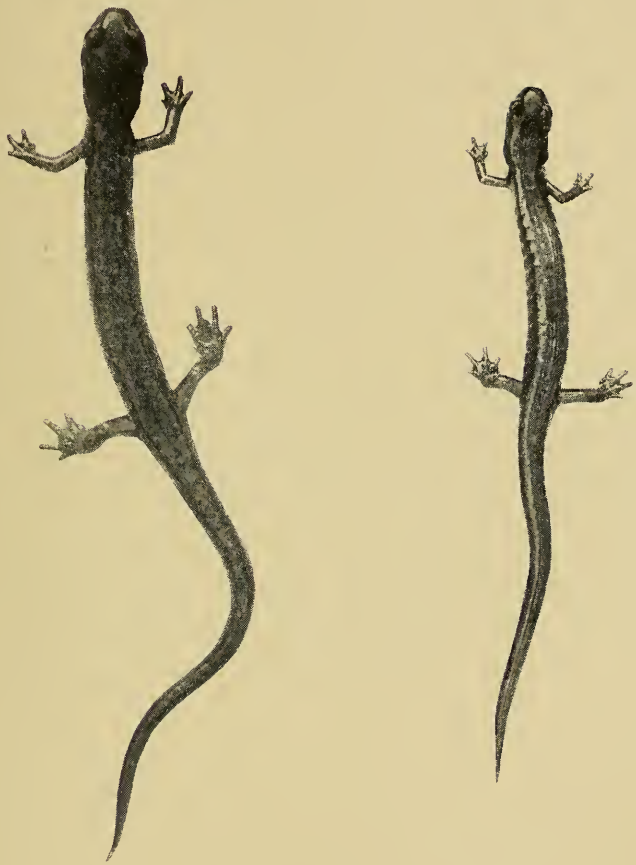
In life, the ground color of the upper sides is deep brown fading to pale slate toward the belly. The broad dorsal band is dull tan with tinges of greenish and flecked with black or dark brown spots of irregular size and shape. The sides are distinctly mottled with small, irregular, white and tan markings. There are fewer dark markings within the dorsal band on

the tail so that the color is brighter in this region, dull yellow with greenish tints. The legs are mottled and the head above is quite uniformly dull brownish yellow. The throat, belly and lower surface of the tail and limbs are slate color flecked with many small pale spots. In one specimen, the dorsal band is quite dark and there is evident a tendency toward melanism.

In alcohol, the ground color of the sides becomes dark brown or slate and the dorsal band fades to dull tan or dirty white.

MEASUREMENTS.

Locality	*Date*	*Sex*	*Length in mm.*				*Vomerine teeth*	*Costal folds between toes*
			Total	*Snout to vent*	*Head*	*Tail*		
Portland, Ore.	Dec. 23, 1933	♀	130	65.5	13.5	64.5	right 9; left 13	3
" "	Jan. 13, 1934	♀	131	66.5	14	64.5	right 9; left 12	3–½
Eagle creek near Estacada, Clackamas Co., Oregon	Jan. 27, 1934	♀	124.5	59.5	13	65	right 8; left 10	3–½
" "	"	♂	98	51	12	tip lost	series imperfect	3–¾
" "	"	♂	120	61	14	59	6–6	3–½
" "	"	♂	103	59	13	—	8–8	3–½



1. *Plethodon dunni*, n. sp. Adult male, natural size.
2. *Plethodon vehiculus* Cooper (*intermedius* Baird).

Type.—An adult female, 131 mm. long collected by Stanley G. Jewett, Jr.

Type locality.—Just outside the city limits of Portland, Oregon in Clackamas county, January 13, 1934. Type in the U. S. National Museum.

Remarks.—While studying type material at the National Museum, I was fortunate to encounter Dr. E. R. Dunn who called my attention to the figure of *Ambystoma vehiculum* Cooper, from Astoria, Oregon, in volume 12 of the Pacific R. R. Survey report for 1860.[1] Dunn suggested that the name might be available for the species from Portland. An examination of the figure, however, and reference to Dr. Dunn's notes revealed that the species long known as *Plethodon intermedius* Baird[2] is, in fact, the species figured by Cooper and should be known as *Plethodon vehiculus.*

J. G. Cooper, attached to the survey as collector, reported on the "reptiles" and among several other salamanders, figured *Ambystoma vehiculum.* (Plate 31, fig. 4.). Following the legend of plate 31 is the parenthetical note, "(not yet published)." This note evidently refers to the salamanders figured, accounts of which were to have appeared at some later date. The series of survey reports closed with volume 12 and apparently nothing more was published. The figure is an excellent one and leaves no doubt as to the identity of the species.

Plethodon dunni is evidently related to *Plethodon vehiculus* and has a similar costal groove count. It is easily distinguished by its larger size, distinctly different color, greater number of vomerine teeth, more compressed tail, more strongly mottled sides and the marked sexual dimorphism in a widened head and short vomerine series of the male. It differs from *P. elongatus* in its lower costal groove count, in body proportions, and color.

The species is named in honor of Dr. E. R. Dunn whose careful studies of salamanders have been so useful to all herpetologists.

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[1] Cooper, J. G. Reports of the Explorations and Surveys from the Mississippi River to the Pacific Ocean. 12(2) rept. 4:292-306, pl. 31, fig. 4.

[2] Baird, S. F. Proc. Acad. Nat. Sci. Phila. 1867, p. 209.

Vol. 47, pp. 173–174 October 2, 1934

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW ERIGERON FROM CALIFORNIA AND NEVADA.

BY S. F. BLAKE.

Among specimens of Asteraceae sent me for study by Dr. Philip A. Munz of Pomona College, Claremont, California, are two sheets of dwarf Erigeron that represent an undescribed species and variety of the *Erigeron tener* group.

Erigeron uncialis Blake, sp. nov.

Perennis caespitosus pygmaeus scaposus, caudice ramoso; folia rosulata scapo breviora integra ubique subdense pilosa, lamina parva obovata v. suborbicularia v. oblanceolata acuta v. obtusa in petiolum multo longiorem cuneate angustata; scapus nudus uncialis dense patenti-pilosus; capitula solitaria parva radiata; involucri 4 mm. alti ca. 3-seriati paullum gradati v. subaequalis phyllaria lineari-lanceolata acuta v. acuminata dense pilosa, medio viridi, margine subscarioso et (interiora) saepe rosaceo; radii ca. 25–35 sicc. pallide rosacei; achenia compressa subsparse strigosa; pappi sparsi subsimplicis setae ca. 16, setulis minimis inconspicuis.

Caudex up to 8 cm. long, the branches clothed at tip with the bases of the previous year's leaves; leaves several or numerous, crowded in a rosette; petiole slender, narrowly herbaceous-margined, somewhat ampliate at base, 7–15 mm. long, densely spreading-pilose especially on margin with few-celled, slender, acuminate, not tuberculate-based hairs; blade suborbicular to obovate or oblanceolate, 3.5–10 mm. long, 2.8–5 mm. wide, usually minutely apiculate, light green, 1-nerved, inconspicuously reticulate-veined, rather firm, evenly but not densely antrorse-pilose on both surfaces and obscurely glandular-granular, or the lower often glabrous or glabrate beneath; scape very slender, 1.5–2.5 cm. high, naked or rarely with a minute bract; head about 1.2–1.5 cm. wide; phyllaries appressed, about 0.7 mm. wide, densely spreading-pilose and obscurely glandular-granular on the greenish center, this slightly thickened, 1-vittate, usually 1-sulcate, the subscarious narrower to broader margin essentially glabrous, often rosy-tinged especially in the inner phyllaries; rays (in dried specimens) white, more or less strongly pink-tinged, the tube puberulous above, 1.8 mm. long, the lamina narrowly elliptic, 2–3-denticulate, 4–6-nerved, 5 mm. long, 1.2–1.5 mm. wide; disk corollas pale yellow, greenish toward

tip, with brown-purplish teeth, sparsely pilosulous toward base of tube, about 2.7 mm. long (tube 0.6–0.7 mm., throat slender, 1.5 mm., teeth ovate, obtusish, papillose-margined, 0.5 mm. long); achenes oblong, 1.5 mm. long, with thickened margins; pappus bristles whitish, in the ray about 8, 2 mm. long, in the disk about 16, 2.5 mm. long, the setulae more numerous, about 0.2 mm. long; style branches with short deltoid obtusish hispidulous tips.

California: Clark Mountain, eastern San Bernardino Co., alt. 2135 m., June 1933, *E. C. Jaeger* (type no. 187357, Herb. Pomona College; duplicate in U. S. Nat. Herb.).

Erigeron uncialis var. **conjugans** Blake, var. nov.

Folia in petiolo antrorso– v. subpatenti-ciliata, in lamina similiter pilosa, subtus interdum glabra; scapus suberecto- v. adscendenti-pilosus infra capitulum patenti-pilosus; involucrum subdense patenti-pilosum et parum puberulum pilis brevissimis subglandularibus.

Nevada: In crevices of vertical rock faces, Big Falls, Kyle Canyon, Charleston Mountains, Clark Co., alt. 2745 m., 3 Sept. 1927, *C. Leo Hitchcock* (type no. 159586, herb. Pomona College; duplicate in U. S. Nat. Herb.).

This attractive little plant is evidently most closely related to *Erigeron tener* A. Gray. The form taken as type of the species is distinct from *E. tener* in pubescence as well as its dwarfer habit and normally bractless scapes, but the variety, although clearly a member of the same species, makes some approach to *E. tener* in pubescence. In *E. tener* the leaves and the scapiform, several-leaved or -bracted stems are densely or sometimes rather sparsely strigillose or strigose, without spreading hairs; the heads almost always decidedly larger; the rays (in dried specimens) violet; and the involucre densely glandular-puberulous and almost always also somewhat spreading-hirsute chiefly on the outer phyllaries.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW GENUS AND SPECIES OF WATER-STRIDER FROM THE WEST INDIES—GERRIDAE: HEMIPTERA.

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

In working over a small collection of water-striders from the West Indies, recently received from the United States National Museum, the following new species of Halobatinae was found.

Eobates, gen. nov.

Apterous form: Fusiform, smooth, shiny, considerably elongated. Head about twice as long as broad between the eyes, rather strongly constricted near the middle above, strongly protruding in front of the eyes, the anteocular part as long as the remaining portion. Vertex broad, arched, higher than the eyes. Eyes as seen from above large, broadly rounded exteriorly, oblique, widely separated, inserted in front, very faintly emarginate within, the posterior third extending along the sides of pronotum. Antennal tubercles moderately prominent. Antennae slightly shorter than body; segment I very long, stoutest, subequal to the next two conjoined; II and IV subequal; III slightly longer than II. Rostrum extending to mesosternum. Pronotum long, produced behind and reaching almost to the base of mesonotum; anterior margin nearly straight. Abdomen about as long as pronotum, somewhat nymphal-like in appearance. Metasternum distinctly divided, the orifice of metastethial gland not prominent. Front legs long; femur strong, elongate, nearly straight; tibia stout, about as long as femur, slightly flattened at apex; tarsus more than one-fourth of the length of tibia, the first segment long and about two-thirds the length of second, claws inserted at apical third of second segment. Intermediate and hind legs very long, the femora slightly longer (female) or distinctly longer (male) than entire head and body conjoined.

Macropterous form: Pronotum strongly developed, the humeri raised and prominent, the apex of hind lobe subtruncate. Hemelytra extending beyond tip of abdomen, opaque, with prominent nervures.

Genotype: Eobates morrisoni, sp. nov.

Certain characters of this genus remind one of *Limnogonus* of the Gerris-group of the family, although it belongs to the Halobates-group. It differs

from other genera of the Halobatinae in the structure of the antennae, head, anterior legs, and length of middle and hind legs.

Eobates morrisoni, sp. nov.

Apterous form: Moderately large, elongate, brown, with black stripes. Head brownish, a large spot in front of vertex, and a large spot on each side opposite the eye, black. Eyes black, from above about twice as long as wide. Antennae brownish black; segment I slightly curved, proportions—(♀) 115 : 52 : 63 : 52. Pronotum broadly rounded behind, there margined with yellowish brown; a broad margin along each side (connected behind so as to form a U-shaped stripe) and a broad stripe along each side of median line black. A large spot on each acetabulum and on each side of the pronotum, the upper portion and a broad stripe on each side of mesothorax, most of the superior surface of metathorax and abdomen, and margin of connexiva, black. Body beneath brown. Anterior tibiae and tarsi dark. Intermediate legs slightly longer than hind ones.

♂. Legs longer and stouter than in female, antennae also slightly longer. Last venter one-fourth longer than the preceding segment. Connexiva tapering on last sgement, not produced behind. First genital segment with the hind margin as seen from the side slightly, roundly produced posteriorly.

♀. Last venter one-half longer than the preceding segment, subtruncate behind. Connexiva not produced behind.

Holotype, male, and *allotype*, female, S. Francisco Mts., St. Domingo, West Indies, Busck collector, U. S. National Museum. *Paratypes* collected at type locality, Aug. Busck; from Blanton mine, North of San Christobal, Republic St. Domingo, July 26, 1917, Harold Morrison, collector; and Mariam, Haiti, Dec. 30, 1925, W. A. Hoffman, collector.

This species is named in honor of Dr. Harold Morrison who has taken an unusually active interest in the insect fauna of the Americas. The species can not be readily confused with any known American water-strider.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

OBSERVATIONS ON THE BUTTERFLIES OF APPLE ORCHARD MOUNTAIN, BEDFORD COUNTY, VIRGINIA.

BY AUSTIN H. CLARK.

In furtherance of our plan of making a detailed survey of the butterflies of Virginia, Mrs. Clark and I spent the week of July 22–28, 1934, on Apple Orchard Mountain in Bedford County, where we made a preliminary study of the local species.

In North Carolina, South Carolina and Georgia much has been done in surveying the interesting butterfly fauna of the higher mountain regions, but the mountains of Virginia have received little attention and there are extraordinarily few published records. Quite a number of species are known from Pennsylvania or Maryland and again from North Carolina or even further south that as yet have not been recorded from Virginia.

Although most of the butterflies included in the present list are wide-ranging species, some of them are of much interest, and one has not, so far as we are aware, heretofore been definitely recorded from the state.

Apple Orchard Mountain rises to a height of about 4,280 feet above sea level, and the camp at which we stayed is situated near its sumit at an altitude of from 3,600 to 4,000 feet.

By far the most abundant butterflies were *Papilio philenor* and *Epargyreus tityrus*, both of which occurred in almost incredible abundance about the milkweed flowers. They were also the butterflies most frequently seen in the woods. *Danais plexippus* was very common, but about the milkweed flowers *Papilio philenor* outnumbered it about eight to one, and *Epargyreus tityrus* was even more numerous. With these on the milkweed flowers there were, in order of decreasing abundance, *Papilio glaucus, P. troilus, P. polyxenes, Argynnis cybele,* and *A. aphrodite.* But all of these together were fewer in numbers than *Danais plexippus.*

Papilio philenor began to fly, in small numbers and in indolent fashion, before sunrise, and a few were on the wing until nearly dark, sharing the milkweed flowers with numerous sphingids. *Epargyreus tityrus* was on the wing nearly, though not quite, as long.

The butterflies of the open fields were surprisingly few, and even *Phyciodes tharos* and *Everes comyntas*, though common, were far from abundant. The very small number of skippers of the subfamily Hesperiinae is noteworthy.

Interesting features of this region are the unusual abundance of moths of the genus *Catocala* throughout the forests, and at dusk of several different species of sphingids coursing about the open places and hovering before the evening primrose and milkweed blossoms.

Specimens of all the butterflies included in the following list were captured and brought home for examination with the single exception of *Neonympha eurytus* of which only two were seen, one, however, at very close range.

FAMILY NYMPHALIDÆ: Subfamily Satyrinæ: *Enodia portlandia;* three of these butterflies were seen within a distance of 40 or 50 feet along the Mons trail on the southeastern side of Rich Mountain, and one on the road about half a mile below the camp. *Neonympha eurytus;* two were seen along the trail to Greenlee on the west side of Apple Orchard Mountain, July 26. *Cercyonis alope;* frequent on brushy slopes.

Subfamily Nymphalinæ: *Basilarchia arthemis astyanax;* not very common, but seen occasionally along the roads, and also along the more open portions of the trail near the summit of Apple Orchard Mountain. *Pyrameis atalanta;* occasional in the more open portions of the trails, and in open places near the woods. *P. virginiensis;* occasional on milkweed. *P. cardui;* one freshly emerged female taken on milkweed in a bushy pasture on Big Onion Mountain, July 25. *Vanessa antiopa;* near the summit of Apple Orchard Mountain, July 22. *Polygonia interrogationis;* one taken along the road about half a mile below the camp, July 26. *P. comma;* a male and a female taken July 23; not common. *P. progne;* common along the roads and the more open portions of the trails. *Phyciodes nycteis;* three taken, July 22, 23, and 27, the first in the woods within a mile from the summit of Apple Orchard Mountain, the others in fields on the mountain side. *P. tharos;* common, though not abundant, in all open places. *Argynnis diana;* four males were met with at widely separated points, two on Apple Orchard Mountain not far above the camp, July 22; one on the east side of Rich Mountain on the Mons trail, July 23; and one about three miles further along the trail to Mons, July 27; all were in or near the woods. *A. cybele;* common on milkweed in all open places, and occasional in the woods; nearly all the individuals were much worn. *A. aphrodite;* common on milkweed in all open places; most of the individuals were much worn, but some of the females were freshly emerged. *Euptoieta claudia;* one met with in the open field on the saddle between Apple Orchard and Big Onion mountains.

Subfamily Danainæ: *Danais plexippus;* abundant in all open places, and occasional throughout the woods; mated pairs were very common in the fields; eggs and young and full grown caterpillars were found.

Family LYCÆNIDÆ: Subfamily Lycæninæ: *Chrysophanus phlœas hypophlœas;* common in all open fields. *Everes comyntas;* common in open

fields. *Lycænopsis argiolus pseudargiolus;* the commonest butterfly in the woods; seen everywhere along the roads and trails, and about the borders of the woods.

Subfamily Theclinæ: *Strymon melinus;* three seen, one in an open field, July 24, and two along trails in the woods, July 25, and 27. *S. cecrops;* two taken in a brushy pasture on the side of Big Onion Mountain, July 25.

Family PAPILIONIDÆ: Subfamily Pierinæ: *Eurema lisa;* frequent at the foot of Apple Orchard Mountain, July 28. *Eurymus eurytheme;* common in all open fields; all seen were more or less deep orange, except for white females. *E. philodice;* one or two seen every day in the fields; by no means so common as the preceding. *Pieris rapæ;* occasional at the foot of Apple Orchard Mountain, July 28.

Subfamily Papilioninæ: *Papilio philenor;* exceedingly abundant in all open places, and frequent throughout the woods. *P. glaucus;* common in all open places, and occasional in the woods; most of the females were black, but a few yellow ones were seen. *P. troilus;* common in all open places, and occasional in the woods. *P. polyxenes;* common in all open places. *P. marcellus;* one taken on Apple Orchard Mountain about a mile from the summit, on milkweed, July 28.

Family HESPERIIDÆ: Subfamily Pyrginæ: *Epargyreus tityrus;* exceedingly abundant in all open places and common in the woods; the caterpillars were found on *Robinia pseudacacia*, and in the woods on *Falcata comosa. Achalarus lyciades;* occasional on brushy mountain sides. *Thanaos icelus;* a very battered individual taken in an open field, July 22. *T. persius;* occasional in open fields. *T. lucilius;* occasional in open fields and on brushy mountain sides. *T. martialis;* one female on the trail to Mons on the east side of Rich Mountain, July 27. *T. juvenalis;* frequent in open fields. *T. horatius;* frequent in open fields.

Subfamily Hesperiinæ: *Atalopedes campestris;* frequent in open fields. *Atrytone ruricola;* frequent in the more open places in the woods, and along the borders of the woods. *Amblyscirtes vialis;* occasional along the borders of the woods and along the roads.

Notes.—*Argynnis diana:* the flight of this species resembles that of *A. cybele* but is higher, stronger, and faster, though with somewhat slower wing beats. It suns itself on a leaf with the wings outspread like *A. cybele* and, like that species, feeds commonly with the wings fully extended. It is more shy than *A. cybele*, and keeps more to the woods. The first one seen dashed at two *Papilio philenor* that were fluttering about together about three feet above some milkweeds. I have never noticed aggressiveness of this sort on the part of *A. cybele.* The odor of this butterfly is unusually strong and resembles that of wild roses, though it is slightly more spicy. It is sweeter and less spicy than that of *A. cybele.*

Enodia portlandia: The flight is strong, rapid, and very irregular, quite without the skipping characteristic of our other satyrids. The butterfly dodges about low down in the bushes, frequently perching head down on a tree trunk or rock, or on the under side of a twig or upper side of a leaf. It is shy and quick, and in its actions is more like a vanessid than it is like our other satyrids.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A RACE OF DIPODOMYS MERRIAMI FROM ARIZONA.

BY SETH B. BENSON,

Museum of Vertebrate Zoology, University of California, Berkeley, California.

Among the mammals collected by Miss Annie M. Alexander and Miss Louise Kellogg in Arizona in the fall of 1932 was a series of extraordinarily dark-colored Merriam kangaroo rats. This series was obtained in the vicinity of Vulcan's Throne which is a cinder cone standing on the north rim of the gorge of the Colorado River in the lower end of Toroweap Valley. Field parties led by Miss Alexander during 1933 and 1934 have collected more specimens from this locality and, in addition, have obtained specimens of Merriam kangaroo rats from many other localities in Arizona, including forty-eight topotypes of *Dipodomys merriami merriami* Mearns. These specimens, together with those already present in the Museum of Vertebrate Zoology, are the basis for the description which follows and for the accompanying comments upon the geographical variation in this species in Arizona. The race from Toroweap Valley may be known as:

Dipodomys merriami vulcani, new subspecies.

Type.—Adult male, skin and skull, no. 56002, Mus. Vert. Zool.; from the lower end of Toroweap Valley (about ½ mile east of Vulcan's Throne), Mohave County, Arizona; collected November 11, 1932, by Annie M. Alexander; original number 2064.

Distribution.—Known only from type locality.

Diagnostic characters and comparisons.—A race of *Dipodomys merriami* characterized by dark, dull dorsal color. Similar to *Dipodomys merriami merriami* Mearns (represented by forty-eight topotypes) in size (see measurements) and skull characters, but distinctly darker in general dorsal coloration; dusky markings on nose and at base of vibrissae darker and more extensive; soles of hind feet more extensively blackish; dorsal and ventral tail stripes

darker and wider; dusky hairs on leg above heel much darker; hairs on outer side of foreleg near elbow colored like hairs on back rather than white.

Color.—(capitalized color terms after Ridgway, Color Standards and Color Nomenclature, 1912). Basal portion of dorsal hairs Slate Gray in *vulcani*, Gray (Deep Gull Gray) in *merriami*; subterminal band close to Pinkish Buff in both races, but narrower in *vulcani;* terminal portion of hair heavily tipped with dusky in *vulcani*, only lightly in *merriami.* In *vulcani* the color of the basal portions and tips of the hairs dominates the general color tone of the dorsal surface; in *merriami* the color of the subterminal band dominates.

Specimens examined.—Twenty-four from the type locality.

Remarks.—The dark color of *vulcani* is probably correlated with the color of the volcanic cinders which cover the ground in the vicinity of Vulcan's Throne.

A study of the topotypes of *D. m. merriami* and of numerous specimens of this species from more than 175 localities in the Southwest from Texas to California present in the Museum of Vertebrate Zoology prompts the following remarks concerning the geographic variation in this species in the United States. As now generally understood, the race *merriami* inhabits the Southwest from western Texas west to the western edge of the Mohave Desert and north in the Great Basin at least as far as Pyramid Lake, Nevada. The race *D. m. simiolus* Rhoads occupies the Colorado Desert of California and the extreme southwestern part of Arizona. On the Pacific slope drainage of California are several other segregates of the *merriami* group which do not concern us here.

Several names have been proposed for geographic variants within the area now ascribed to the race *merriami*, but Grinnell (Univ. Calif. Publ. Zool., **24**, 1922, 73–77) synonymized these names with *merriami.* More recently Swarth (Proc. Calif. Acad. Sci., **18**, 1929, 356–359) proposed the name *olivaceus* for a race from Fairbank, Arizona.

In Arizona the darkest Merriam kangaroo rats are from Toroweap Valley, the palest are from Yuma and south of Yuma along the valley of the Colorado River. Between these extremes, and from areas more or less intermediate geographically, all degrees of intergradation are present. South of the Colorado River, Merriam kangaroo rats inhabit the area south and west of the Mogollon Plateau. Those from nearest the plateau and in the northwest, from Sacramento Valley, New River, Arlington, Solomonsville, Dos Cabezos, Fairbank, San Bernardino Ranch, are relatively dark in color. Specimens from the area between these localities and Yuma grade toward *simiolus.* Specimens from California and Nevada exhibit various degrees of approach toward *simiolus* on the one hand and topotypes of *merriami* on the other. Specimens from St. George, Utah, closely approach topotypes of *merriami* in dark color. Among specimens from the edge of the Virgin Valley, 6 and 10 miles north of Wolf Hole, Arizona, are examples as dark as *vulcani*, indicating intergradation with that race.

Although topotypes of *merriami* are perceptibly darker than the majority of specimens ordinarily ascribed to that race, it is not deemed advisable to

restrict the name *merriami* to the darker kangaroo rats of central Arizona. It would be difficult at present to define satisfactorily the race or races included in the population of kangaroo rats intermediate in character between *merriami*, represented by topotypes, and *simiolus*, because the amount of geographic variation in color, size, and skull characters is small, and largely obscured by a great amount of individual variation in these characters.

In his description of *D. m. olivaceus* Swarth (*loc. cit.*) drew comparisons between the specimens from Fairbank and specimens from the vicinity of Tucson, assuming the latter to be typical of *merriami*. He stated that *olivaceus* was not a strongly marked form. Although specimens from Fairbank and from near Tucson undoubtedly do differ in the manner described by Swarth, there are no distinctive differences between specimens from Fairbank and from New River either in color, size, or skull characters. Consequently, it is best to regard *olivaceus* as a synonym of *merriami*.

It appears best for the present to retain the usage of the name *merriami* as applied by Grinnell (*loc. cit.*) while recognizing that the kangaroo rats included under that name vary from specimens nearly as dark as *vulcani* to specimens nearly as pale as *simiolus*.

MEASUREMENTS, IN MILLIMETERS AND GRAMS, OF TOPOTYPES OF *Dipodomys merriami merriami* AND *Dipodomys merriami vulcani*.

[Measurements of skull according to method described by Grinnell (Univ. Calif. Publ. Zool., **24**, 1922, 4–7).]

	Total length	Tail length	Hind foot	Ear from notch	Ear from crown	Head and body	Weight	Greatest length of skull	Breadth of skull across bullae	Spread of maxillary arches	Greatest length of nasals	Greatest width of rostrum near end	Width of maxillary arch at middle
						merriami (adult males).							
Number of specimens	27	27	27	16	11	27	27	27	27	27	27	27	27
Mean	247	146	37	11	15	101	40.9	35.9	22.9	19.6	13.3	3.1	5.1
Minimum	234	132	35	10	14	94	34.3	34.8	22.0	18.5	12.7	2.8	4.4
Maximum	262	164	39	11	16	108	45.9	37.4	23.9	20.6	13.9	3.4	5.5
						merriami (adult females).							
Number of specimens	21	21	21	14	7	21	21	21	21	20	21	21	21
Mean	242	142	37	11	15	100	37.7	35.4	22.9	19.7	13.2	3.1	5.1
Minimum	232	132	34	10	14	95	34.2	34.2	21.9	18.4	12.6	2.9	4.7
Maximum	256	153	38	11	15	105	41.5	36.6	24.1	20.4	14.1	3.4	5.5
						vulcani (adult males).							
Number of specimens	10	10	10	10	—	10	10	9	9	9	10	10	9
Mean	242	143	38	10	—	99	38.3	35.4	22.8	19.7	13.4	3.2	5.1
Minimum	228	135	37	9	—	92	29.8	34.0	21.8	18.2	13.1	3.1	4.6
Maximum	252	152	39	11	—	105	44.4	36.7	23.4	20.1	14.2	3.5	5.7
						vulcani (adult females).							
Number of specimens	14	14	14	14	—	14	14	14	14	10	13	14	14
Mean	235	137	38	10	—	98	37.1	35.2	22.2	19.1	13.1	3.2	5.1
Minimum	227	130	36	9	—	92	31.4	34.1	22.0	18.0	12.4	3.0	4.7
Maximum	244	145	40	11	—	105	51.5	36.6	23.6	20.1	13.8	3.6	5.6

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW OREGON PLANTS.

BY M. E. PECK,

Willamette University, Salem, Oregon.

The State of Oregon, with its strongly diversified and for the most part sparsely populated territory, is still very imperfectly known botanically, as the following list of new species and varieties indicates. The types of these are in the Herbarium of Willamette University except the two collected by Mrs. Lilla Leach, which are in her private collection in Portland, Ore.

SCIRPUS MICROCARPUS Presl, var. *longispicatus, var. nov.*, inflorescentia simplice ramis paucis longissimis folia involucri multo excedentibus; spiculis magnis 6–8 mm. longis.

Type, *Peck* 13332, low woods, Rockaway, Clatsop Co., July 3, 1924. A well marked local variety of the northern Oregon coast, chiefly remarkable for its large spikelets, but intergrading with the typical form.

RUMEX MEXICANUS Meisn. var. *strictus, var. nov.*, erectus gracillimus strictusque ramis arte adscendentibus; foliis lineari-lanceolatis vel anguste oblongo-lanceolatis ad petiolos gradatim contractis; inflorescentia angusta ramis arte ascendentibus; segmentis interioribus perianthi anguste ovatis minime deltoideis.

Type, *Peck* 13924, in a wet meadow 8 mi. south of Burns, Harney Co., June 24, 1925. A very narrow-leaved, slender and strict form, quite unlike the typical plant.

ASARUM CAUDATUM Lindl. var. *viridiflorum, var. nov.*, foliis crassis pallidis saepe duplo longiroibus quam latis; calyce toto pallide viridi vel paullum purpureo-tincto appendiculis caudiformibus brevibus.

Type, *Peck* 16579, in dry coniferous woods, north end of Lake-of-the-Woods, Klamath Co., July 3, 1931. In appearance a very different plant from the typical form of the species, which was not found in the same neighborhood. It should perhaps be given specific rank, but until more definite morphological differences can be pointed out it seems better to leave it as here indicated.

Montia pallida, sp. nov., annua parva acaulescente succulentissima valde glauca pallidaque vel interdum obscure livida; foliis multis erectis

anguste linearibus vel lineari-spathulatis 3–7 cm. longis; scapis depressis plerumque brevioribus foliis; foliis involucri omnino fusis monile facientibus plerumque cum lobis duobus brevibus latisque, pedunculo e centro oriente, hoc 2–5 mm. longo, pedicellis 1–2 mm. longis; sepalis 1.5–2 mm. longis; petalis albis, 2.5–3 mm. longis apice truncato vel paullum retuso; seminibus vix 1 mm. latis nigris nitidis valde tessellatis.

Type *Peck* 1699, in a dry field near Salem, March, 1911.

An obscure little plant, seemingly quite distinct and locally plentiful. Perhaps most nearly related to *M. exigua* (T. G.) Jeps. or to *M. spathulata* (Dougl.) How.

Silene filisecta, sp. nov., caulibus singulatim vel fasciculis parvis e caudicibus brevibus orientibus simplicibus erectis gracillimis 4–7 dm. altis, subter minute puberulentibus pilis incurvatis, super medium viscidissimo-puberulis; foliis radicatis et caulinis infimis oblanceolatis vel interdum anguste obovatis obtusis vel paullum acutis in petiolos longos gracilesque contractis toto 5–10 cm. longo, reliquis 2–3 jugis linearibus vel lineari-attenuatis et maxime redactis, foliis infimis fere glabris superioribus glanduloso-puberulis; inflorescentia e 2–3 nodis summis arta, floribus paucis ramis brevibus flores 1–3 quoque ferente, bracteis subtendentibus 1–3 cm. longis, pedicellis gracilibus erectis non longioribus quam calycibus; calyce 17–20 mm. longo lobis triangulari-subulatis 4 mm. longis scarioso-marginatis tubo maxime ex parte scarioso cylindrato ad extremum capsulo paullum dilatato; petalis viridescenti-albidis interdum purpureo-tinctis 2.5–3 cm. longis calycem aliquantum excedentibus, lamina prope ad basin 4–partita, partibus exterioribus interdum ad apicem bidentatis, partibus mediis profunde partitis et interdum dentatis, partibus omnibus ultimis linearifiliformibus; squamis 2 mm. longis bipartitis lobis filiformibus, auriculis nullis sed marginibus basis laminae minute denticulatis; staminibus longo-exsertis; capsulo oblongo-ovato 12–15 mm. longo stipite 5–7 mm. longa.

Type, *Peck* 16538, in open coniferous woods near the north end of Lake-of-the-Woods, Klamath Co., July 1, 1931.

Readily distinguishable by the finely dissected petals, the only far western species to be compared with it in this particular being *S. oregana* Wats., which is otherwise not very similar.

Lesquerella Sherwoodii sp. nov., caulibus paucis vel multis e caudice brevissimo vix ligneo, adscendentibus vel prostratis copiose ramosis 1–4 dm. longis sparse vel densiore stellato-puberulis, radiis stellularum semplicibus vel bifurcatis; foliis integris vel obscure repandis plus minusve dense canescentibus interdum viridibus, infimis orbiculatis obovatis vel late spathulatis longo-petiolatis, caulinibus angustius spathulatis vel oblanceolatis; petalis luteis 6–8 mm. longis; recemis fructescentibus saepe longissimis laxisque; pedicellis 6–15 mm. longis patentibus recurvatis paullum S–formatis; siliculis dense stellatis turgidis paullum contra partitionem compressis suturis omnibus partibus aequaliter prominentibus circiter 4 mm. latis plerumque latioribus quam longis, partitione saepe perforata; ovulis 2–3 in utroque loculo.

Type, *Peck* 17859, dry lower slope of east side of Lostine River canyon, 16 mi. above Lostine, Wallowa Co., July 22, 1933.

This plant was first collected in the canyon of the Imnaha River by the late Wm. E. Sherwood, for whom it is named. It most nearly resembles, perhaps, *L. Kingii* Wats, and *L. utahensis* Rydb. of the Great Basin, and is very different from any of the other species of its own general range, both in the freely branching, nearly prostrate habit and in the form of the silicles.

Godetia pacifica, sp. nov., herba omnino puberula; caule simplice vel ramoso gracili 1–4 dm. alto; foliis paucis integerrimis anguste oblanceolatis in petiolos plus minusve distinctos contractis toto 1.5–4 cm. longo plerumque non complicatis; floribus paucis; gemmis interdum nutantibus acutis vel abrupte acuminatis apicibus loborum calycis non liberis; tubo calycis circiter 2 mm. longo in anthesi lobis plerumque ad basin et apicam liberis aliter coalescentibus praeter suturam unam petalis explicantibus fissam; petalis rhombeo-ovatis 9–13 mm. longis pallide roseo-purpureis ad apices basin versus gradatim albescentibus interdum 1–2 lineis coccineis mediis; staminibus pallide purpureis filamentis bis longioribus quam antheris oblongis obtusisque; stylo gracili filamenta breviora aequante, stigmatis flavis lobis anguste oblongis et antheras fere aequantibus; capsulis puberulis anguste clavatis paullum curvatis acute 4–angulatis lateribus leve costatis 2–2.5 cm. longis, pedicellis 1–3 mm. longis.

Type, *Peck* 16332, dry open bluff above the sea, Otter Crest, Lincoln Co., May 23, 1931; found also between Yachats and Cape Perpetua. A small coastal species, probably very local. Easily recognized by the short calyx-tube, pale color and rhombic-ovobate form of the petals, the short style with completely 4–parted stigma, and the 4–sided, clavate capsules.

Mimulus primuloides Benth. var *minimus, var. nov.*, caule 3–4 mm. longo; foliis ovatis denticulatis 4–8 mm. longis supra pilosis; pedunculis vix 2 mm. longis; calyce circiter 4 mm. longo; corolla 5–6 mm. longa tubo vix exserto lobis minus quam 1.5 mm. longis.

Type *Mrs. Lilla Leach* 4361, from Raz Lake, Wallowa Mts., August 1, 1931. An extremely dwarfed variety of this highly variable species.

Downingia willamettensis, sp. nov., caule erecto paullum stricto a basi ramoso 1–2 dm. alto; foliis late vel anguste lanceolatis denticulatis ascendentibus 5–7 mm. longis; tubo corollae anguste infundibuliforme quam calyce paullo breviore lobis labri superioris fere rectis parallelisque linearibus acutis 4 mm. longis; labro inferiore librato plano basi anguste abrupte dilatato parte latissima 10–12 mm. lata lobis valde divaricantibus rotundatis abrupte acutis; corolla tota caerulea clare praeter maculam magnam cordatum flavescenti-albidam apice ad fauces et in maculas binas oblongas flavas mergentem; columna staminali brevi fere recta, antheris dimidio e faucibus exsertis; capsulo 2.5–3 cm. longo.

Type, *Peck* 16291, in a roadside ditch 2 mi. east of Aumsville, Marion Co., July 11, 1930. Apparently of infrequent occurrence in the Willamette Valley. It appears to have been confused with *D. pulchella* Torr. From this California species it differs in the ascending rather than spreading calyx segments, erect instead of spreading lobes of the upper lip of the corolla, in having the sinuses cut below the dilated part of the lower lip,

with the lobes of the latter strongly divergent, and in the absence of folds and dark spots in the throat.

Scorzonella Leachiana, sp. nov., omnino plus minusve furfuracea; caule cum pedunculis 3–6 dm. alto graciliore; foliis 1.5–3 dm. longis angustissime lineari-lanceolatis cum 8–16 lobis linearibus divaricantibus, his 3–7 cm. longis apicibus omnibus minute calloso-truncatis; pedunculis gracilibus 2–4 dm. longis ebractiatis vel cum una bractea parva; involucro 1.5–2 cm. alto campanulato squamis lanceolatis vel ovatis omnibus forma simillibus, externis griseo-furfuraceis interioribus nigro-puberulis; capitulis 25–40-floris; ligulis clare luteis 1.5–2 cm. longis; pappo albo, paleis plerumque 10, erosis truncatis ad basin abrupte angustatis 1 mm. longis fereque 1 mm. latis arista longa valde barbellulata vel subplumosa.

Type, *Mrs. Lilla Leach* 3513, on an open slope near the juncture of the main stream of Chetco River with the South Fork, Curry Co., June 15, 1932.

Seemingly a very distinct species, the leaf-characters quite unlike anything else known to us.

Hieracium siskiyouense, sp. nov., caulibus solitariis vel 2–3 in fasciculo e rhizomate ramoso 6–11 dm. altis hirsutis pilis longis albis infra medium supra glabris et paullum glaucis; foliis caulinis 6–9 omnibus praeter suprema oblanceolatis 3–4 infimis in petiolos plus minusve distinctos gradatim contractis toto 1.5–2 dm. longo remote denticulatis vel repandis hirsutis maxime subter in nervis mediis, superioribus minoribus lanceolatis vel lanceolato-oblongis fere glabris; inflorescentia patentissima ramis longis et divaricatis gracillimis; capitulis 25–30-floris; involucro anguste campanulato 9–10 mm. alto phyllariis brevibus externis paucis, reliquis plerumque obtusiusculis late scarioso-marginatis setis nigrescentibus paucis parvisque in tergo et sparse glanduloso-puberulis; ligulis flavis 8–10 mm. longis externis infra valde villosis; pappo pallide fulvo.

Type, *Peck* 16410, wooded slope of the Siskiyou Mts. along the Middle Fork of Applegate River, 4 mi. above the mouth of Carberry Creek, southern Jackson Co., June 26, 1931. Readily distinguished by the total lack of stellate pubescence, the tall leafy stems, very diffuse inflorescence and scantiness of bristles and glands on the involucre.

Aster argillicolus, sp. nov., caulibus e rhizomatibus gracilibus ligneis vel caudicibus patentibus decumbentibus vel fere prostratis 1–2 dm. longis pilis brevibus patentibus canescentibus et supra glandulosis, foliosissimis; foliis 1.5–2.5 cm. longis linearibus vel lineari-oblanceolatis integerrimis acutis paullum complectentibus obscure 3-nervatis paullum supra redactis, pubescentia brevi aspera patente canescente; capitulis in caule 1–4; involucro minute denseque glanduloso phyllariis linearibus plerumque obtusis 3–seriatis mollibus laxis non patentibus exterioribus plerumque herbaceis; radiis 12–25 violaceis 8 mm. longis; achaeniis sericeo-villosulis.

Type, *Peck* 16666, in a stony clayey flat 6 mi. southwest of Lake-of-the-Woods, Klamath Co., July 5, 1931. Related to *A. campestris* Nutt., especially *var. Suksdorfii* Piper, but differing in the fewer heads to a stem, the softer, more herbaceous and fewer involucral bracts, and the smaller number of rays,—about half as many.

Vol. 47, pp. 189–192 October 2, 1934

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON NORTHWESTERN FLORA.

PART 1.

BY CARL S. ENGLISH, JR.

In this paper the opportunity is taken to describe four new species of plants, including three members of the Portulacaceae and one of the Gentianaceae. In addition to their interest from the botanical viewpoint, all of these plants, after being tested, have proved of definite horticultural value as rock garden subjects.

Claytonia nivalis, sp. nov.

Perennial from a thick, fleshy, elongated tap-root, 1–2 cm. in diameter; stems fleshy, numerous, 3.5–6 cm. long, bearing 2 subopposite linear leaves, 1 cm. long; basal leaves numerous, thick and very fleshy, crowded in a basal rosette, distinctly spatulate, 5–8 cm. long, 1-nerved; petiole winged only at the base, distinctly oval in cross-section above, edges of leaf blade and petiole rounded; blade pinnately veined, entire, cuneate at base, apex usually rounded or occasionally abruptly acute, 8–15 mm. broad, 2–3 mm. thick, about half as long as the petiole; inflorescence a 3–7 flowered corymb, shorter than the basal leaves or equalling them at fruiting time; pedicels about 1 cm. long; flowers clear rose pink, 2 cm. broad; sepals 2, unequal, ovate, 8–11 mm. long; petals 5, nearly cuneate, more or less truncate at apex, about 7-veined, 12–14 mm. long, 6–8 mm. wide; stamens 5, 7–8 mm. long; anthers about 2 mm. long; capsule ovoid, 3-angled, 4 mm. long; seeds, discoid, shiny, black, 2 mm. long. The measurements here compiled are based upon live material.

Radix verticalis incrassata carnosa; caules numerosi carnosi; folia basilaria numerosa spatulata petiolata 5–8 cm. longa, laminae unicostatae penninerviis; folia caulis 2 subopposita linearia 1 cm. longa; inflorescentia corymbiformis 3.5–6 cm. longa, flora 3–7; sepala ovata 8–11 mm. longa; petala cuneata truncata lucida rosea 12–14 mm. longa; capsula ovoidea; semina nigra 2 mm. longa.

WASHINGTON: Cold, north, rocky exposure near perpetual snow, at the crest of the Wenatchee Ridge about 1 mile south east of the top of

Ingalls Peak, Wenatchee Mountains, 7000 ft. elevation, Chelan Co., August 4, 1933, *English* 1732 (type in Herb. *Carl S. English, Jr.*); live plants which were grown in the garden were collected: north rocky exposure near perpetual snow, west arm of Ingalls Peak, Kittitas Co., September 3, 1932.

Piper and others have included this new species under *C. megarrhiza.* After growing, side by side for a season, the three species, *C. megarrhiza* Parry (obtained from D. M. Andrews, Boulder, Colorado), *C. bellidifolia* Rydberg (collected at Paulina Peak, Deschutes County, Oregon by the writer) and *C. nivalis* (from the Wenatchee Mountains), conclusive evidence was found, as pointed out below, to prove that the Wenatchee Mountain plant is a distinct species.

The new species, *C. nivalis,* is most closely related to *C. bellidifolia* Rydberg and *C. megarrhiza* Parry. *C. nivalis* may be distinguished from *C. bellidifolia* by the absence of the scarious dilated base of the stem leaves; corymb branches elongate; sepals 8–11 mm. long; petals clear rose color, cuneate, truncate, 12–14 mm. long. On the contrary, *C. bellidifolia* has stem leaves with a scarious dilated base; corymb branches nearly sessile; sepals 4–5 mm. long; petals white or pink-veined, rounded at apex, about 7 mm. long.

C. nivalis may be distinguished from *C. megarrhiza* by having basal leaves with petiole winged only at base, edges rounded, blade 8–15 mm. broad; corymb branches elongated; sepals 8–11 mm. long; petals clear rose, truncate at apex, 12–14 mm. long. On the contrary, *C. megarrhiza* has basal leaves 1.5–3 cm. broad, with petioles very broadly winged their entire length; corymb branches almost sessile; sepals 7 mm. long; petals white, more or less emarginate at apex, 5–10 mm. long.

Lewisia rupicola, sp. nov.

Perennial from a thick tap-root; caudex of old plants often branched at the base; stems numerous, 12–18 cm. long; basal leaves evergreen, numerous, crowded in a dense rosette, thick fleshy, entire, linear to linear-spatulate, 2–4 cm. long, 4–5 mm. broad; cauline leaves fleshy, few, 4–10 mm. long, upper glandular ciliate; inflorescence corymbose, 10–25 flowered; sepals 2, glandular ciliate, orbicular, 3 mm. long; petals 7–10, bright magenta to rose, oblong, 12–13 mm. long, 4.5 mm. broad, 5–7 parallel nerves more deeply colored, somewhat erose at apex; stamens mostly 6, two-thirds as long as the petals; capsule conical, seeds several, shiny black, about 2 mm. long, more or less pear shaped.

Radix verticalis carnosa; caules numerosi 10–25 cm. longi; folia basilaria carnosa numerosa linearia 2–4 cm. longa, 4–5 mm. lata; petala oblonga 12–13 mm. longa, lucida rosea; semina nigra.

OREGON: Described from plants in cultivation, originally collected on bare, almost perpendicular basaltic rock cliffs, 2000–3000 ft. elevation, Saddle Mountain, Clatsop County, July 23, 1931. The type specimen (Herb. Carl S. English, Jr.) was taken from the writer's garden in Portland, October 8, 1931, *Carl S. English, Jr.,* 1734. This plant is known only from the one isolated locality.

Lewisia rupicola is most closely related to *Lewisia columbiana* Howell. *L. rupicola* may be distinguished by having branches of the caudex quite slender, leaves more numerous in rosettes that are more compact and symmetrical, leaves more slender and shorter, flowers magenta rose, petals 12–13 mm. long. On the contrary, *L. columbiana* has branches of the caudex short and thick, leaves broader, of varying lengths, in a loose rosette, petals with only the veins rose colored, or white, petals 8–10 mm. long.

Talinum okanoganense, sp. nov.

Perennial from a thickened tap root 3–7 mm. in diameter; branches cespitose, numerous, short, diffuse, 1–3 mm. in diameter, more or less clothed with leaf midribs of the previous season; leaves deciduous, crowded, linear, almost terete, mucronate, acute at apex, narrowed at base, gray green, 4–12 mm. long, 1–2 mm. wide; inflorescence a terminal corymb about 2–3 cm. long, 3–9 flowered, branched from near the base, branches subtended by scarious bracts 1 mm. long; pedicels 5 mm. long; sepals ovate, mucronate, with a narrow scarious margin, 3 mm. wide, 4 mm. long; petals usually 5, occasionally more, orbicular, white, 6–7 mm. broad, 7–8 mm. long; stamens about 20, distinct to base, 5 mm. long; anthers yellow; filaments white, glandular below; style 4 mm. long, stigma capitate, three lobed; capsule decidedly three angled, ovoid, 3 mm. broad, bearing 15–25 seeds; seeds shiny black, more or less kidney shaped, about 1 mm. long.

Herba perennis; radix verticalis carnosa; caules numerosi caespitosi diffusi; folia numerosa tereta linearia glauca, 4–12 mm. longa; inflorescentia corymbiformis, 2–3 cm. longa; petala orbiculata alba, 7–8 mm. longa; semina nigra.

WASHINGTON: Live plants of *Talinum okanoganense* were collected May 27, 1933, on the bare rock ledges of the ridge north west of the junction of Sweet Creek and the West Fork of Granite Creek, Okanogan Co., elevation 4000 ft., R. 31 E., T. 37 N. In this same township other plants were collected May 28, 1933, on Fir Mountain, 5666 ft. elevation, where large areas of snow still remained on the barren north slopes at this date. This plant occurs in both the Canadian and Hudsonian plant zones. The type specimen was taken from the writer's garden August 10, 1933, *English* 1733.

Talinum okanoganense is most closely related to *Talinum spinescens* of central Washington. *Talinum okanoganense* may be distinguished by its gray leaves 4–12 mm. long and 1–2 mm. wide, midribs persistent but not thick woody spines; flowers white, in corymbs 2–3 cm. long which lie in horizontal position. On the contrary, *Talinum spinescens* has green leaves 1.5–2.5 cm. long, 2.5 mm. wide, midribs becoming thick woody spines; flowers crimson magenta in erect corymbs 15 cm. long.

Talinum okanoganense is an especially attractive little plant. It thrives in bright sunshine, opening its numerous satiny white blossoms about midday. The ease with which it adapts itself to conditions in the garden, its neat, compact habit of growth and the profusion of flowers which it offers throughout the summer, combine to make this new plant an admirable subject for horticultural use in rock gardens.

The specific name, *okanoganense*, is derived from Okanogan, the name of the county in which the plant was discovered. The county received its name in honor of the aboriginal tribe of this region.

Gentiana saxicola, sp. nov.

Perennial herb from stout roots; stems tufted, stout, erect, 1.5–3 dm. high, 1–7 flowered; leaves ovate, sessile, 2–3.5 cm. long, 1.3–2.3 cm. wide, 5–9 veined, about equalling the internodes; uppermost leaves forming an involucre; calyx tube 9 mm. long, 11 mm. wide; corolla deep violet blue, greenish dotted within, 4 cm. long, 2 cm. wide, plaited, appendages acute, entire or bifid, corolla lobes orbicular, entire, expanding; stamens united to corolla tube for half the length, 2.3 cm. long; capsule stalked; seeds brown, appendaged, long pear shape, 1.5 mm. long.

Perennis herbaceus, caulis numerus strictus glabrus, 1.5–3 dm. altus, flora 1–7, folia integerrimis ovata sessilis 2–3.5 cm. longa; calyx tubis 9 mm. longus, lobis rotata deltoidea 9 mm. longa, 11 mm. lata; corollis grandis campanulatis azureis 4 cm. longa, lobis orbiculatis integerrimis.

WASHINGTON: Open rocky slopes and ledges, 4500 ft. elevation, Mountains northwest of Morton, Lewis County, T. 14 N., R. 3 E., *Carl S. English, Jr.*, 1650 (Type in Herb. Carl. S. English, Jr.), July 23, 1933. This species was observed also on Silver Star Mt., Skamania County, July 25, 1929, and August 1, 1930.

This new species is most closely related to *Gentiana calycosa*. *G. saxicola* may be distinguished by its habit of growing on open rocky slopes and ledges with complete drainage, stems stout and erect, calyx lobes rotate, broadly deltoid, as broad or broader than long, 9 mm. long and 9–11 mm. wide; corolla lobes orbicular, entire; leaves about equalling or exceeding the internodes. On the contrary *G. calycosa* grows in wet alpine meadows, stems procumbent, fertile ones eventually arching upward, calyx lobes erect, 5 mm. long, 3 mm. wide, corolla lobes erose margined, internodes usually much exceeding the leaves.

Vol. 47, pp. 193–198 October 2, 1934

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OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW POCKET GOPHER FROM LASSEN COUNTY, CALIFORNIA.

BY JOSEPH GRINNELL

Museum of Vertebrate Zoology, University of California.

The week from May 27 to June 3, 1934, was occupied by Mrs. Hilda W. Grinnell and myself in scouting out in various directions for pocket gophers from our temporary headquarters at "Inspiration Point Auto Camp," just west of Susanville, Lassen County, California. It will be recalled by persons familiar with the literature of the genus *Thomomys* that races representative of four different groups have been recorded from that general vicinity, that is, from within a radius of twelve miles or so of Susanville. These forms, under their last published names (Grinnell, 1933, pp. 137–147) are: *Thomomys townsendii relictus*, *T. bottae leucodon*, *T. quadratus quadratus*, and *T. monticola monticola*. One of these, *leucodon*, had been recorded (Bailey, 1915, p. 49) on the basis of three specimens from "Susanville" and, because it provided the only instance of a northern representative of the Pacific-slope *bottae* group having been collected within the Great Basin drainage, I was anxious to learn more of its status there. A series of thirteen specimens (nos. 63347–59, Mus. Vert. Zool.) was finally gathered, and these proved so uniform in characters, and presented a combination of features so unique in the "*leucodon*" complex, that formal naming of a new race based on them is in order. Furthermore, our findings indicate for it a separate, sequestered area of occupancy.

Thomomys bottae saxatilis, new subspecies.

Susanville Pocket Gopher.

Type.—Mature female, skull and skin; no. 63354, Mus. Vert. Zool.; open, rocky, uncultivated ground, one mile north of Susanville, at 4400

feet altitude, Lassen County, California; May 31, 1934; collected by J. and H. W. Grinnell (orig. no. 7341).

Diagnosis.—Externally like *T. b. leucodon* Merriam (series in Mus. Vert. Zool. from near Grants Pass and Medford, Oregon, recently collected and presented to the Museum by Mr. Henry S. Fitch), but general size slightly smaller; tone of brown coloration above about as deep, but lower surface very much paler, near Tilleul-Buff (of Ridgway, 1912, pl. XL) as compared with Cinnamon in *leucodon*. Skull different in notable respects from that of topotypical *leucodon*, as also in various ways from skulls of other races in the *bottae* group; in general: light, not heavily ridged, and flat-topped; temporal ridges indistinct and far apart; braincase small; rostrum very narrow; premaxillary tongues narrow; lacrimal bones conspicuously developed and up-turned (so that they are felt when the finger is moved over the top of the skull); interparietal bone very short (extreme in the *bottae* group), being nearly twice as broad as long, and length of parietals along interparietal suture complementarily long; occipital plane of braincase nearly vertical, not sloping; superior outline of foramen magnum forming segment of a nearly perfect circle—not notched or otherwise angular; auditory bulla rather small, with a depression or at least a flat place, marked by translucent bone, on lateral lower surface; anterior zygomatic roots narrow and weak, and maxillary "shelf" deeply restricted or emarginate behind; incisor teeth slender, exceedingly long and forward-projecting—extreme in the *bottae* group; faces of incisor teeth in many cases entirely whitish, in some cases partly or weakly yellowish.

Measurements.—Of type, female: weight 103.6 g.; total length 200 mm.; tail 57; hind foot 27; ear from crown 3.5; skull: basilar length 32.9; length nasals 11.9; zygomatic breadth 24.7; mastoid breadth 19.2; width rostrum at middle 7.1; interorbital width 6.8; interparietal bone: length 3.2, breadth 5.7; alveolar length upper molar series 7.3; anterior face of incisor to anterior margin of alveolus of premolar 17.6. Of male, no. 63351, same data as type: weight 154.3 g.; total length 218 mm.; tail 66; hind foot 29; ear from crown 4; skull: basilar length 35.1; length nasals 13.5; zygomatic breadth 27.8; mastoid breadth 20.7; width rostrum at middle 8; interorbital width 6.3; interparietal bone: length 4, breadth (at base) 6.4 (but compressed medially through approach of temporal ridges to an interval of 4.3); alveolar length upper molar series 7.8; anterior face of incisor to anterior margin of alveolus of premolar 19.6.

Distribution.—So far as now known, the upper (western) part of the valley of the east-flowing Susan River, Lassen County, California; life-zone, Upper Sonoran and low Transition. Specimens examined from: close to highway at 4800 ft. alt., 9 miles west of Susanville, 2; close to highway, near Inspiration Point, at 4400 ft., 1 mile west of Susanville, 1; O'Kelly ranch, adjacent to Piute Creek at 4200 ft., 1 mile northwest of Susanville, 1; open, level, gently sloping area at 4400 ft., 1 mile north of Susanville, 7; edge of Faulkner ranch, adjacent to Gold Run, 4200 ft., 4½ miles south of Susanville, 2. The conspicuous Great Basin faunal "indicator," antelope brush (*Purshia tridentata*), grew in the vicinity of all of these places of capture. Ground in each case, save one, notably rocky, with soil

reddish, clayey, and exceedingly sticky when wet; the exception was the one from the O'Kelly ranch, which was taken in a clover pasture, of dark soil, yet within 30 yards of an uncultivated stony hillside with antelope brush growing on it.

Comparisons and Remarks.—The nearest relatives in the Austral, *bottae* group at hand from the western, Sacramento Valley slope of the Sierra-Cascade mountain system are from the vicinity of Lyonsville, Tehama County, 60 miles almost due west of Susanville. Although recorded under the name *leucodon* (Grinnell, Dixon and Linsdale, 1930, p. 496) these specimens are not at all typical of true *leucodon;* yet they do not seem to me to approach *saxatilis* in any significant combination of respects. Rather, do they approach in several respects *T. b. mewa*, of the lower western slope of the more southern Sierra Nevada. Even though it is probably this same west-slope "differentiate" that extends east up the Feather River drainage as far as Lake Almanor (specimen from Prattville recorded by Bailey, *loc. cit.*, but not seen by me), it would appear that the range of *saxatilis* is now cut off from "*leucodon*" (or *mewa*) by the continuous north-south range of the Boreal *T. monticola.*

To test out this matter, Mrs. Grinnell and I trapped west from Susanville, up over Fredonyer Pass and west to Westwood. Two miles east of Westwood, at 4800 ft. alt., high Transition zone, in the forest floor, we got *monticola.* Right in Fredonyer Pass, 5752 ft. alt., at side of highway over top of the divide at this latitude, between the Susan River and Feather River drainages, in floor of high Transition forest, we got *monticola.* And we got *monticola* again on the highway, at 4600 ft., where it traverses the southward, Transition-zone slope of the mountain on the south side of Eagle Lake, and north of the canyon of the Susan River. Then there are various stations for *monticola* already recorded, westward from Eagle Lake (Grinnell, Dixon and Linsdale, *op. cit.*, fig. 86 and p. 497); and in the Museum is a specimen from a point in the Plumas National Forest 8 miles south of Susanville.

Of course there is a chance that colonies of *bottae* gophers still exist some place or other quite close together in a course across the mountains, so that the range of the peripheral differentiate, *saxatilis*, would not be so completely isolated as is here indicated. However, there can be no question of the origin of the ancestral stock of that form—from the west, at some period when climatic or floral shifts brought conditions more favorable over the intervening territory, to the *bottae* than to the *monticola* kind of gopher. (Incidentally, all the facts at my command indicate that these two species of gopher, distributionally, are mutually exclusive.)

To discuss further the cranial characters of the new race: While old males of *saxatilis*, taking into account their larger size, show most of the subspecific peculiarities above set forth for females, there is one character which seemingly fails in the former sex. This is shape of interparietal, which is, in the adult males, squarish, therefore more nearly normal for *bottae.* But the following facts argue that this is a secondary condition, acquired in the individual as the skull (in the male) grows bigger, the bones get heavier, and the temporal ridges advance toward the median line (though

not reaching it to form a sagittal crest in any of the five examples at hand). Appeal was taken to juvenile males; and it happens that two comparable individuals, of *leucodon* and *saxatilis*, respectively, are at hand, as follows: ♂ juv., no. 60350, from near Grants Pass, Oregon, June 9, 1933, H. S. Fitch; weight 65.7 grams, total length 181 mm.; and ♂ juv., no. 63357, from near Susanville, California, May 31, 1934, J. and H. W. Grinnell: weight 60.4 grams, total length 170 mm. It can thus be said that these two males are but half-grown at most; yet they show nearly every one of the differentiating features of their respective subspecies in almost as extreme measure as the adult females. Take that matter of the interparietal bones: the young male *leucodon* presents dimensions of 4.1 by 7.1, while in the young *saxatilis* the bone is 2.6 by 5.6 mm., being less than half its surficial area in the other. Others of the diagnostic features of the latter as compared with the former are smaller braincase, flatter top of skull, narrower zygomatic spread anteriorly, more restricted or emarginate maxillary shelf, more nearly circular foramen magnum, and slenderer incisor teeth. I suspect strongly that these are innate, germinal features, hence of real phylogenetic significance. Even as to coloration, the pallor of the lower surface in *saxatilis* makes it strikingly different from the Warm Buff tone of the lower surface of the young *leucodon*.

The range of *Thomomys bottae saxatilis* is apparently hemmed in to the eastward down the valley of the Susan River by that of the huge *Thomomys townsendii relictus*. Our findings concerning the latter species this year supplement those of 12 years ago (see Grinnell, 1926) as follows. We saved 12 additional specimens from three localities: the ranch of Lester Clark, 3 miles south (and a bit east) of Susanville, along-side of Gold Run, 4200 ft. alt.; the E. B. Coffin ranch, 4½ miles northeast (a bit east) of Susanville, in a canyon mouth at 4600 ft., at the foot of the steeply rising mountain on the north side of Susan River Valley; and on the Gibson ranch, at 4000 ft., 2 miles east of Litchfield, at south base of Shaffer Peak. In each place, the gophers caught were in fine-grained, when dry, powdery, soil of alfalfa fields. We saw the enormous mounds also on uncultivated ground of the same character at various points all the way to Amedee, on the east side of Honey Lake (now dust dry). Locally, this type of soil is called "volcanic ash." Where not cultivated the ground occupied by *relictus* is covered scatteringly by salt-grass (*Distichlis spicata*) and by bushes of "black greasewood" (*Sarcobatus vermiculatus*). Indeed, *relictus* under natural conditions was just about as surely associated with *Sarcobatus* as *saxatilis* was with *Purshia;* yet it is not likely that in either case the rodent was in any degree dependent upon the particular plant. Workings of *relictus* were seen also on the *Sarcobatus* flats out from the east base of Bald Mountain and thence southwest up the valley of Baxter Creek, to the crossing of the road approaching Buntingville from the northeast. Although we were told of "small" gophers having been caught in fields where we caught *relictus*, we found no evidence for believing them to have been other than young individuals of *relictus*. So far, we have no established instance in this region of any two kinds of gophers inhabiting precisely the same local area.

As regards *Thomomys quadratus quadratus*, Bailey (*op. cit.*, p. 115)

records 2 specimens from "Susanville (4 miles south)". We failed to find this species, though we saw very small workings of gophers among lava blocks on very stony, juniper-grown slopes within 2 miles northeast of Susanville, that might have pertained to it. The nearest specimens at hand from Lassen County are from Secret Valley (see Grinnell, Dixon and Linsdale, *op. cit.*, p. 497), the waters from which (when any) reach the Susan River by the way of Willow Creek. But this circumstance is irrelevant because *quadratus* is an upland gopher, and drainage slope probably does not affect its distribution any more than in the case of *monticola*. However, this factor *does* probably vitally restrict *relictus* because of the latter's obvious dependence upon fine-textured, rock-free substratum, such as has accumulated through the ages to form the floor of Honey Lake Valley and of its intrant valleys, those of the Susan River, Baxter Creek, and the creek northeast of Susanville that comes down through the Coffin ranch.

There is thus in this region of Lassen County an almost completely satisfactory demonstration of sharp delimitation of the ranges of species in the genus *Thomomys* by the factor of soil texture.

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Vol. 47, pp. 199–202 October 2, 1934

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF TWO RACES OF PEROGNATHUS INTERMEDIUS FROM ARIZONA.

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The rock pocket mouse (*Perognathus intermedius* Merriam) has a wide range in the deserts of Arizona south of the Colorado River. It is an inhabitant of rocky ground, preferring canyons, hills, and gullies to plains and sandy ground. In consequence, it is not evenly distributed over its general range, but tends to occur in more or less isolated populations. There is much geographic variation within the species. It appears possible that each of the many isolated populations is unique in the possession of some character, or combination of characters. While it seems inadvisable now to recognize each one of these populations as a separate geographic race, some of them diverge so much from the average, that it seems desirable to grant them subspecific rank. Two such races are described below.

Perognathus intermedius crinitus, new subspecies.

Type.—Adult male, skin and skull, no. 55883, Mus. Vert. Zool., from 2.6 miles west of the Wupatki Ruins, Coconino County, Arizona. Collected October 8, 1932, by Louise Kellogg. Original number 1889.

Distribution.—Northeastern Arizona and southeastern Utah south of the Colorado and San Juan rivers; probably intergrading with *P. i. intermedius* through the Grand Canyon of the Colorado.

Diagnosis and comparisons.—A race of *Perognathus intermedius* characterized by large size, soft long pelage, and strongly penicillate tail. Compared with *Perognathus intermedius intermedius* Merriam as represented by topotypes, *crinitus* has, on the average: an actually and relatively longer, and more penicillate tail; softer, longer, denser pelage; longer, relatively narrower skull; relatively smaller and less expanded mastoids. For comparison with *Perognathus intermedius umbrosus* see description of the latter below.

Color (capitalized terms after Ridgway, Color Standards and Color Nomenclature, 1912).—Dorsal hairs with tips black, subterminal bands Light Pinkish Cinnamon, basal portions Neutral Gray. Hairs of throat, breast, and feet white. Belly hairs white or faintly suffused with Pale Pinkish Cinnamon. Tail bicolor, blackish above, white beneath. Narrow stripe of Light Pinkish Cinnamon along flanks. The color of the subterminal band of each hair dominates the color tone.

Measurements.—Average, minimum, and maximum measurements in millimeters of adult males (the single number in parenthesis indicates the number of specimens averaged): Total length (10), 175 (167–179); tail (10), 99 (95–101); hind foot (12), 23 (21–24); ear from crown (12), 5 (5–6); weight in grams (12), 14.0 (12.4–18.1). Skull: occipitonasal length (16), 25.0 (24.3–25.8); frontonasal length (15), 16.7 (16.0–17.5); mastoid breadth (16), 13.1 (12.7–13.6); length of mastoid (15), 8.2 (7.9–8.5); distance between stylomastoid foramina (15), 10.2 (9.7–10.6); interorbital space (15), 6.3 (6.0–6.5).

Specimens examined.—Total number, 35, from the following localities: *Utah.* San Juan County: Rainbow Bridge, 2; Navajo Mountain Trading Post, 1. *Arizona.* Coconino County: south side of Grand Canyon Bridge, 2; Moa Ave, 1; Little Colorado River at Cameron, 16; Black Tank, 2; Tanner Tank, 2; 2.6 miles west of Wupatki Ruins, 8; lava field 12 miles north of Deadman Flat, 1.

Remarks.—The range of this race is probably separated from the ranges of the other races to the south by the Mogollon Plateau. It meets the range of the race *intermedius* only in the Grand Canyon.

It is interesting to note that in its pelage, softer, longer, and denser than in the other races of *intermedius*, *crinitus* shows some approach toward *Perognathus formosus*, a counterpart as to habitat, whose range is separated from that of *crinitus* by the Colorado River. These species are, however, altogether distinct.

Perognathus intermedius umbrosus, new subspecies.

Type.—Adult male, skin and skull, no. 55964, Mus. Vert. Zool., from Camp Verde, Yavapai County, Arizona. Collected October 3, 1932, by Louise Kellogg. Original number 1863.

Distribution.—Known only from the vicinity of the type locality.

Diagnostic characters and comparisons.—A large, dark-colored race of *Perognathus intermedius*, with a large, relatively narrow skull and small mastoids. Compared with *P. i. intermedius*, as represented by topotypes, *umbrosus* differs in larger body size, larger feet, relatively narrower skull, proportionally shorter rostrum, and smaller, less inflated mastoids. Compared with *P. i. crinitus*, *umbrosus* differs in average larger size, harsher scantier pelage, less penicillate tail, larger skull, less expanded mastoid bullae.

Color.—Dorsal hairs with tips black, narrow subterminal bands Light Pinkish Cinnamon, basal portions Deep Neutral Gray. Hairs of throat, breast and front feet, white. Hairs of belly and hind feet white or Light Pinkish Cinnamon. Tail with a dark dorsal stripe. Sides and lower side

of tail white. The dark color of the tips and bases of the dorsal hairs dominates the color tone.

Measurements.—Average, minimum, and maximum measurements in millimeters of adult males (the single number in parenthesis indicates the number of specimens averaged): Total length (7), 175 (167–178); tail (7), 96 (89–100); hind foot (7), 23 (22–24); ear from crown (5), 5 (4–5); weight, (5), 16.8 (16.0–17.9). Skull: occipitonasal length (6), 25.8 (25.4–26.7); frontonasal length (6), 16.9 (16.6–17.2); mastoid breadth (7), 13.4 (13.1–13.6); length of mastoid (7), 8.5 (8.2–8.8); distance between stylomastoid foramina (6), 10.6 (10.1–11.3); interorbital space (6), 10.6 (10.1–11.3).

Specimens examined.—Total number, 22, from the following localities: *Arizona.* Yavapai County: Camp Verde, 19; 1 mile west of Camp Verde, 1; 5 miles northeast of Camp Verde, 2.

Remarks.—This race bears a remarkable resemblance in some characters to *Perognathus fallax* of California. It represents the extreme in the species *intermedius* in the development of large size of skull, and relatively small mastoid bullae. The other extreme is represented by *intermedius* from the lower part of the Colorado River Valley. Were it not for intergradation with *intermedius* in skull characters through the race *crinitus* it would be easy to regard *umbrosus* as specifically distinct. Specimens of *intermedius* from New River Valley, 30 miles north of Phoenix, approach *umbrosus* in color, but more nearly resemble topotypes of *intermedius* in skull characters.

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New names are printed in **heavy type.**

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