



574.0673

*Index*

570797

*Smith*

*12*

# PROCEEDINGS

OF THE

# Biological Society of Washington




---

VOLUME 55  
1942

---

WASHINGTON  
PRINTED FOR THE SOCIETY

## COMMITTEE ON PUBLICATIONS

HERBERT FRIEDMANN, *Chairman*

REMINGTON KELLOGG

F. C. LINCOLN

E. P. KILLIP

J. S. WADE

---

### 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  
H. L. & J. B. MCQUEEN, INC.  
WASHINGTON, D. C.

OFFICERS AND COUNCIL  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON  
(FOR 1942-1943)

(ELECTED MAY 23, 1942)

OFFICERS

*President*

H. B. HUMPHREY

*Vice-Presidents*

(In the order of election)

J. E. SHILLINGER  
F. THONE

L. K. COUCH  
J. S. WADE

*Recording Secretary*

S. F. BLAKE

*Corresponding Secretary*

ROBERT S. BRAY

*Treasurer*

F. C. LINCOLN

COUNCIL

*Elected Members*

I. N. HOFFMAN  
J. E. BENEDICT, JR.

F. W. POOS  
J. W. ALDRICH

MALCOLM DAVIS

*Ex-Presidents*

PAUL BARTSCH  
W. B. BELL  
C. E. CHAMBLISS  
H. C. FULLER  
E. A. GOLDMAN  
W. P. HAY  
A. D. HOPKINS

L. O. HOWARD  
H. H. T. JACKSON  
H. C. OBERHOLSER  
T. S. PALMER  
S. A. ROHWER  
L. STEJNEGER  
E. P. WALKER

A. WETMORE

STANDING COMMITTEES—1942-1943

*Committee on Communications*

A. M. DAY, *Chairman*  
F. C. BISHOPP  
R. F. GRIGGS  
C. COTTAM  
S. F. HILDEBRAND  
H. FRIEDMANN  
D. E. MCHENRY  
F. F. SMITH  
F. THONE

*Committee on Zoological Nomenclature*

AUSTIN H. CLARK, *Chairman*

PAUL BARTSCH  
A. WETMORE  
H. H. T. JACKSON  
C. F. W. MUESEBECK

*Committee on Publications*

HERBERT FRIEDMANN, *Chairman*

REMINGTON KELLOGG  
E. P. KILLIP  
F. C. LINCOLN  
J. S. WADE

*Trustees of Permanent Funds*

H. C. FULLER (1941-1943), *Chairman*  
J. E. GRAF (1941-1943)  
M. B. WAITE (1941-1943)

EX-PRESIDENTS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

- \*THEODORE N. GILL, 1881, 1882  
\*CHARLES A. WHITE, 1883, 1884  
\*G. BROWN GOODE, 1885, 1886  
\*WILLIAM H. DALL, 1887, 1888  
\*LESTER F. WARD, 1889, 1890  
\*C. HART MERRIAM, 1891, 1892  
\*C. V. RILEY, 1893, 1894  
\*GEO. M. STERNBERG, 1895, 1896  
L. O. HOWARD, 1897, 1898  
\*FREDERICK V. COVILLE, 1899, 1900  
\*F. A. LUCAS, 1901, 1902  
\*B. W. EVERMANN, 1903, 1904  
\*F. H. KNOWLTON, 1905, 1906  
L. STEJNEGER, 1907, 1908  
T. S. PALMER, 1909, 1910  
\*DAVID WHITE, 1911  
\*E. W. NELSON, 1912, 1913  
PAUL BARTSCH, 1914, 1915  
W. P. HAY, 1916, 1917  
\*J. N. ROSE, 1918  
\*HUGH M. SMITH, 1919  
A. D. HOPKINS, 1920  
\*N. HOLLISTER, 1921  
\*VERNON BAILEY, 1922  
\*A. S. HITCHCOCK, 1923  
\*J. W. GIDLEY, 1924  
S. A. ROHWER, 1925  
H. C. OBERHOLSER, 1926-1927  
E. A. GOLDMAN, 1927-1929  
ALEXANDER WETMORE, 1929-1931  
H. H. T. JACKSON, 1931-1933  
C. E. CHAMBLISS, 1933-1936  
H. C. FULLER, 1936-1938  
W. B. BELL, 1938-1940  
E. P. WALKER, 1940-1942

---

\*Deceased.

740673



TABLE OF CONTENTS.

Officers and Committees for 1942.....	iii-iv
Proceedings for 1942.....	v
Notes on Fishes in the Zoological Museum of Stanford University	
IX. A New Species of Salarias, with a Key to the Philippine Species by Albert W. C. T. Herre.....	1-8
Preliminary Comment on Some Pacific Coast Petrels, by A. J. van Rossem.....	9-12
A New Red Squirrel from North Dakota, by Arthur H. Howell....	13-14
Description of a New Arizona Race of the Grasshopper Sparrow, by Harry C. Oberholser.....	15-16
On Ten New Centipeds from Mexico and Venezuela, by Ralph V. Chamberlin.....	17-24
✓ The Subgeneric Position of the Lepus californicus group of Hares, by H. Harold Shamel.....	25-26
A Synopsis of the Philippine Land Mollusks of the Genus Hemitrichia, by Paul Bartsch.....	27-44
Notes on Pipilo fuscus of Mexico and Description of a New Form, by Robert T. Moore.....	45-48
A New Frog from the Anamallai Hills, with Notes on Other Frogs and Some Snakes from South India, by George S. Myers.....	49-56
New Millipeds from Michoacan, by Ralph V. Chamberlin.....	57-62
A New Subspecies of Mexican Coral Snake, by Bryce C. Brown and Hobart M. Smity.....	63-66
New Bobwhite from Northeastern Mexico, by John W. Aldrich..	67-70
A New Frog of the Genus Micrixalus from Travancore, by George S. Myers.....	71-74
Three New Rodents from Southern Utah, by E. A. Goldman.....	75-78
Notes on the Coatis of the Mexican Mainland, by E. A. Goldman.....	79-82
A New Species of Sphaceloma on Poinsettia, by Anna E. Jenkins and George D. Ruehle.....	83-84
A New Tanager from Venezuela, by Herbert Friedmann.....	85-86
Three New Rodents from Southern Utah, by Ross Hardy.....	87-92
Two New Grasses from Florida and Texas, by Jason R. Swallen..	93-94
Three New Pocket Gophers (Genus Thomomys) from Western Washington, By Walter W. Dalquest and Victor B. Scheffer..	95-98
The Genus Batocarpus Karst (Moraceae), by F. R. Fosberg.....	99-102
A New Myotis from Manchuria, by H. Harold Shamel.....	103-104
Description of Three Additional Birds from Southern Veracruz, by Alexander Wetmore.....	105-108

Nomenclatorial changes in Glossopetalon (Celastraceae), by Harold St. John.....	109-112
Five New Asteraceae from Oaxaca Collected by W. H. Camp, by S. F. Blake.....	113-120
Some Notes on the Taxonomy of Grain Mites. (Acarina: Acaridae, Formerly Tyroglyphidae), by H. E. Ewing and Herbert H. S. Nesbitt.....	121-124
On a New Family in the Notostigma A., by Ralph V. Chamberlin and Stanley Mulaik.....	125-132
Studies of the Rat Snake, <i>Elaphe laeta</i> , with Description of A New Subspecies, by Angus M. Woodbury and Dixon M. Woodbury.....	133-142
Comments on the Undulata group of <i>Ameiva</i> (Sauria), by L. C. Stuart.....	143-150
Notes on Some Frogs from Peru and Ecuador, by George S. Myers.....	151-156
A New White-footed Mouse from Mexico, by E. A. Goldman....	157-158
Additional Notes on Mexican Snakes of the Genus <i>Pliocercus</i> , by Hobart M. Smith.....	159-164
New Subspecies of Kangaroo Rats of the <i>Dipodomys ordii</i> Group from Montana and Wyoming, by Donald F. Hoffmeister.....	165-168
The Species <i>Eurystomus orientalis</i> , by S. Dillon Ripley.....	169-176
A New <i>Tropidodipsas</i> (Ophidia) from Alta Verapaz, Guatemala, by L. C. Stuart.....	177-180
The Chalchalaca of Interior Chiapas, by Pierce Brodkorb.....	181-182
A New Subspecies of <i>Trogon citreolus</i> , by Pierce Brodkorb.....	183-184
Descriptions of New Species and Subspecies of Mexican Snakes of the Genus <i>Rhadinaea</i> , by Hobart M. Smith.....	185-192

LIST OF PLATES.

1. <i>Neocarus texanus</i> , details.....	130
2. <i>Neocarus texanus</i> , details.....	131
3. New Mexican Snakes of Genus <i>Rhadinaea</i> .....	192

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

---

PROCEEDINGS.

---

The Society meets from October to May, on Alternate Saturdays, at 8 P. M. All meetings during 1942 were held in the new lecture hall of the Cosmos Club.

**January 10, 1942—918th Meeting.**

President Walker in the chair; 32 persons present.

New member elected: Ross Hardy.

*Informal communications:* Frank Thone, Exhibition of new books; M. B. Waite, Note on scarcity of rabbits.

*Formal communications:* F. C. Lincoln, Review of 1941 North American waterfowl situation; Father A. Dutilly, Arctic flora.

**January 24, 1942—919th Meeting.**

President Walker in the chair; 32 persons present.

New members elected: A. J. Duvall, Charles Oehler, I. R. Watts.

*Informal communication:* J. S. Wade, Exhibition of new books;

*Formal communication:* N. J. Pyle, Commercial production of biological and pharmaceutical products.

**February 7, 1942—920th Meeting.**

Vice-president Thone in the chair; 35 persons present.

*Informal communication:* Frank Thone, Exhibition of new books.

*Formal communications:* W. E. Dove, Dogfly control; C. C. Presnall, Indian salmon fishing in the Pacific Northwest.

**February 21, 1942—921st Meeting.**

President Walker in the chair; 15 persons present.

*Formal communications:* E. P. Walker, Air raid precautions taken at National Zoological Park; W. B. Bell, Quest of the Alaska seal skin.

**March 7, 1942—922d Meeting.**

President Walker in the chair; 70 persons present.

New member elected: Richard Loomis.

*Informal communications:* Frank Thone, Exhibition of new books; P. B. Johnson, Notes on birds and other animals seen in Maine in the winter.

*Formal communication:* W. F. Kubichek, Glimpses of bird life in color.

**March 21, 1942—923d Meeting.**

President Walker in the chair; 55 persons present.

New member elected: E. L. Little, Jr.

The death of C. Hart Merriam was announced.

*Formal communication:* Alexander Wetmore, A naturalist explores the Guajira Peninsula.

**April 4, 1942—924th Meeting.**

President Walker in the chair; 40 persons present.

*Informal communication:* Frank Thone, Exhibition of new books.

*Formal communications:* John and Frank Craighead, Know your hawks; H. L. Shantz, Trends in wildlife populations on the National Forests.

**April 18, 1942—925th Meeting.**

Vice-president Humphrey in the chair; 30 persons present.

New member elected; L. W. Swift.

*Informal communication:* J. E. Shillinger, Account of the 7th North American Wildlife Conference.

*Formal communications:* (Symposium in memory of C. Hart Merriam:) T. S. Palmer, Dr. Merriam's life as a scientist; W. C. Henderson, Comparison between the Biological Survey of Dr. Merriam's time and the present; H. H. T. Jackson, His publications; L. K. Couch, As a photographer



May 2, 1942—926th Meeting.

SIXTY-THIRD ANNUAL MEETING.

President Walker in the chair; 14 persons present.

New members elected: Katherine Owen, J. H. Shawvan, S. D. Ripley.

The death of Vernon Bailey was announced.

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

The following officers and members of council were elected: President, H. B. Humphrey; Vice-presidents, J. E. Shillinger, Frank Thone, L. K. Couch, J. S. Wade; Recording Secretary S. F. Blake; Corresponding Secretary, R. S. Bray; Treasurer, F. C. Lincoln; Members of the Council, I. N. Hoffman, J. E. Benedict, Jr., F. W. Poos, J. W. Aldrich, Malcolm Davis.

October 17, 1942—927th Meeting.

President Humphrey in the chair; 50 persons present.

*Informal communication:* F. C. Lincoln, Account of the A. O. U. meeting at Philadelphia.

*Formal communications:* T. S. Palmer, Vernon Bailey, an appreciation; A. K. Fisher, Henry C. Fuller, an appreciation; D. E. McHenry, Fauna and flora of the Chesapeake and Ohio Canal.

November 14, 1942—928th Meeting.

President Humphrey in the chair; 15 persons present.

*Informal communications:* R. S. Bray, Note on the distribution of Branchiopoda as affected by floods of the Potomac; J. A. Fowler, Note on the effects of the October flood on the distribution of reptiles and other animals; Malcolm Davis, Note on recent arrivals at the National Zoological Park.

*Formal communications:* J. A. Fowler, An exhibit of the salamanders of the District of Columbia and vicinity; J. P. E. Morrison, Some new Virginia snails with remarks on the molluscan fauna of the Shenandoah region.

**December 12, 1942—929th Meeting.**

President Humphrey in the chair; 55 persons present.

President Humphrey was nominated as Vice-president of the Washington Academy of Sciences to represent the Biological Society.

*Informal communications:* Frank Thone, Exhibition of new books; Arno Viehoveer, Notice of a recent book.

*Formal communication:* P. L. Ricker, Our botanist's paradise.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

---

NOTES ON FISHES IN THE ZOOLOGICAL MUSEUM  
OF STANFORD UNIVERSITY. IX. A NEW  
SPECIES OF *SALARIAS*, WITH A KEY  
TO THE PHILIPPINE SPECIES.

BY ALBERT W. C. T. HERRE.

---

The blennies belonging to the genus *Salarias* are herbivorous fishes of tropical reefs and rocky shores. They are abundant in the Indian and Pacific Oceans, where they range north to Japan and south to Tasmania and the coast of Natal. Some of the Indo-Pacific species are very widely distributed, occurring from the east coast of Africa to the Marquesas Islands.

The identification of *Salarias* species is often difficult. Many kinds lose their characteristic colors and markings after death, or have them greatly altered. The difficulty is enhanced by the fact that in a number of species the sexes are very unlike in appearance, while in closely related species the sexes may be alike in every respect except the presence of a crest. Where the sexes have entirely different color patterns or markings, either of body or fins, or both, their determination is easy as long as the markings remain.

Males are usually distinguished by the cutaneous median crest on the occiput, by much thicker lips, by the presence of canines, and by a dusky spot or two on the upper part of the membrane between the first and third dorsal spines. However, the student must realize that no single character may be depended upon for determination. While the crest is usually a male character, it is developed in both sexes sometimes, and in other species is never developed at all. A few species have canines present in both sexes, while others never have them, and they may be entirely absent from species or males that usually have them. Characters that are fairly constant are the number of dorsal and anal spines and rays, the shape of the dorsal and whether it is free or attached to the caudal, the crest, the presence or absence and character of tentacles on nape, eyes, and nostrils, and whether the lips are entire or crenulate.

A study of the large collection of *Salarias* made during my stay in the Philippines from May to October, 1940, has compelled a revision of

Philippine species and the publication of a new key. One new species is presented, and one species is relegated to synonymy. No doubt further intensive collecting will reveal some of Bleeker's East Indian species in the Philippines; we may expect several more species of *Salarias* ultimately in Philippine waters.

#### SALARIAS Cuvier.

Small blennies with a naked and usually slender, elongate body; the numerous movable teeth are set on the gums; a curved canine may be present on each side of the lower jaw, behind the other teeth. Simple, fringed, or divided tentacles may be present on the eyes, nape, and nostrils. A median longitudinal crest may be present on the head; so far as known only males of some Philippine species ordinarily have it, while other kinds never have a crest. The dorsal may be entire, or more or less deeply notched between the spinous and rayed portions, and may be free from the caudal or more or less attached to it. The jugular ventrals are of a spine and 2 or 3 rays. The wide gill opening forms a free fold across the isthmus.

#### *Salarias martini* Herre, new species.

Dorsal XIII—18 or 17, rarely 19; anal 18 or 19, or I or II—18—19; pectoral 14; caudal 3—9—3, rarely 2—10—2. A very few specimens have 12 dorsal spines, and one young specimen about 35 mm. long has 14 spines.

The proportions, as in most species of *Salarias*, vary greatly according to the size and condition of specimens. In large adults the depth, length of head, and of caudal fin, are usually sub-equal. The depth of such specimens is from 4 to 4.8, the head 4 to 4.7, the rounded caudal 4.3 to 4.85 times in the length. Young specimens are often slenderer, their depth being up to 5.6 times in the length. The eye is 4 to 4.8, the snout 2.4 to 2.85, the least depth of the much compressed caudal peduncle about 2.4 times in the head.

The body is elongate, the anterior portion moderately rounded, the posterior half compressed, the head large and thick, with a vertical or nearly vertical broad blunt snout. The eye is high up and as far forward as possible, lying entirely within the anterior third of the head; the inter-orbital width is half or less than half an eye diameter. The mouth is large, inferior, without canines, the lips entire; the maxillary extends to a vertical from the hind margin of the eye, or usually beyond some distance. The ocular tentacle is more or less marginally fringed, and usually equals the eye, but may be only half an eye diameter to more than the eye; the fimbriate nasal tentacle has 4 or more filaments; there are no nuchal tentacles. Males have a thin skinny crest of moderate height on the head.

The dorsal is deeply notched, and continues to the caudal base but is not adherent to the caudal itself; the anterior half is lower than the hind half, its longest spines 8.5 to 10 times in the length; the dorsal rays are highest posteriorly, the longest 5 to 6.5, the anal height 7 to 10 times in the length. Occasionally a specimen has the fins much higher. In adults the anal is incised, leaving the tips of the rays free. The pectoral is 5 to 6 times in the length or 1.2 to 1.35 times in the head.

The color in alcohol is light reddish brown with 7 pairs of blackish cross bars, and a blackish spot on the caudal peduncle; usually the entire head is dusky and the anterior cross bars obscured, or the whole fish may be more or less bluish dusky. The dorsal and caudal are light brown to blackish, the posterior half of the dorsal with numerous darker lines curving upward and backward; the anal is uniform light brown to nearly black. In females and young males the dorsal, anal and caudal have a white edge, but in large males this may disappear, or only the second half of the dorsal retain the white margin.

Described from the type, a male, 119 mm. long, and 226 other specimens, ranging down to 27 mm. in length; they were taken from a reef at Estancia, Panay, Philippine Islands. Unlike most species of *Salarias*, the males are as large, or even larger, than the females. Some females from 70 to 104 mm. in length were in breeding condition. This species is close to *Salarias edentulus* and *Salarias dussumieri*, but is readily separated from them both. It lacks the nuchal tentacles of *Salarias edentulus* and has fewer fin rays than either *S. edentulus* or *S. dussumieri*. Both these species are also sexually dimorphic, while the sexes are alike in *S. martini*, except for the masculine crest.

I take pleasure in naming this handsome blenny for Mr. Claro Martin of the Philippine Division of Fisheries, whose generous aid made my stay at Estancia both pleasant and profitable.

#### SALARIAS DUSSUMIERI Cuv. & Val.

*Salarias dussumieri* Cuv. & Val., Hist. Nat. Poiss., vol. XI, p. 229, 1836.

Playfair, Fishes Zanzibar, p. 77, pl. IX, figs. 6 and 7, 1866.

*Salarias zamboangae* Evermann and Seale, Proc. U. S. Nat. Mus., vol. 31, p. 512, fig. 4, 1907.

Herre, Phil. Journ. Sci., vol. 70, p. 359, 1939.

Study of a series from the Andaman Islands quickly showed that *S. zamboangae* is a synonym of *S. dussumieri*. The sexes are markedly different in appearance. Playfair's figures are excellent, but he has curiously reversed the sexes. Evermann and Seale had 3 males, one of which was described and figured. I have had 168 Philippine specimens of both sexes and all sizes from 23 to 109 mm. length, from the following localities: Nasugbu, Batangas Prov.; Calapan, Mindoro; Basis and Dumaguete, Oriental Negros Prov.; Estancia, Panay; Kolambugan, Lanao Prov.; Patalon Plantation, Zamboanga Province. I have also had one from Lembeh Strait, Celebes, and 10 from the Andaman Islands.

#### KEY TO THE PHILIPPINE SPECIES OF *Salarias*.

(Based on preserved specimens.)

##### 1. Dorsal entire and not divided.

- A. Uniformly dark brown or black, with caudal and pectoral sometimes yellow; last anal and dorsal rays often elongate, reaching last half of caudal; dorsal XII—17 to 19; anal 19 or II—18 or 19.....1. *SALARIAS FUSCUS*

AA. Not uniformly dark brown or black.

B. Dorsal free from caudal; 2 or 3 rows of elongate brown-edged white spots on sides and small circular ones on head; no blue or violet-brown spot on each side of throat; usually small canines in lower jaw; minute simple tentacles on eye, nape, and nostril; dorsal XII—XIII, 19 to 22; anal II—20—22 or I—23 ..... 2. *S. NITIDUS*  
[*S. alboguttatus*, with a large violet-brown spot on each side of the throat is a Polynesian species.]

BB. Dorsal attached to caudal; no canines.

C. Brown, thickly sprinkled with blue-black dots; dorsal and caudal cross-banded with brown spots and black dots; broad, palmately fringed tentacles on eye and nape; dorsal 29—30; anal I—19 or 18..... 3. *S. CERAMENSIS*

CC. Brown or bluish brown with 6—8 wide dark cross bands; black dots and dashes above pectoral, passing into lengthwise lines along the side; large circular white or pale spots (blue in life) below lines and on pectoral base; broad fringed tentacles on eye, nape, and nostril; dorsal XII—19 or 20; anal I—19 or 20..... 4. *S. FASCIATUS*

2. Dorsal more or less deeply notched.

D. A longitudinal skinny crest on top of head.

E. Dorsal XV or XIV—18 or 19; anal II—19 or 20; ocular tentacle stout, marginally fringed, nasal tentacle fringed, none on nape; no canines; light brown with 8 broad dark cross bars, divided below, and a band at caudal base..... 5. *S. COLEI*

EE. Dorsal with XII or XIII spines, by exception XI or XIV.

F. Two rows of short blue or pearly bars on side; a circular blue-black spot at upper angle of opercle; often 1 or 2 blue or black spots behind eye; dorsal XII, 20 or 21; anal I—II, 20 or 21; a long simple tentacle on eye; lower jaw with canines..... 6. Males of *S. PERIOPHTHALMUS*

As above, with 4 to 8 longitudinal brown lines from near tip of pectoral to above middle of anal.....

Males of *S. PERIOPHTHALMUS* var. *VISAYANUS*

FF. Without rows of blue or pearly bars on sides.

G. 4 to 10 dark or black longitudinal lines on sides; upper lip crenulate; no tentacles at nape.

H. Pale brown, with 5 to 7 black or very dark lines along side, changing posteriorly to dots and dashes; caudal barred with rows of black dots; dorsal slightly attached to caudal; canines present or absent in lower jaw; dorsal XIII—20 to 23; anal I or II—20 to 24..... 7. Males of *S. CAUDOLINEATUS*

HH. Brown or leaden with 6 to 10 black lines along sides, becoming 4 to 6 posteriorly, sometimes becoming spots or dots near the caudal; no canines; dorsal attached to caudal, XI or XII—22—24; anal II—23 or 24..... 8. Males of *S. LINEATUS*  
[*S. bilitonensis*, an East Indian species, is to be expected and

is likely to be confused with *S. lineatus*. Dorsal XII—20 to 21; anal II—20—21; posterior canines in lower jaw; about 10 dusky lines along side; blue stripes below and behind eye; large blue spot on opercle.]

GG. No dark lengthwise parallel lines on sides.

I. Roseate, with many violet crossbands wider than interspaces, becoming irregular vertical lines posteriorly; in alcohol often becoming violet-brown or brown; canines present or absent in lower jaw; dorsal XIII—19 to 21; anal I—21 or 22 or I or II—19 to 20.....9. *S. OORTI*

II. Not rosy with violet cross bands.

J. A pair of small or minute tentacles on nape.

K. Two rows of white dots on sides, or dots in curved vertical rows, and blue dots on sides of head; all dots often brown in preservative; dorsal free, ending before caudal, XII—15 to 17, or XIII—17 or 18; anal I or II—16 to 18; 6 pairs broad forked dark crossbands, extending on basal half of dorsal; lower jaw with canines.....10. Males of *S. BILINEATUS*

KK. No white dots on sides; no canines; dorsal attached to caudal, XIII—19 to 21; anal I (rarely II) 20—22, very rarely 23 or 24; ocular tentacle small, simple; nasal tentacle very small, of 4 filaments; brown, usually with darker cross bars; anal with 2 rows of bluish spots, or uniform; a diagonal dark bar behind eye, often disappearing; sexes markedly different.....

11. Males of *S. EDENTULUS*

JJ. No tentacles on nape; dorsal free of caudal, rarely slightly attached.

L. Dorsal XIII, rarely XII—17—18, rarely 19; anal 18—19 or I or II—18—19; no canines; color reddish brown with 7 pairs of blackish cross bars and a spot on caudal peduncle; orbital tentacle stout, marginally fringed; nasal tentacle of 4 or more filaments; sexes alike except for crest on males.....

12. *S. MARTINI*

LL. Dorsal XII, seldom XIII—20 to 22; anal I, 23 or 24, or II—21 to 24, or III, 22; fringed orbital tentacle equal to or more than eye; nasal tentacle small, bifid or trifid; 7 double brown cross bars, and usually 2 rows brown dots on lower half of body posteriorly; a blackish spot between first and second or third spines; usually a clear band along middle of rayed dorsal; upper part of rayed dorsal with diagonal rows of spots, dots, or zigzag lines, continued on upper half of caudal.....

13. Males of *S. DUSSUMIERI*

DD. No crest on the head.

M. Upper lip crenulate; dorsal free from caudal; orbital tentacle large, fringed.

N. Pearly bands with dark margins on snout, sides and underneath head; in preservative the dark lines remain, extending downward from eye; canines present or absent; nasal ten-

- tacle minute, simple; no tentacles on nape; dorsal XIII—15 to 18; anal I—17 to 19 or II—16 to 17.....14. *S. FRENATUS*
- NN.* Sides mottled brown, with row of white spots below lateral median line; a black spot above pectoral base and dark streak behind eye; short fringed tentacles at nape and nostrils; dorsal XII or XIII, 14 to 16; anal I or II—16 or 17.  
15. *S. MARMORATUS*
- MM.* Upper lip entire.
- O.* A purplish or brown spot or ring on each side of throat; body pale brown, with pale crossbands, forked below; a row of 15-20 black dots below dorsal, or irregular rows of black dots on upper half of body; 1 or 2 large circular white or pale blue spots on pectoral base; canines absent or present; dorsal XI or XII—17 or 18; anal I—18 or 19.....16. *S. GUTTATUS*
- OO.* No purplish or dark spot or ring on each side of throat.
- P.* Sides with 2 rows of short blue or pearl bars; a circular blue or black spot behind and bar below eye; a small canine in lower jaw; orbital tentacle small, simple; dorsal XII—20 or 21; anal I or II—20 to 21.....  
6. Females of *S. PERIOPHTHALMUS*
- Also with 4 to 8 brown lines from near pectoral tip to above middle of anal.....  
Females of *S. PERIOPHTHALMUS* var. *VISAYANUS*
- PP.* No blue or pearl bars along sides.
- Q.* Body with longitudinal dark or black lines on sides.
- R.* Anterior half with many black dots, passing into brown or black lines on posterior half; anal with 2 black lengthwise stripes; small canines in lower jaw; tentacles on nape very small; orbital tentacle large, fringed; dorsal XIII—15 to 17; anal II—16 to 18.....17. *S. ANEITENSIS*
- RR.* Anterior half not covered with black dots. 4 to 10 dark lengthwise lines on sides; upper lip crenulate; no tentacles at nape.
- S.* Pale brown with 5-7 black or very dark lines along side, breaking up into dots and dashes posteriorly; caudal barred by rows of black dots; anal rays with white tips; orbital tentacle slender, pointed, usually less than eye; dorsal slightly attached to caudal, XIII—20 to 23; anal I or II—20 to 24....  
7. Females of *S. CAUDOLINEATUS*
- SS.* Brown or leaden with 6 to 10 black lines on side, reduced to 4-6 posteriorly, sometimes becoming spots or dots near the caudal; orbital tentacle small, finely fringed; dorsal attached to caudal, XI or XII—22 to 24; anal II—23 to 24.....  
8. Females of *S. LINEATUS*
- QQ.* Without 4 to 10 lines along each side; upper lip entire.
- T.* Reddish brown, with several rows of short blackish-brown bars and spots on sides; a simple tentacle on eye and a small divided nasal one, none on nape; a minute canine in lower



jaw; dorsal free of caudal, XIII—19 or 20; anal I—19 or 20.

18. *S. INTERRUPTUS*

TT. Not as above.

U. Pectoral clear, with 3 transverse rows of brown dots, or rarely spots; a row of red-brown spots above anal and 2 to 4 rows posteriorly; dorsal and caudal clear, with 4 rows of red-brown spots; males with a small canine; ocular tentacle simple, nasal one bifid or trifid; none on nape; dorsal free of caudal, XIII—19 or 20, rarely XII—18; anal I—19 to 21.

19. *S. DEANI*

UU. Pectoral not as above; no canines in lower jaw.

V. Dorsal free from caudal.

W. Minute simple tentacles on nape, eye, and nostril; dorsal XII—19 or 20; anal II—20; whitish with 7 brown spots along middle of side, each containing 3 or more conspicuous black dots; a row of prominent black dots along lower part of side.

20. *S. FOWLERI*

WW. No tentacles on nape; dorsal XIII (rarely XII)—17 or 18, rarely 19; anal 18—19 or I or II—18 to 19; reddish brown, with 7 pairs of blackish cross bars and a spot on caudal peduncle; orbital tentacle stout, marginally fringed; nasal tentacle of 4 or more filaments; no canines.....

12. Females of *S. MARTINI*

VV. Dorsal attached to caudal.

X. Small tentacles on nape; many reddish or dark brown dots or small spots all over body, dorsal, caudal and pectorals; orbital tentacle small; nasal tentacle very small, usually of 4 filaments; dorsal XIII—19 to 21; anal I—20 to 22.....

11. Females of *S. EDENTULUS*

XX. No tentacles on nape; 7 double brown cross bars, and 2 rows of brown dots on lower half posteriorly; dorsal rays and caudal barred with brown dots, or with diagonal zigzag lines connecting dots; nasal tentacle small, bifid or trifid; orbital tentacle fringed, equal to or more than eye; dorsal XII, seldom XIII—20 to 22; anal I—23 or 24, or II—21 to 24; or III—22.

13. Females of *S. DUSSUMIERI*



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

---

PRELIMINARY COMMENT ON SOME PACIFIC  
COAST PETRELS.

BY A. J. VAN ROSSEM.

---

Ever since 1913, when the writer camped for a period of several weeks on Los Coronados Islands off the Pacific coast of Lower California and had almost daily contact with the petrel colonies there, he has been intrigued not only by the seemingly endless variations in the pattern of the upper tail-coverts, but also by the equally limitless variations of opinion as to the relationships of the petrels which form a chain of colonies from southeastern Alaska to the San Benito Islands off Lower California. I refer to the *Oceanodroma beali*—*beldingi*—*kaedingi*—*socorroensis*—*chapmani* series to which the above names have been applied in a specific sense, or subspecifically in combination with *Oceanodroma leucorhoa* or *Oceanodroma monorhis*.

It was the contention of the late Leverett M. Loomis (Proc. Calif. Acad. Sci. 4th ser., 2, Pt. 2, 1918, pp. 1-187) that this whole complex, with the possible exception of "*kaedingi*," belonged to a single dichromatic species, *Oceanodroma leucorhoa*, in which color and size variations were more or less segregated geographically. Loomis was, as everyone knows, a staunch advocate of strictly binomial nomenclature, and while he gave full consideration to geographic variation he refused to dignify it by name. In the present case he presented all the facts in meticulous detail, but no one, so far as I am aware, has given consideration to his well presented data. For instance, the 1931 edition of the 'Check-list' carries "*socorroensis*" as a full species, separated from *leucorhoa* by no less than four species of no particularly close relationship to either. I mention the Check-list since it is the most impersonal target which can be selected.

In the course of the past several months I have assembled a series of 284 petrels, all but 35 of which are known to be breeding birds taken from their nesting burrows. The localities range from the Sitka region of southeastern Alaska, south to Guadalupe and the San Benito Islands. All of these are represented by more than adequate material save for the

Farallone Islands from which only six specimens have been examined. A rather lengthy paper, accompanied by photographs, is in manuscript, but as this may not be published for several months, I give here a summary of the conclusions from a nomenclatural and distributional standpoint. In these conclusions there is no claim to originality. Loomis correctly diagnosed the situation twenty-three years ago and there remains only the decision as to how many transitional steps to recognize by formal name.

*Oceanodroma leucorhoa beali* Emerson.

*Oceanodroma beali* Emerson, Condor, 8, No. 2, March 20, 1906, 54 (Sitka Bay, Alaska).

*Oceanodroma beldingi* Emerson, *ibid.* (Netarts Bay, coast of Oregon.)

*Range*.—Breeds on islands from the Sitka region, southeastern Alaska, south to the Farallone Islands and probably to Año Nuevo Island, San Mateo County, California.

*Oceanodroma leucorhoa willetti*, subsp. nov.<sup>1</sup>

(*Oceanodroma socorroensis* part, of authors but not of Townsend.)

*Range*.—Breeds on Los Coronados Islands, northern Lower California.

*Oceanodroma leucorhoa chapmani* Berlepsch.

*Oceanodroma monorhis chapmani* Berlepsch, Auk, 23, No. 2, April, 1906, 185 (San Benito Island, Lower California).

<sup>1</sup> *Type*.—Breeding male adult No. 8930 Dickey collection; Little Middle Island, Los Coronados Islands, Pacific coast of northern Lower California, Mexico, June 19, 1913; collected by A. J. van Rossem.

*Subspecific characters*.—Similar to *Oceanodroma leucorhoa beali* in body coloration but upper tail coverts extremely variable, usually nearly uniform blackish gray and paler than the rump and tail but varying to nearly pure white exactly as in *beali*. Similar to *Oceanodroma leucorhoa chapmani* but body coloration (particularly anteriorly) slightly lighter and distinctly more plumbeous (less fuliginous or brownish); upper tail coverts paler and highly variable in the amount of white, instead of being nearly or quite concolor with the rump and tail. Size slightly larger than either *beali* or *chapmani*. Similar to *Oceanodroma leucorhoa socorroensis* in the extreme variability of the amount of white in the upper tail coverts, but body coloration paler and more plumbeous (less blackish) and size larger in all dimensions.

*Remarks*.—Perhaps the only surprise connected with the present work was the fact that examination of the type of *socorroensis* shows it to belong without question to the small, Guadalupe race. In fact it approaches the minimum in measurements and slenderness of bill and tarsi. Just why Anthony, in the light of his own observed variability in the color of the upper tail coverts of both Los Coronados and Guadalupe specimens, and with Townsend's published measurements before him, should have re-described the smaller race is quite incomprehensible. Equally so is the failure of anyone else to investigate the nature of the type of *socorroensis*.

It will be noted that the Asiatic *Oceanodroma monorhis* is not mentioned in the above synopsis, even though it is usually considered to be conspecific with the San Benito and Los Coronados birds. Whether or not it merges into *leucorhoa* in the manner of the North American "dark-rumped" races would seem to be of more importance in deciding its specific status than a, perhaps superficial, resemblance to *chapmani*. However, I have not the material to discuss the question, nor is it of especial importance in the present connection.

In naming the race of Los Coronados Islands for George Willett, I do so as a measure of appreciation for help and advice in various problems, including the present one. I am happy to say that we are in complete agreement on all points.

(*Oceanodroma socorroensis* part, of authors but not of Townsend.)

*Range*.—Breeds on the San Benito Islands, central Lower California.

*Oceanodroma leucorhoa socorroensis* Townsend.

*Oceanodroma socorroensis* Townsend, Proc. U. S. Nat. Mus., 13, No. 799, Sept. 9, 1890, 134 ([at sea near] Socorro Island [off western Mexico]).

*Oceanodroma kaedingi* Anthony, Auk, 15, No. 1, Jan., 1898, 37 (at sea near Guadalupe [sic] Island, Lower California = Lat. 31° N.; Long. 117° W.).

*Range*.—Breeds on Guadalupe Island, off Lower California.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

---

A NEW RED SQUIRREL FROM NORTH DAKOTA.<sup>1</sup>

BY ARTHUR H. HOWELL.

---

The examination of a large series of North American chickarees has revealed the existence of the following undescribed subspecies:

***Tamiasciurus hudsonicus pallescens***, new subspecies.

NORTH DAKOTA CHICKAREE.

*Type*.—Collected 8 miles east of Upham, McHenry County, North Dakota, January 8, 1936, by C. J. Henry; adult female, skin and skull, No. 261625, U. S. National Museum (Biological Survey's collection); original number 135 (27532X.)

*Range*.—North-central North Dakota, specifically the Souris River Valley in McHenry County, North Dakota, and the Turtle Mountains.

*External characters*.—Similar to *T. h. dakotensis*, but smaller; dorsal area and tail a darker shade of red; sides of head and body paler and more grayish (less buffy), especially in winter pelage; nose and face more grayish, lacking the rich buffy wash of *dakotensis*; fore and hind feet in winter pelage grayish rather than cinnamon buff; hind feet in summer darker buff; under parts in winter sometimes slightly vermiculated with fuscous. Compared with *preblei*: Similar in winter pelage, but upper parts and sides averaging paler and less reddish, the red of the back never forming a distinct band; sides of head paler gray; fore and hind feet paler and more buffy (less grayish); under parts mainly without vermiculation. In summer pelage upper parts averaging more tawny (less olivaceous), the fore and hind feet darker buff and the tail darker red above. Compared with *loquax*: Size larger; upper parts and tail in winter much paler, lacking the deep reddish dorsal band of that race; in summer pelage upper parts paler and more ochraceous.

*Cranial characters*.—Skull similar to that of *preblei*, but averaging smaller and relatively narrower across zygomata; much smaller than that of *dakotensis*; larger than that of *loquax*.

---

<sup>1</sup> This description of a hitherto unrecognized subspecies of red squirrel was found by me in arranging the papers of the late Arthur H. Howell. It was prepared by him in connection with his revision of the red squirrels of North America which was left uncompleted by his untimely death.—Viola S. Schantz.

MAY 10 1942

*Color.*—*Winter pelage:* Median dorsal area hazel or mikado brown, not sharply defined, shading into color of the sides, which are warm buff, lightly shaded with fuscous; sides of face pale neutral gray; ears fuscous, shaded with hazel; sides of nose pinkish buff; feet pinkish buff, shaded with fuscous; tail above, tawny or mikado brown, bordered with black and edged with warm buff; tail beneath, warm buff, mixed with neutral gray; under parts white. *Summer pelage:* Upper parts warm buff, mixed with fuscous, the head darker; sides of nose warm buff; ears ochraceous tawny, shaded with fuscous; front feet ochraceous tawny; hind feet similar; the toes buckthorn brown; tail above, russet, bordered with black and edged with warm buff; tail beneath, mixed russet and neutral gray; under parts white, faintly washed with pale pinkish buff.

*Measurements.*—Average of 10 adults from Mouse River, North Dakota: Total length, 333.4 (324–360); tail vertebrae, 132.9 (120–143); hind foot, 48.1 (46–49). *Skull:* Average of 10 adult males from same locality: Greatest length, 47.6 (46.9–49); zygomatic breadth, 26.6 (25–27.7); cranial breadth, 20.5 (20–21.3); interorbital breadth, 13.5 (13–14.3); least post-orbital breadth, 14.2 (13–15.1); length of nasals, 14.4 (12.9–15.7); maxillary tooth row, 7.9 (7.6–8.2). Seven females average: Total length, 46.5; zygomatic breadth, 26.6; cranial breadth, 20.1; the other measurements are much as in the males.

*Remarks.*—This race occupies a limited area in the Souris River Valley, North Dakota, extending northward into the Turtle Mountains. It is the palest of all the races of *hudsonicus*, the red on the back much reduced in extent and intensity. In color it most resembles *dakotensis*, but is less suffused with ochraceous.

*Specimens examined.*—Total number, 31, from localities as follows: North Dakota: Bottineau, 2; Max Lake, Turtle Mountains, 2;<sup>2</sup> Mouse River, 10 miles east of Upham, and S. E. of Stillings Dam, 14; Towner, 7; Turtle Mountains, 6.<sup>3</sup>

*United States Department of the Interior, Fish and Wildlife Service, Washington, D. C.*

---

<sup>2</sup> Coll. Nat. Mus. Canada.

<sup>3</sup> Two in American Mus. Nat. Hist.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW ARIZONA RACE OF THE  
GRASSHOPPER SPARROW.

BY HARRY C. OBERHOLSER.

An interesting and apparently isolated area in the vicinity of the Huachuca Mountains in Arizona is occupied by breeding Grasshopper Sparrows that apparently represent an undescribed race easily distinguished from the other known forms of the species. This may be called

*Ammodramus savannarum ammolegus*, subsp. nov.

*Subspecific characters*.—Similar to *Ammodramus savannarum perpallidus* but averaging somewhat larger, at least in the male. Upper parts decidedly paler, with more chestnut or rufous, and also with much less, sometimes almost no black on the back; lower parts also lighter and not so dull.

*Measurements*.—*Adult male*.—Wing, 62-67 (average, 64.8) mm.; tail, 45-50 (47.0); exposed culmen, 12-12.5 (12.2); tarsus, 20-22 (21.2); middle toe without claw, 15-16 (15.2).

*Adult female*.—Wing, 59.5-62 (60.8); tail, 44.5-48 (45.8); exposed culmen, 11.5-12 (11.8); tarsus, 20.5-22 (21.3); middle toe without claw, 15.

*Type*.—Adult male, No. 39783, Cleveland Museum of Natural History; Huachuca Mountains at 5,000 feet altitude, 6 miles southeast of Fort Huachuca, Arizona; July 3, 1932; Alex. Walker, original number, 8154.

*Geographic distribution*.—Breeds in central southern Arizona, chiefly in the Huachuca Mountain region. Winters south to Guatemala.

*Remarks*.—This interesting bird apparently occupies an isolated breeding range in central southern Arizona, where in the vicinity of the Huachuca Mountains a series of breeding specimens was collected by Alex. Walker during his trip to Arizona in 1932 in the interest of the Cleveland Museum of Natural History. His series is apparently the best in existence as there are few specimens of this race in other museums. A single individual in the United States National Museum is a winter bird from Guatemala, indicating the southern limit of the winter range of this race. It apparently does not winter in Arizona.

The juvenal plumage shows very much the same character of difference as is indicated by the adult, since the upper parts are paler than in the juvenal plumage of *Ammodramus savannarum perpallidus*; there is also more rufous on the upper parts, and somewhat less extensive black marking.

The writer wishes to express his appreciation of the cordial cooperation of Doctor Herbert Friedmann of the United States National Museum in the loan of material for this investigation, and also for the same courtesy to the authorities of the Biological Surveys, of the Fish and Wildlife Service, U. S. Department of the Interior, Washington, D. C.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

---

ON TEN NEW CENTIPEDS FROM MEXICO  
AND VENEZUELA.

BY RALPH V. CHAMBERLIN.

The specimens upon which seven of the new forms herein described are based were collected by Harry Hoogstraal in the state of Michoacan, on his "Fourth Mexican Biological Expedition." The material was secured at and near Tancitaro and Apatzingan. The types of the other three species were taken at quarantine, two at Laredo, Texas, with orchids from Vera Cruz, Mexico, and one at Hoboken, New Jersey, with Cattleya from Venezuela. The specimens taken at quarantine were among material sent to me for identification by Mr. C. T. W. Muesebeck of the U. S. Bureau of Entomology and Plant Quarantine. All types are retained in the author's collection.

*Scolopendra chlora*, new species.

In the smaller type the dorsum, including the head, dark green, the antennae similar, with venter and legs a lighter green. In the larger type the color olive brown, with caudal border of plates olive.

Head without sulci. Antennae composed of 24 articles of which the first four are glabrous.

Prosternal teeth 4 + 4, but the 2 innermost on each side fused, separate only at tips, the two outer free. Prosternum anteriorly with a short median sulcus which is branched at anterior end.

First dorsal plate with a transverse curved impression as in *viridis*, etc.; paired sulci diverging forward and terminating on the sulcus.

Dorsal plates laterally margined from about the tenth plate caudad. Last tergite with a median sulcus.

Paired sulci on second sternite extending caudad of middle, and complete on third and following. Last sternite strongly narrowed caudad, with posterior margin excavated at middle.

First legs with 2 tarsal spines, others to and including the twentieth with a single tarsal spine.

Coxopleurae of last segment with distinct caudal processes bearing 6 spines; caudal margin with 2 spines.

Femur of anal legs bearing about 17 ventral spines in 4 rows; on mesal surface above with 5 spines in 2 series; distal process bearing 4 spines.

Length, 83 and 117 mm.

Locality—Mexico: Michoacan, above Apatzingan, 2000 ft., under stones, two specimens, holotype and paratype, taken August 21 and 22, 1941, by H. Hoogstraal.

This species seems to be most nearly related to *S. viridis* Say. It differs from the latter in the more numerous spines of the anal legs with the caudal process of femur bearing 4 spines instead of 2; in having a median sulcus impressed on anterior part of prosternum; and in having the caudal margin of last sternite distinctly incurved or excavated instead of truncate.

#### *Scolopendra pomacea michoacana*, subsp. nov.

All specimens in the present collection differ from what seems to be the typical *pomacea* in having a spine at dorsodistal angle of femur, patella and tibia of first pairs of legs in addition to the 2 normally present on the first tarsal joint (one dorsodistal and one ventral).

The head wholly lacks sulci and the pair of posterior impressions mentioned by Pocock as present on his specimens of *pomacea*.

Length, 50–55 mm.

Locality—Mexico: Michoacan, Tancitaro, elevation 6000 ft., under rocks and logs, holotype and numerous paratypes taken June 23, 1941, by H. Hoogstraal.

#### *Scolopendra mima*, new species.

Related to the Venezuelan species *S. armata*. It differs in color in having the head and first and last tergite abruptly paler instead of darker than the rest of the dorsum which is olive. Antennae and legs yellowish.

Head with paired sulci extending over entire length.

First dorsal plate with transverse semicircular sulcus. Prosternal teeth fused on each side excepting outermost which is free. Prosternum differing from that of *armata*, in having anteriorly a distinct median longitudinal sulcus which extends back to a sharply impressed transverse sulcus.

Dorsal plates laterally margined from about 15th to last plate. Last tergite with caudal margin obtuse, the angle rounded, not ridged or sulcate; with a sub-circular depression in front of caudal angle.

Sternites with paired sulci indicated only on anterior border, not complete on any and thus differing from *armata*.

Differing from *armata* also in the spining of the legs, of which the first pair have only a single tarsal spine, and the twentieth lacks ventral spines on the femur. Femur and patella with a dorsal spine at distal end on both 19th and 20th pairs, the femur of the 20th leg on one side also with an additional dorsal spine near the first one. Anal legs lost in type.

Coxopleural process on each side with 4 spines at end; a single spine on adjacent caudal margin.

Length, 72 mm.

Locality—Taken at quarantine at Hoboken, New Jersey, with *Cattleya* plants from Venezuela, May 31, 1941, one specimen which has lost the anal legs.

***Simoleptus michoacanus*, new species.**

Cephalic plate rather short, sides convex and caudal margin straight. No frontal suture present.

Labrum divided into oblong sections by means of longitudinal or sub-longitudinal striae. Middle division transversely oblong, its margin finely pectinate as in the genotype.

Prebasal plate a little exposed at middle.

Prehensors when closed about even with anterior margin of head; joints within, and prosternum unarmed, or claw at base with indications of a minute denticle. Chitinous lines very fine, nearly complete.

First maxillae with 2 well-developed membranous lappets on each side.

Dorsal plates bisulcate.

Spiracles all circular.

Ventral pores in a band across caudal border.

Last ventral plate broad, strongly narrowed caudad, trapeziform. Coxal pores (2 on each side) covered by border of sternite.

Second tarsal joint abruptly considerably more slender than the first.

Pairs of legs, 59.

Length, about 17 mm.

Locality—Mexico: Michoacan, Cerro Tancitaro, 9000 ft., under pine bark, one specimen taken by H. Hoogstraal.

***Simoleptus cruzanus*, new species.**

Head obviously longer than broad, narrowed from middle forward. Frontal suture absent. Antennae short, strongly narrowed distad. Head overlapping basal plate, the sides of which are nearly parallel.

Claws of prehensors when closed not reaching anterior end of head, slender and unarmed at base. Other joints and prosternum also unarmed. Prosternum with chitinous lines present, but very fine.

A convex area between lateral pieces of labrum very long fringed or finely pectinate; caudally, a long smooth middle sclerotized piece dorsad of this pectinate portion. Lateral pieces with the usual long pectinae.

First maxillae with membranous lappets.

Last ventral plate wide, trapeziform, covering the 2 coxal pits on each side.

Anal legs differing from those of *michoacanus* and especially those of *pauropodus* in more slender legs in which there is less difference in diameter of first and second tarsal joints.

Pairs of legs, 65.

Length, about 16 mm.

Locality—Mexico: Vera Cruz. One specimen taken at quarantine at Laredo, Texas, with orchids in baggage, June 5, 1941.

Differing from *S. pauropodus* and *S. michoacanus* in not having the pre-basal plate exposed. The fringed median portion of labral area relatively much longer than in *michoacanus*.

***Vulcanbius pedrigalus*, new species.**

Dorsum brown with head and antennae darker than other parts; legs light brown.

Antennae short, composed in holotype of 40 articles. Ocelli, e. g., 1 + 3, 3, 4, or 1 + 1, 3, 5 with top ocellus or caudal ocellus of top row larger than other of series.

Prosternal teeth, 2 + 2, the line of apices gently recurved; ectal spine slender but shorter and stouter than ordinary setae.

Posterior angles of 9th, 11th and 13th dorsal plates strongly produced, those of 7th a little bowed caudad with caudal side widely convex.

Coxal pores, circular; 5, 5, 4, 4.

Ventral spines of first legs, 0, 0, 1 (0), 1, 1; of second, 0, 0, 2, 1. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal, 0, 0, 3, 2, 2; claws 3. Ventral spines of anal legs, 0, 1, 3, 3, 1; dorsal, 0, 0, 3, 2, 1; claws 2. None of coxae armed either dorsally or laterally.

Anal legs of male slender; the dorsal process at distal end of tibiae well developed, relatively wide and short, in side view appearing much like the corresponding one in species of *Nadabius*.

Length, about 20 mm.

Locality—Mexico: Michoacan, Tancitaro Pedregal, El. 6000 ft.; male holotype taken under loose bark by H. Hoogstraal, June 23, 1941.

A female probably of this same species was taken under loose bark at Cerro Tancitaro at an elevation of 11,000 ft. on July 20, 1941. Unfortunately, it has lost all the posterior legs. The claw of the gonopod is strictly entire, with the basal spines characteristically broad and short. The antennae have only 33 articles. The specimen is smaller than the male holotype.

Genus **CERROBIUS**, new.

Articles of antennae typically fixed at 19. Prosternal teeth 2 + 2. None of dorsal plates with posterior angles produced. Coxal pores in a single series. Claw of female gonopods entire. The male characterized especially by having the first tarsal article of the penult legs greatly inflated. Anal legs in male not specially modified.

Genotype ***Cerrobium tancitarus***, new species.

A related new genus, *Guerrobium*, which includes *G. pontifex* (Pocock), genotype, and *G. humberti* (Pocock), has the first tarsal joint of the anal legs inflated, with the preceding article bearing a characteristic dorsal lobe, but the penult legs are not modified. In the genus *Vulcanbius*, the tibiae of both anal and penult legs, instead of the first joint, are more or less conspicuously inflated.

**Cerrobium tancitarus**, new species.

General color above light brown, with the legs paler and somewhat orange distally.

Antennae short, composed of 19 short articles of which the ultimate somewhat exceeds the two preceding taken together. Ocelli typically in three series; e. g., 1 + 3, 3, 2; single ocellus and caudal one of top series, largest, some of anterior ones very small.

Prosternal teeth small and pale, 2 + 2; median sinus relatively wide, U-shaped. Posterior angles of none of the dorsal plates produced.

Coxal pores small and round; 2, 3, 3, 3.

Ventral spines of first legs, 0, 0, 0, 0, 1; of the second, 0, 0, 1, 2, 1. Ventral spines of the penult legs, 0, 1, 3, 3, 1; dorsal, 0, 0, 3, 1, 1; claws, 3. Ventral spines of anal legs, 0, 1, 3, 2, 1; dorsal, 0, 0, 1, 1, 0; claws 2. None of posterior coxae armed either dorsally or laterally.

Claw of female gonopods strictly entire; basal spines 2 + 2.

In the male the first tarsal joint of the penult legs is strongly and evenly inflated obviously exceeding in diameter the preceding article and very greatly exceeding that of the second tarsal article.

Length, about 9 mm.

Locality—Mexico: Michoacan, Cerro Tancitaro, July 20, 1941, el. 11,000 ft., male holotype, female allotype and four paratypes taken under bark by H. Hoogstraal.

**Lithobius michoacanus**, new species.

Dorsum in general brown, the head and antennae chestnut.

Posterior angles of 9th, 11th and 13th dorsal plates produced, the processes of the 9th rather short or weak.

Head with marginal break distinct.

Articles of antennae, 28.

Ocelli in 4 or 5 series; e. g., 1 + 2, 5, 6, 5, 2 or 1 + 5, 6, 4, 2, the two ocelli of the bottom series widely separated from each other in the holotype. The single ocellus not enlarged or specially differentiated.

Prosternal teeth 6 + 7 in holotype, even the ectal seta bristle-like.

Coxal pores 5, 6, 6, 5, transversely more or less elongate.

Ventral spines of first legs, 0, 0, 2, 3, 2.

Dorsal spines of penult legs, 1, 0, 3, 1, 1; ventral, 0, 1, 3, 3, 2; one small accessory claw. Last 5 pairs of coxae dorsally armed, last 2 also laterally armed.

Gonopods of female with claw tripartite; basal spines 2 + 2.

Length, 17 mm.

Locality—Mexico: Michoacan, Cerro Tancitaro, July 20, 1941, female holotype taken at 11,000 ft., under bark, by H. Hoogstraal.

Genus **CRUZOBIUS**, new genus.

A genus apparently nearest to *Arkansobius* of the *Watobiidae*, but having no ventral spine on tibia of legs, most legs of middle, however, bearing a slender, almost setiform dorsal spine at distal end of tibia on anterior side.

The articles of antennae 20.

Tarsi of all legs unarticulate excepting in last two pairs where they are biarticulate. Tibia in anal legs of male bearing a lobe at distal end above, this lobe resembling that found on penult legs of males in *Nampabius*.

Genotype *Cruzobius verus*, new species.

The genera which I refer to the Watobiidae, distinguished from Lithobiidae, e. g., by having spiracles on the 8th segment, may be separated by means of the following key:

KEY TO GENERA OF *Watobiidae*.

1. (4) Articles of antennae 20 to 22.....2
2. Most legs with a ventral spine at distal end of tibia in addition to the antero-dorsal one..... *Arkansobius*  
 —None of the legs with a ventral tibial spine.....3
3. Posterior angles of 9th, 11th and 13th dorsal plates produced; penult legs in male with tibia strongly crassate and with a low, heel-like dorsal elevation at distal end; a similar not on anal legs of male.....*Watobius*  
 Posterior angles of none of the dorsal plates produced; penult legs of male with tibia normal, neither specially crassate nor bearing a dorsal lobe; tibia of anal legs of male with a peg-like dorsal lobe.....*Cruzobius*
4. (1) Articles of antennae numerous (e. g., 50 in the genotype).....  
*Elattobius*

*Cruzobius verus*, new species.

Dorsum and antennae brown, the frontal region of head and the legs paler.

Antennae short; articles 20.

Ocelli typically 1, 3, the single ocellus largest and lying above the caudal ocellus of the series of 3.

Prosternal teeth 2 + 2.

Posterior angles of none of the dorsal plates produced, the caudal margin of 9th, 11th and 13th straight.

Tarsi of penult and anal legs biarticulate, those of the other legs not divided. All legs with 3 claws.

Tibia of anal leg in male with dorsal surface at distal end oblique, bearing a peg-like process which is distally obliquely truncate.

Length, about 6.5 mm.

Locality—Taken at quarantine at Laredo, Texas, with orchids brought from Vera Cruz, Mexico, June 5, 1941. One male.

*Scutigera tancitarona*, new species.

Dorsum marked with three longitudinal stripes of bluish-black color, one along each lateral border and one over middle. The median stripe is continuous, embracing the stoma saddle in front of which it is constricted



and then expanding forward on each tergite in a subelliptic form, with a narrow transverse line connecting this expanded portion with the lateral band on each side. Legs annulate, bearing 2 rather broad annuli on each of the third, fourth and fifth joints; tarsi more or less ferruginous yellow. Antennae also ferruginous.

Articles of antennae relatively decidedly longer than usual in species of the genus, e. g., in *S. coleoprata* and *S. chichivaca*, but still shorter than broad. First division consisting of 55 articles; the second of about 160.

Tergites incurved at middle behind with stoma relatively short and projecting but slightly into the excavation. Stoma saddles broad and moderately elevated. Surface of tergites bearing numerous setae of the usual character, these rather evenly distributed.

Last tergite with caudal margin evenly convex, not at all incurved or notched at middle.

First tarsus I composed of 14 articles, the second of 32. First tarsus II composed of 13 articles, the second of 33; the tarsal pegs on alternate segments beginning on 10th and ending on 28th. First tarsus III consisting of 13 articles, the second of 29. First tarsus with spines at distal end.

The gonopods of the female parallel out to base of terminal claws, the interval separating them narrow.

Length, about 16 mm.

Locality—Mexico: Michoacan, Tancitaro; a female (holotype) and male (allotype) taken by H. Hoogstraal, August 1, 1941.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

THE SUBGENERIC POSITION OF THE *LEPUS*  
*CALIFORNICUS* GROUP OF HARES.

BY H. HAROLD SHAMEL.

While engaged in a study of the *Leporidae* in the U. S. National Museum I have noticed a wrong classification of the following forms of the subgenus *Macrotolagus*: *texianus*, *melanotis*, *merriami*, *asellus*, and *festinus*, currently classified by Nelson and others as subspecies of *L. californicus*.

All of these hares have, on the cutting edge of the incisors, the enamel pattern that is characteristic of this subgenus, a pattern that is absent in the members of the subgenus *Lepus*. They also have the very gray jack-rabbit rump which contrasts more or less strongly with the color of the back. In *Lepus californicus* there is as in *Lepus americanus* and *L. timidus* no enamel pattern on the incisors, and the color of the rump is essentially the same as that of the back.

The forms of *Lepus californicus* and those of the subgenus *Macrotolagus* as I believe they should stand are as follows:

<i>Lepus californicus californicus</i>	<i>Macrotolagus alleni alleni</i>
" <i>wallawalla</i>	" <i>palitans</i>
" <i>richardsonii</i>	" <i>tiburonensis</i>
" <i>bennettii</i>	<i>gaillardii gaillardii</i>
" <i>deserticola</i>	<i>gaillardii bottyi</i>
" <i>eremicus</i>	<i>callotis</i>
" <i>depressus</i>	<i>flavigularis</i>
" <i>sheldoni</i>	<i>altamirae</i>
" <i>vigilax</i>	<i>melanotis</i>
" <i>martirensis</i>	<i>merriami</i>
" <i>magdalenae</i>	<i>asellus</i>
" <i>xanti</i>	<i>festinus</i>
<i>insularis</i>	<i>texianus</i>



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

---

A SYNOPSIS OF THE PHILIPPINE LAND MOLLUSKS  
OF THE GENUS HEMITRICHIA.<sup>1</sup>

BY PAUL BARTSCH,

*Curator, Division of Mollusks and Cenozoic Invertebrates,  
U. S. National Museum.*

---

In the Proceedings of this Society I published on May 19, 1938, "A Synopsis of the Philippine Land Mollusks of the Subgenus *Ryssota*." On March 11, 1939, "A Synopsis of the Philippine Land Mollusks of the Subgenera *Lamarckiella* and *Pararyssota* of the Genus *Ryssota*" was likewise published here.

The present paper is a third synopsis, dealing with the genus *Hemitrichia*. In it I have attempted to render available the information furnished by the immense collection in the United States National Museum. I have avoided publication of previously described species except where they seemed necessary to an understanding of the subspecies included under them; I have, however, included them in the keys.

It is hoped that the fully illustrated monograph on "The Larger Zonitid Land Mollusks of the Philippine Islands" may find publication at some not all too distant date.

HEMITRICHIA Möllendorff.

In 1888, von Möllendorff created the genus *Hemitrichia*<sup>2</sup> to embrace the Philippine Island land mollusks that have a globose or depressed-globose shell, which is regularly granulated upon the upper surface, and is hirsute or covered with a thin cuticle, the under surface being smooth and shining. Von Möllendorff here reports a number of species without designating a type. I have not been able to discover a subsequent type designation and therefore now select *Hemitrichia xanthotrichia* Pfeiffer, the first species of Möllendorff's list, as the type.

Von Möllendorff says<sup>3</sup> that according to Semper and Pfeiffer the follow-

---

<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution.

<sup>2</sup> *Nachrichtsbl. deutschen Malak. Ges.*, 1888, vol. 20, p. 81.

<sup>3</sup> *Reisen im Archipel der Philippinen*, vol. 8, p. 148, 1902.

ing anatomic characters are present in the group: The foot is tripartite in *H. setigera*. The caudal horn development is completely reduced in *H. setigera*, while in *H. luteofasciata* the terminal caudal portion is provided with an exceedingly long horn. The reproductive system is said to be without accessory organs in *H. luteofasciata*, according to Semper. The glandula mucosa is present, according to Pfeiffer, in *H. setigera*. The jaw possesses a middle tooth and the radula resembles that of *Macrochlamys*.

Hemitrichias are leaf-mulch dwellers. In the rainy season they leave their hiding places and walk about over the vegetation on the ground and may climb trees to some distance above the ground. Most of the species are rarely found in large numbers in any one place.

The large quantity of material before me divides easily into three groups, which I shall designate as subgenera. It is unfortunate that no specimens for dissection are at hand, for it seems more than likely that the groups which I am designating below, based upon shell characters, will also have anatomic support. This is indicated by the references that Semper and others make. *Hemitrichia luteofasciata* is said to have a caudal horn, while in *H. setigera* this is said to be absent.

The subjoined key will readily characterize the three groups.

#### KEY TO THE SUBGENERA OF *Hemitrichia*.

- Granules of the upper surface bearing hairs.....*Hemitrichia*  
 Granules of the upper surface not bearing hairs.  
     Granules of the upper surface bearing scales.....*Lepidotrichia*  
     Granules of the upper surface not bearing scales.  
         Upper surface covered with a thin periostracum.....*Atrichoconcha*

#### Subgenus HEMITRICHIA.

Shell with the upper, or upper and peripheral, or sometimes even posterior basal, surface papillose. The papillae surmounted by a hair-like cuticular projection.

Type.—*Hemitrichia xanthotrichia* Pfeiffer (= *H. velutina* Sowerby).

#### KEY TO THE SPECIES OF THE SUBGENUS *Hemitrichia*.

- Axial ribs and trichose spiral threads terminating in a conspicuous angle on the base.  
 Periphery strongly angulated.  
     Space between periphery and basal angulation rounded....*cinnamomea*  
     Space between periphery and basal angulation not rounded.  
         Space between periphery and basal angulation almost flattened.  
             Hairs exceedingly short.....*pruinosa*  
             Hairs not exceedingly short.  
                 Hairs moderately long.....*consimilis*  
 Periphery not strongly angulated.  
 Periphery almost rounded.  
     Trichose spiral threads between summit and periphery more than 33.

- Trichose spiral threads on base 36.....*brachytricha*  
 Trichose spiral threads on base 28.....*velutinella*  
 Trichose spiral threads between summit and periphery less  
 than 25.....*xanthotrichia*  
 Axial ribs and trichose spiral threads not terminating in conspicu-  
 ous angle on the base.  
 Basal angle merely indicated.  
 Chestnut colored band extending over all the trichose portion  
 of the base.....*platyzona*  
 Chestnut colored band extending only over a small portion of  
 the trichose portion of the base.....*kobelti*  
 Basal angle not merely indicated.  
 Basal angle absent.  
 Hairs upon the upper surface developed into long, strong  
 setae.....*setigera*  
 Hairs upon the upper surface not developed into long, strong  
 setae.  
 Periphery of the last whorl conspicuously angulated.....*striatula*  
 Periphery of the last whorl not conspicuously angulated.  
 Periphery of the last whorl obsoletely angulated.  
 Shell banded.  
 Spiral lirations between summit and periphery more  
 than 30.  
 Periphery and base with a narrow chestnut colored  
 band.....*aparriana*  
 Periphery and base without a narrow chestnut  
 colored band.  
 Shell chestnut brown on the anterior half of  
 upper and posterior half of lower sur-  
 face.....*pandana*  
 Spiral lirations between summit and periphery less  
 than 25.  
 Shell with a narrow peripheral chestnut colored  
 band only.....*hidalgoi*  
 Shell not with a narrow peripheral chestnut  
 colored band only.  
 Shell with a peripheral and basal chestnut  
 colored band<sup>4</sup>.....*tagalensis*  
 Shell without a peripheral and basal chestnut  
 colored band.  
 Shell chestnut brown on anterior half of upper  
 and posterior half of lower surface.....*setosula*  
 Shell chestnut brown on anterior half of  
 upper but not posterior half of lower  
 surface.....*boettgeri*  
 Shell not banded but unicolor .....*abraea*

<sup>4</sup> Sometimes a third dark band is present between the periphery and the summit.

## HEMITRICHIA (HEMITRICHIA) PRUINOSA Möllendorff.

Shell helicoid, horn-colored. Nuclear whorls well rounded, marked by lines of growth only. Postnuclear whorls well rounded, marked by very fine, wavy, slightly retractively slanting, axial riblets and numerous, closely spaced, spiral threads, the junctions of the two forming tubercles which bear very short, pale yellowish hairs. Periphery obtusely angulated. Posterior two-fifths of the base marked by the continuations of the axial riblets and spiral threads, similar in strength to those of the spire. The trichose portion of the base terminates abruptly anteriorly in a ridge. The area between this ridge and the periphery is almost flattened. The rest of the base is marked by lines of growth and numerous, very closely spaced, microscopic spiral striations. Aperture broadly oval; outer lip curving a little more abruptly from the periphery toward the summit than it does basally; inner lip expanded toward its insertion where it is reflected over the umbilicus as a white callus.

The present species is closely related to *Hemitrichia (Hemitrichia) consimilis* Quadras and Möllendorff, but differs from it by having much shorter hairs of a little paler color.

KEY TO THE SUBSPECIES OF *Hemitrichia (Hemitrichia) pruinosa*.

Trichose spirals between periphery and basal angle more than 50.....	<i>depressa</i>
Trichose spirals between periphery and basal angle 40.....	<i>pruinosa</i>
Trichose spirals between periphery and basal angle 29.....	<i>zambalesana</i>

## HEMITRICHIA (HEMITRICHIA) PRUINOSA DEPRESSA

Möllendorff.

This subspecies comes from Bayabas, Bulacan, Luzon. Möllendorff gives the measurements as: Height 10.7 mm.; greater diameter 20.5 mm.; height of aperture 8.7 mm.; diameter 11 mm.

## HEMITRICHIA (HEMITRICHIA) PRUINOSA PRUINOSA

Möllendorff.

U.S.N.M. No. 184614, a topotype, comes from Montalban, Luzon. It has 5.9 whorls and measures: Height 13.7 mm.; greater diameter 21.2 mm.; lesser diameter 18.7 mm.

***Hemitrichia (Hemitrichia) pruinosa zambalesana*, new subspecies.**

The type of this subspecies, U.S.N.M. No. 311413, comes from San Antonio, Zambales, Luzon. It has 5.3 whorls and measures: Height 12.7 mm.; greater diameter 20.3 mm.; lesser diameter 17.9 mm.

## HEMITRICHIA (HEMITRICHIA) CONSIMILIS

Quadras and Möllendorff.

Shell helicoid, moderately large, pale brown, sometimes straw-colored. Nuclear whorls well rounded, smooth, marked by lines of growth only. Postnuclear whorls well rounded, marked by numerous, feeble, retractively



slanting axial riblets and spiral striations, which are almost of the same strength as the riblets. Periphery angulated. Basal angle conspicuous. The space between the periphery and basal angle flattened, ornamented like the spire. The rest of the base is smooth, excepting lines of growth and numerous, closely spaced, microscopic spiral striations. Aperture oval; outer lip curving a little more abruptly toward the summit than the base from the periphery; inner lip expanded at its insertion where it is reflected over the umbilicus as a white callus.

This species is very closely related to *H. (H.) pruinosa* Möllendorff, but differs from it by usually being brown instead of horn-colored, and in having the hairs about double the length of those on *H. (H.) pruinosa*.

KEY TO THE SUBSPECIES OF *Hemitrichia (Hemitrichia) consimilis*

Quadras and Möllendorff.

Trichose spiral threads between summit and periphery 40.

Trichose spiral threads on base 38.....*consimilis*

Trichose spiral threads on base 35.....*sibuyanensis*

Trichose spiral threads between summit and periphery 35.....*badajosana*

HEMITRICHIA (HEMITRICHIA) CONSIMILIS CONSIMILIS .

Quadras and Möllendorff.

U.S.N.M. No. 311415, a topotype, comes from Tablas Island. It has 5.6 whorls and measures: Height 13.2 mm.; greater diameter 21.3 mm.; lesser diameter 18.6 mm.

*Hemitrichia (Hemitrichia) consimilis sibuyanensis*, new subspecies.

The type, U.S.N.M. No. 311414, comes from the Island of Sibuyan. It has 5.8 whorls and measures: Height 13.7 mm.; greater diameter 21 mm.; lesser diameter 18.2 mm.

*Hemitrichia (Hemitrichia) consimilis badajosana*, new subspecies.

The type, U.S.N.M. 311419, comes from Badajos, Tablas Island. It has 5.4 whorls and measures: Height 12 mm.; greater diameter 20.3 mm.; lesser diameter 17.5 mm.

HEMITRICHIA (HEMITRICHIA) BRACHYTRICHA Möllendorff.

Shell helicoid, rather inflated, whorls pale brown, usually a little darker on the base than on the spire. Nuclear whorls smooth except for lines of growth. Postnuclear whorls inflated, marked by closely spaced, slender, wavy, retractively curving axial riblets and trichose spiral threads, which are almost as strong as the riblets. The peripheral angulation, characteristic of most species of *Hemitrichia*, in this species is merely indicated on the first portion of the last turn and disappears completely on the latter portion of this whorl leaving the periphery well rounded. The basal termination of the axial and trichose spiral sculpture is marked by a conspicuous angle. The rest of the base is smooth, polished, marked by lines of growth, and very closely spaced microscopic spiral striations. Aperture broadly oval; outer lip curving a little more abruptly toward the summit

from the periphery than it does basally; inner lip expanded at its insertion where it is reflected over the umbilicus. Interior of aperture white with a purplish tinge.

KEY TO THE SUBSPECIES OF *Hemitrichia* (*Hemitrichia*) *brachytricha*  
Möllendorff.

Trichose spiral threads between summit and periphery 34.....*brachytricha*

Trichose spiral threads between summit and periphery not 34.

Trichose spiral threads between summit and periphery 29....*albayana*

Trichose spiral threads between summit and periphery 25....*batanensis*

HEMITRICHIA (HEMITRICHIA) BRACHYTRICHA  
BRACHYTRICHA Möllendorff.

U.S.N.M. No. 116560 contains 2 specimens of this subspecies, collected by Cuming, the exact locality for which is not known. One of these has 5.2 whorls and measures: Height 15 mm.; greater diameter 23.8 mm.; lesser diameter 20.4 mm.

***Hemitrichia* (*Hemitrichia*) *brachytricha albayana*, new subspecies.**

The type, U.S.N.M. No. 311411, comes from Malinao, Albay, Luzon. It has 5.3 whorls and measures; Height 15.2 mm.; greater diameter 23.7 mm.; lesser diameter 20.2 mm.

***Hemitrichia* (*Hemitrichia*) *brachytricha batanensis*, new subspecies.**

The type, U.S.N.M. No. 256202, comes from near the coal mines on Batan Island off east Luzon. It is a not quite mature specimen having 5 whorls and measures: Height 13.7 mm.; greater diameter 20.3 mm.; lesser diameter 17.7 mm.

HEMITRICHIA (HEMITRICHIA) KOBELTI Möllendorff.

Shell helicoid. Nuclear whorls flesh-colored, the rest of the turns flesh-colored with a greenish-yellow tinge on the upper surface, pale brown on the base. A broad chestnut-colored zone is present at the periphery and extends a little more toward the summit than it does toward the base. Nuclear whorls smooth excepting growth wrinkles. Postnuclear whorls well rounded, marked by fine, wavy, retractively slanting axial riblets and numerous, trichose spiral lirations, the junction of the two forming tubercles which are surmounted by slender, golden-yellow hairs. Periphery almost rounded. Base somewhat inflated, rounded, the posterior third marked by the continuations of the axial ribs and trichose spiral threads equaling those of the spire in strength, the rest of the base being marked by lines of growth and closely spaced, microscopic spiral striations. Aperture oval; outer lip curving a little more abruptly toward the summit than toward the base from the periphery; inner lip strongly arched, expanded at its insertion and there reflected over the umbilicus as a whitish callus.

KEY TO THE SUBSPECIES OF *Hemitrichia (Hemitrichia) kobelti* Möllendorff.

Trichose spiral threads between summit and periphery 32.....*kobelti*  
Trichose spiral threads between summit and periphery 27.....*romblonensis*

HEMITRICHIA (HEMITRICHIA) KOBELTI KOBELTI Möllendorff.

U.S.N.M. No. 184835, a topotype, comes from Sibuyan Island. It has 6.5 whorls and measures: Height 17.5 mm.; greater diameter 28.4 mm.; lesser diameter 24.4 mm.

***Hemitrichia (Hemitrichia) kobelti romblonensis*, new subspecies.**

The type, U.S.N.M. No. 256205, comes from Romblon Harbor, Romblon Island. It has 5.2 whorls and measures: Height 12.8 mm.; greater diameter 21.8 mm.; lesser diameter 19.1 mm.

HEMITRICHIA (HEMITRICHIA) SETIGERA Sowerby.

Shell varying from helicoid to subglobular in shape. The early whorls are pale brown, the later turns chestnut-colored on the upper surface, while the base has a greenish-yellow zone about one-fourth of the distance between the periphery and the umbilicus anterior to the periphery, which varies somewhat in width in the various subspecies. Anterior to this zone is a broad band of brown equal to about two-fifths of the width of the shell, while the inner portion is greenish-yellow. The whorls of the spire are inflated, strongly rounded and marked by rather rough lines of growth and slender spiral threads which are more or less equal and equally spaced. These spiral threads extend over the periphery on to the posterior portion of the base, sometimes terminating at the narrow light zone and in some subspecies passing beyond this. On the upper surface there are strongly developed, hair-like appendages, which are placed on the spiral threads at rather regular intervals. These lend to the shell a decidedly hairy appearance. On the posterior basal portion where the spiral threads are present these hairs are less strongly developed, in fact usually worn off, probably on account of the progression of the animal, for near the aperture on the last whorl they are quite well developed. The base, in addition to these stronger spirals on the posterior portion, is marked between them by fine, closely spaced, wavy, spiral striations, which also extend over the anterior portion of the base, though in a little more microscopic form. Aperture broadly oval; the outer lip curving a little more abruptly toward the summit than the base; the inner lip strongly arched and becoming somewhat expanded toward its insertion where it is reflected over the umbilical chink.

The following key and descriptions will help to differentiate the subspecies

KEY TO THE SUBSPECIES OF *Hemitrichia (Hemitrichia) setigera* Sowerby.

Heavy trichose spirals on first postnuclear whorl 4.....*quadrasi*  
Heavy trichose spirals on first postnuclear whorl not 4.  
Heavy trichose spirals on first postnuclear whorl 5.

Spiral lirations on base extending below light zone.	
Basal lirations 27.....	<i>balerana</i>
Basal lirations not 27.	
Basal lirations 21.....	<i>casigurana</i>
Basal lirations not 21.	
Basal lirations 19.	
Trichose spirals on last whorl 19.....	<i>tauitana</i>
Trichose spirals on last whorl 15.....	<i>makabengana</i>
Basal lirations not 19.	
Basal lirations 17.....	<i>palanana</i>
Basal lirations 15.....	<i>setigera</i>
Spiral lirations on base not extending below light zone.....	
<i>malupana</i>	
Heavy trichose spirals on first postnuclear whorl 6.	
Spiral lirations on base extending below light zone.	
Basal lirations not more than 20.....	<i>polilloensis</i>
Basal lirations more than 22.....	<i>batangasana</i>
Spiral lirations on base not extending below light zone.....	
<i>moellendorffi</i>	

**Hemitrichia (Hemitrichia) setigera quadrasi**, new subspecies.

The type, U.S.N.M. No. 311388, comes from Alcala, Cagayan, Luzon. It has 6.8 whorls and measures: Height 22.7 mm.; greater diameter 32.4 mm.; lesser diameter 28.3 mm.

**Hemitrichia (Hemitrichia) setigera balerana**, new subspecies.

The type, U.S.N.M. No. 311392, comes from Baler, Tayabas, Luzon. It has 6.2 whorls and measures: Height 20.2 mm; greater diameter, 30.6 mm.; lesser diameter 26.7 mm.

**Hemitrichia (Hemitrichia) setigera casigurana**, new subspecies.

The type, U.S.N.M. No. 311437, comes from Sitio Dinog, Casiguran, Luzon. It has 6.5 whorls and measures: Height 19.2 mm.; greater diameter 27.2 mm.; lesser diameter 24.1 mm.

**Hemitrichia (Hemitrichia) setigera taitana**, new subspecies.

The type, U.S.N.M. No. 311389, was collected at Taut, Apayao, Luzon. It has 6.3 whorls and measures: Height 22 mm.; greater diameter 31 mm.; lesser diameter 27 mm.

**Hemitrichia (Hemitrichia) setigera makabengana**, new subspecies.

The type, U.S.N.M. No. 311393, comes from Makabenga, Nueva, Vizcaya, Luzon. It has 6.2 whorls and measures: Height 20.6 mm.; greater diameter 26.7 mm.; lesser diameter 23.1 mm.

**Hemitrichia (Hemitrichia) setigera palanana**, new subspecies.

The type, U.S.N.M. No. 311394, comes from Paguidin, Palanan, Isabella, Luzon. It has 6.8 whorls and measures: Height 22.3 mm.; greater diameter 29.1 mm.; lesser diameter 25.8 mm.

**HEMITRICHIA (HEMITRICHIA) SETIGERA** Sowerby.

U.S.N.M. No. 311396 contains a specimen from Claveria, Cegayan, Luzon. It has 6.7 whorls and measures: Height 23.7 mm.; greater diameter 35 mm.; lesser diameter 30.2 mm.

***Hemitrichia (Hemitrichia) setigera malupana***, new subspecies.

The type, U.S.N.M. No. 311397, comes from Malupa, Panay. It has 6.6 whorls and measures: Height 24 mm.; greater diameter 33.6 mm.; lesser diameter 29.4 mm.

***Hemitrichia (Hemitrichia) setigera polilloensis***, new subspecies.

The type, U.S.N.M. No. 311400, comes from Polillo Island. It has 7.1 whorls and measures: Height 23 mm.; greater diameter 29.5 mm.; lesser diameter 26.2 mm.

***Hemitrichia (Hemitrichia) setigera batangasana***, new subspecies.

The type, U.S.N.M. No. 311398, comes from Lipa, Batangas, Luzon. It has 6.9 whorls and measures: Height 22 mm.; greater diameter 29 mm.; lesser diameter 26.5 mm.

***Hemitrichia (Hemitrichia) setigera moellendorffi***, new subspecies.

The type, U.S.N.M. No. 311399, comes from Cagayan, Luzon. It has 6.9 whorls and measures: Height 25.3 mm.; greater diameter 32.3 mm.; lesser diameter 28.6 mm.

***Hemitrichia (Hemitrichia) appariana***, new species.

Shell depressed, helicoid, thin, horn-colored with a narrow chestnut-colored peripheral zone and another a little wider on the middle of the base. Nuclear whorls 2.3, well rounded, separated by a strongly impressed suture, and marked by obsolete axial riblets. The junction between the nucleus and the postnuclear whorls is strongly marked, and the trichose ornamentation begins with the beginning of the postnuclear turns. The postnuclear whorls are moderately rounded, separated by a well impressed suture, ornamented by closely spaced axial riblets which are more or less wavy, and slightly retractively slanting and numerous, almost equal and almost equally spaced spiral threads, which are about as strong as the riblets. The junction of these two elements forms rounded nodules which are surmounted by moderately long yellowish hairs when the epidermis is present. Of these spiral threads 31 occur between the summit and the periphery in the type. Periphery obtusely angulated, base well rounded, somewhat inflated and marked on the posterior third by the continuation of the axial riblets and spiral threads; of the latter 35 are present. The axial riblets continue feebly over the rest of the base and the spirally sculptured zone and terminate anteriorly without a conspicuous demarcation. The anterior portion of the base is marked, in addition to the irregular lines of growth, by closely spaced, wavy, microscopic spiral striations. Aperture moderately large, broadly oval; outer lip curving

a little more abruptly from the periphery to the summit than it does from the periphery to the base; inner lip strongly arched, slightly expanded toward its insertion where it is reflected partly over the umbilicus. The interior of the aperture is bluish with the brown bands showing conspicuously.

The type, U.S.N.M. No. 311403, comes from Aparri, Cagayan, Luzon. It is an immature specimen having 4.8 whorls and measures: Height 10.2 mm.; greater diameter 15.8 mm.; lesser diameter 13 mm.

**Hemitrichia (Hemitrichia) pandana**, new species.

Shell helicoid; nuclear turns 2.3, flesh-colored, the rest of the shell having a broad zone of greenish yellow adjacent to the summit which covers about one-third of the distance between the summit and the periphery; the inner two-fifths of the base is of the same color, while the rest of the whorls are pale chestnut-brown. The whorls are strongly rounded and separated by a well impressed suture. They are marked by slender, wavy, retractively slanting axial riblets and numerous equal and equally spaced spiral threads, which are almost equal to the axial riblets in strength and form nodules at their junction with them. Of these threads, 34 occur between the summit and the obtusely angulated periphery. Base somewhat inflated, strongly rounded, the posterior third marked by the continuation of the sculpture characteristic of the upper portion of the whorls, 36 spiral threads being present. The anterior three-fifths is marked by feeble lines of growth and numerous, wavy, closely spaced, microscopic spiral striations. Aperture large, broadly ovate, bluish white within; the outer lip curving much more strongly from the periphery to the summit than it does from the periphery to the base; inner lip strongly arched, slightly expanded at its insertion where it is reflected over the umbilicus which it almost closes.

The type, U.S.N.M. No. 311404, comes from Pandan, Antiqua, Panay. It has 5.6 whorls and measures: Height 16.8 mm.; greater diameter 24.3 mm.; lesser diameter 21.3 mm.

**HEMITRICHIA (HEMITRICHIA) HIDALGOI** Möllendorff.

Shell varying from depressed-helicoid to subglobose. The periphery varies from well rounded in *H. (H.) h. matuliana* to somewhat flattened in *H. (H.) h. stenostoma* Möllendorff. The number of trichose spiral lines on the last whorl varies from 14 in *H. (H.) h. matuliana* to 19 in *H. (H.) h. globosa* Möllendorff. The hairs are pale yellow and a trifle shorter than those of *H. (H.) tagalensis* Dohrn. The posterior portion of the base bears a sculpture similar to that of the upper portion of the last turn. The number of trichose spirals here varies from 19 in *H. (H.) h. hidalgoi* to 23 in *H. (H.) h. globosa*. The shape of the aperture varies from broadly ovate in *H. (H.) h. globosa* to rather compressed in *H. (H.) h. stenostoma*. The shell is almost unicolored, the early whorls being flesh-colored and the rest more or less straw-colored, the last whorl, particularly the last half, usually a little darker. All the races so far known have a single narrow peripheral brown band.

KEY TO THE SUBSPECIES OF *Hemitrichia* (*Hemitrichia*) *hidalgoi* Möllendorff.

Trichose spiral threads between summit and periphery 14 or 15.

Trichose spiral threads on base 19.....*hidalgoi*

Trichose spiral threads on base 22.....*matuliana*

Trichose spiral threads between summit and periphery 19.....*globosa*

*Hemitrichia* (*Hemitrichia*) *hidalgoi stenostoma* belongs here, but I have not seen specimens and hence can not key it.

HEMITRICHIA (HEMITRICHIA) HIDALGOI HIDALGOI  
Möllendorff.

U.S.N.M. No. 311405, a topotype, comes from Montalban, Luzon. It has 5.5 whorls and measures: Height 20 mm.; greater diameter 30 mm.; lesser diameter 25 mm.

***Hemitrichia* (*Hemitrichia*) *hidalgoi matuliana*, new subspecies.**

The type, U.S.N.M. No. 311406, comes from Mt. Matuli, Luzon. It has 6 whorls and measures: Height 22.5 mm.; greater diameter 29.2 mm.; lesser diameter 24.9 mm.

HEMITRICHIA (HEMITRICHIA) HIDALGOI GLOBOSA  
Möllendorff.

A topotype, U.S.N.M. No. 184619, comes from Morong, Luzon. It has 5.7 whorls and measures: Height 19.1 mm.; greater diameter 28 mm.; lesser diameter 24 mm.

HEMITRICHIA (HEMITRICHIA) HIDALGOI STENOSTOMA  
Möllendorff.

The type comes from the village Cuyapo, Nueva Ecija, Luzon, and the measurements given by Möllendorff are: Height 17 mm.; greater diameter 27 mm.

HEMITRICHIA (HEMITRICHIA) TAGALENSIS Dohrn.

Shell helicoid, ground color varying from flesh-color to straw-color. All the races have a peripheral and a basal color band. The peripheral band may be narrow, as in *H. (H.) t. casigurana* and *H. (H.) t. mearnsi*, or it may be broad as in *H. (H.) t. tagalensis*. In the last-named subspecies there is also present a narrow brown band between the summit and the dark band at the periphery. Here, too, the basal band is much broader than in any of the other races, and as a result this subspecies has a rather dark appearance. The whorls are well rounded and marked by wavy, retractively slanting, closely spaced, axial riblets, which are crossed by spiral threads a little weaker than the axial riblets. The junction of the two supports moderately long hairs, which are golden-yellow and are a trifle longer than are those of *H. (H.) hidalgoi*. The number of these trichose threads varies in the different races from 20 to 23 between the summit and the periphery. The periphery is well rounded with, at best,

only an obsolete angulation. The posterior two-fifths of the base is marked by the continuations of the axial riblets and trichose spiral threads. Of these, 20 to 28 occur in the different subspecies. The trichose sculpture is not strongly bounded at its anterior termination on the base. The inner three-fifths of the base is marked by mere lines of growth and closely spaced, fine, microscopic, wavy spiral striations. Aperture moderately large and oval. This species is nearest related to *H. (H.) hidalgoi*, but differs from it in having the basal color band and in having more trichose spiral lirations both on the spire and base.

The following key will readily distinguish the three groups.

KEY TO THE SUBSPECIES OF *Hemitrichia (Hemitrichia) tagalensis* Dohrn.

Peripheral dark zone narrow.

Basal trichose spirals 20.....*principensis*

Basal trichose spirals more than 25.....*mearnsi*

Peripheral dark zone broad.....*tagalensis*

***Hemitrichia (Hemitrichia) tagalensis principensis***, new subspecies.

The type, U.S.N.M. No. 311407, comes from Sitio Iminoig, Casiguran, Principe, Luzon. It has 5.9 whorls and measures: Height 16.8 mm.; greater diameter 25.5 mm.; lesser diameter 21.8 mm.

***Hemitrichia (Hemitrichia) tagalensis mearnsi***, new subspecies.

The type, U.S.N.M. No. 311408, comes from Baler, Luzon. It has 5.9 whorls and measures: Height 19.1 mm.; greater diameter 27 mm.; lesser diameter 23 mm.

HEMITRICHIA (HEMITRICHIA) TAGALENSIS TAGALENSIS  
Dohrn.

U.S.N.M. No. 311409 comes from Sitio Disigun, Casiguran, Luzon. It has 5.9 whorls and measures: Height 19.2 mm.; greater diameter 28.8 mm.; lesser diameter 24.2 mm.

***Lepidotrichia***, new subgenus.

In *Lepidotrichia* the upper, peripheral, and posterior basal surfaces are finely papillose. The papillae instead of bearing hair-like appendages as in *Hemitrichia* ss., have minute scales which bend over into tiny pearl-like elements.

Type species, *Hemitrichia (Lepidotrichia) purpurascens* Möllendorff.

So far only a single species known belongs to this group.

***Atrichoconcha***, new subgenus.

This subgenus is created to embrace those members of the genus *Hemitrichia* that have the upper surface covered with a thin periostracum. No hairs are present on the granules of the upper surface.

Type species, *Hemitrichia (Atrichoconcha) luteofasciata* Lea.



KEY TO THE SPECIES OF *Atrichoconcha*.

- Spiral sculpture extending from the summit to the periphery.  
 Spiral sculpture extending from the summit to the periphery only.  
   Spiral lirations more than 24.....*laccata*  
   Spiral lirations less than 20.  
     Light subperipheral band present.  
       Summit of the whorls with a light zone.....*semisculpta*  
       Summit of the whorls without light zone.....*gummata*  
     Light subperipheral band absent.....*flavida*  
 Spiral sculpture not extending from the summit to the periphery only.  
   Spiral sculpture extending over part of the base.  
     Periphery strongly angulated.....*oblita*  
     Periphery not strongly angulated.  
       Periphery rounded.  
         Shell chestnut-brown.....*bakeri*  
         Shell horn-colored.....*panayensis*  
 Spiral sculpture not extending from the summit to the periphery.  
   Spiral sculpture extending over the posterior portion of the whorls only.....*luteofasciata*

HEMITRICHIA (ATRICHOCONCHA) SEMISCULPTA Möllendorff.

In this species the form varies from depressed-helicoid to rather elevated. The entire upper surface beneath the pale brown, dehiscent cuticle is covered with equally or subequally spaced spiral lirations. These lirations range from 14 to 22, but this number appears quite constant for the various subspecies, i. e. zoogeographic races. The upper surface has a light zone at the summit which varies in width in the different subspecies, the rest of the upper surface being chestnut-brown. Immediately below the periphery there is a yellow or flesh-colored band, which in some of the subspecies is rather narrow, in others, wide, but again a constant feature for the particular race in question. The base has a broad dark zone immediately anterior to the subperipheral light zone, which differs in intensity in the different subspecies and covers two-fifths to one-half of the base. The inner portion of the base, that is, the umbilical half, or two-thirds, may be white, pale yellow, or pale rose-colored. The upper surface is marked by fine, rather broad, depressed, retractively curved axial riblets, over which the spiral lirations pass conspicuously.

This species is nearest related to *H. (A.) gummata* Sowerby, from which it may, however, be at once distinguished by the presence of the yellow zone at the summit.

KEY TO THE SUBSPECIES OF *Hemitrichia (Atrichoconcha) semisculpta*  
Möllendorff.

Spiral liration 22.....	<i>webbi</i>
Spiral lirations not 22.	
Spiral lirations 19.	
Basal brown band very dark chestnut.....	<i>cataduanensis</i>
Basal brown band light chestnut.....	<i>semisculpta</i>
Spiral lirations not 19.	
Spiral lirations 18.....	<i>polagana</i>
Spiral lirations not 18.	
Spiral lirations 15.....	<i>antimonana</i>
Spiral lirations not 15.	
Spiral lirations 14.....	<i>woodi</i>

***Hemitrichia (Atrichoconcha) semisculpta webbi***, new subspecies

The type, U.S.N.M. No. 311379, comes from Donsal, Sorsogon, Luzon. It has 6 whorls and measures: Height 20 mm.; greater diameter 31.2 mm.; lesser diameter 27 mm.

***Hemitrichia (Atrichoconcha) semisculpta cataduanensis***, new subspecies.

The type, U.S.N.M. No. 311022, comes from Cataduanes Island. It has 5.5 whorls and measures: Height 22.7 mm.; greater diameter 29 mm.; lesser diameter 25.6 mm.

HEMITRICHIA (ATRICHOCOCONCHA) SEMISFULPTA  
SEMISFULPTA Möllendorff.

U.S.N.M. No. 311380, a topotype, comes from Caramuan, Canarines, Luzon. It has 6 whorls and measures: Height 20 mm.; greater diameter 28.2 mm.; lesser diameter 24 mm.

***Hemitrichia (Atrichoconcha) semisculpta polagana***, new subspecies.

The type, U.S.N.M. No. 311381, comes from Polag Bay, Luzon. It is a not quite mature specimen having 5.9 whorls and measures: Height 17.1 mm.; greater diameter 23.8 mm.; lesser diameter 21.1 mm.

***Hemitrichia (Atrichoconcha) semisculpta antimonana***, new subspecies.

The type, U.S.N.M. No. 311382, comes from Antimonan, Tayabas, Luzon. It has 5.9 whorls and measures: Height 21 mm.; greater diameter 27 mm.; lesser diameter 23.7 mm.

***Hemitrichia (Atrichoconcha) semisculpta woodi***, new subspecies.

The type, U.S.N.M. No. 311383, comes from Manila, probably the market, and not its normal habitat. It has 6.4 whorls and measures: Height 19.2 mm.; greater diameter 31.8 mm.; lesser diameter 27.3 mm.

HEMITRICHIA (ATRICOCONCHA) GUMMATA Sowerby.

In this species the entire upper surface is covered with spiral lirations under the dehiscent cuticle. There are 15 or 16 of these present. The entire upper surface is brown. There is no white zone at the summit. A broad light zone is present immediately anterior to the periphery, the rest of the base being brown, except a small area at the umbilicus, which tends toward flesh color. Base marked by fine lines of growth and numerous, closely spaced, wavy, spiral striations. It is nearest related to *H. (A.) semisculpta*, from which the absence of the light zone at the summit will at once distinguish it.

KEY TO THE SUBSPECIES OF *Hemitrichia (Atrichoconcha) gummata* Sowerby.

Diameter more than 29 mm.....*obscura*  
 Diameter less than 25 mm.....*gummata*

HEMITRICHIA (ATRICOCONCHA) GUMMATA OBSCURA  
 Möllendorff.

U.S.N.M. No. 311378 comes from Molinao, Albay, Luzon. It has 5.6 whorls and measures: Height 20.4 mm.; greater diameter 30.3 mm.; lesser diameter 24.8 mm.

HEMITRICHIA (ATRICOCONCHA) GUMMATA GUMMATA  
 Sowerby.

U.S.N.M. No. 116582 is a cotype with the label "Luzon." It has 5.2 whorls and measures: Height 15.8 mm.; greater diameter 18 mm.; lesser diameter 21.5 mm.

HEMITRICHIA (ATRICOCONCHA) OBLITA Möllendorff.

Shell rather depressed, helicoid, covered with a thin, pale brown, dehiscent cuticle. The spiral sculpture extends over the upper surface of the whorls, the periphery, and the posterior portion of the base. Periphery strongly angulated. A dark brown band is present either at the periphery or immediately posterior to it. The base may be unicolor or the umbilical portion may be lighter. This species is nearest related to *H. (A.) bakeri* and *H. (A.) panayensis*, from which the angulated periphery will at once distinguish it. The following key will help in separating the two known subspecies.

KEY TO THE SUBSPECIES OF *Hemitrichia (Atrichoconcha) oblita* Möllendorff.

Base with a light zone at the umbilicus.....*oblita*  
 Base without a light zone at the umbilicus.....*tayabasana*

HEMITRICHIA (ATRICOCONCHA) OBLITA OBLITA  
 Möllendorff.

U.S.N.M. No. 184615 comes from Morong, Luzon. It has 5.7 whorls and measures: Height 15.3 mm.; greater diameter 24.2 mm.; lesser diameter 20.8 mm.

**Hemitrichia (Atrichoconcha) oblita tayabasana**, new subspecies.

The type, U.S.N.M. No. 311384, comes from Baler, Tayabas, Luzon. It has 5.7 whorls and measures: Height 17.3 mm.; greater diameter 23.3 mm.; lesser diameter 22.2 mm.

**Hemitrichia (Atrichoconcha) bakeri**, new species.

Shell small, helicoid, subglobular, the upper surface covered by a thin, pale brown, dehiscient cuticle. When the cuticle is removed the first 2.5 whorls are flesh-colored, the rest chestnut-brown on the upper surface. The periphery is marked by a narrow flesh-colored zone with a yellowish tinge. Immediately posterior to this zone there is a narrow, very dark, chestnut-brown zone, considerably darker than the rest of the upper portion of the whorls. The base is chestnut-brown, a little paler than the upper surface with the area within the umbilicus a trifle lighter. The upper surface of the whorls is strongly inflated and rounded, marked by numerous, irregularly wavy, low, rounded, retractively slanting axial riblets, which are crossed by 24 equal and almost equally spaced, spiral lines. The riblets and spiral sculpture extend over the well-rounded periphery and the posterior fifth of the base, there being 16 additional spiral lines on the base. The rest of the base is marked by strong lines of growth and numerous, wavy, closely spaced, microscopic, spiral striations. The base is inflated, strongly rounded, and rather impressed at the umbilicus. Aperture sub-circular; outer lip arched a little more strongly toward the summit than the base from the periphery; inner lip strongly arched, slightly expanding at its insertion where it is reflected over and almost covers the umbilical chink. The inside of the aperture is purplish brown with a light peripheral zone.

The type, U.S.N.M. No. 311093, comes from the east coast of Polillo Island. It has 5.9 whorls and measures: Height 15.8 mm.; greater diameter 21.4 mm.; lesser diameter 18.3 mm.

**Hemitrichia (Atrichoconcha) panayensis**, new species.

Shell small, helicoid, exceedingly thin, covered with a thin, horn-colored cuticle. When this is removed the first 2 turns are flesh-colored, the rest pale horn-colored. There is a narrow, bright, chestnut-brown band at the periphery bordered anteriorly by a band about the same width, a little paler than the upper surface of the whorl. The base is horn-colored, paling to flesh color within the umbilicus. The whorls are well rounded, separated by a rather impressed suture. The summit of the succeeding turns falls below the peripheral brown band. The whorls are marked by numerous, slender, wavy, rounded, closely crowded, retractively slanting axial riblets, which extend over the feebly angulated periphery and the posterior two-fifths of the base. In addition to this, there are 15 incised spiral lines between the summit and the brown peripheral band which are about equal and equally spaced. Three additional lines of the same strength mark the brown band, while the ribbed area of the base is marked by 20 incised spiral lines, the latter being a little more closely spaced than the rest.

The rest of the rather inflated, well rounded base is marked by lines of growth and numerous, closely crowded, wavy, spiral striations. Aperture oval; the outer lip curving a little more abruptly toward the summit than the base from the periphery; inner lip strongly curved, slightly expanded at its insertion and reflected over the umbilical chink, which it almost covers. The interior of the aperture is flesh-colored with a purplish tinge showing conspicuously the dark zone at the periphery.

The type, U.S.N.M. No. 196002, comes from Malupa, Panay. It has 6 whorls and measures: Height 14.8 mm.; greater diameter 22 mm.; lesser diameter 18.8 mm.

HEMITRICHIA (ATRICOCONCHA) LUTEOFASCIATA Lea.

Shell large, the upper surface covered with a thin, dehiscent cuticle, the strong, incised, spiral striations of the whorl never covering the entire upper surface, but confined to the posterior portion. The spirally striated upper portion is also crossed by axial riblets, which evanesce immediately anterior to the termination of the incised spiral lines. The rest of the surface of the shell is marked by lines of growth and exceedingly fine, wavy, closely spaced, spiral striations. The upper surface of the shell may be horn color or chestnut brown. There is always a dark peripheral band present which on the brown shells is merely an intensification of that color. Below the peripheral brown zone there is a light zone of varying widths in the different races which is followed basally by a brown zone that again varies in width in the different subspecies, the inner portion of the base being yellow or greenish yellow. This species has been much misunderstood by previous writers. It is a rather compact group which can be distinguished at once from all the other forms by the fact that the spiral sculpture on the upper surface does not cover the entire whorl.

KEY TO THE SUBSPECIES OF *Hemitrichia (Atrichoconcha) luteofasciata* Lea.

Spiral lirations 16.....	<i>libmanana</i>
Spiral lirations not 16.	
Spiral lirations 14.....	<i>maculaboensis</i>
Spiral lirations not 14.	
Spiral lirations 12.....	<i>luteofasciata</i>
Spiral lirations not 12.	
Spiral lirations 11.....	<i>paracaleana</i>
Spiral lirations not 11.	
Spiral lirations 10.....	<i>conoidalis</i>
Spiral lirations not 10.	

*Hemitrichia (Atrichoconcha) luteofasciata libmanana*, new subspecies.

The type, U.S.N.M. No. 311386, comes from Libmanan, Camarines, Luzon. It has 6 whorls and measures: Height 24.7 mm.; greater diameter 36.3 mm.; lesser diameter 30.8 mm.

**Hemitrichia (Atrichoconcha) luteofasciata maculaboensis**, new subspecies

The type, U.S.N.M. No. 255197, comes from Maculabo Island of the Calaguas group. It has 6.5 whorls and measures: Height 25.8 mm.; greater diameter 39.6 mm.; lesser diameter 33.7 mm.

HEMITRICHIA (ATRICHOCONCHA) LUTEOFASCIATA  
LUTEOFASCIATA Lea.

The type, U.S.N.M. No. 116566, comes from Manila. It has 6 whorls and measures: Height 23.3 mm.; greater diameter 34 mm.; lesser diameter 29.2 mm.

**Hemitrichia (Atrichoconcha) luteofasciata paracaleana**, new subspecies.

The type, U.S.N.M. No. 311387, comes from Paracale, Luzon. It has 6.1 whorls and measures: Height 23.1 mm.; greater diameter 32.3 mm.; lesser diameter 27.9 mm.

HEMITRICHIA (ATRICHOCONCHA) LUTEOFASCIATA  
CONOIDALIS Möllendorff.

U.S.N.M. No. 311386, a topotype, comes from Antimonan, Tayabas, Luzon. It has 6.1 whorls and measures: Height 22.8 mm.; greater diameter 33 mm.; lesser diameter 28 mm.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTONNOTES ON PIPILO FUSCUS OF MEXICO AND  
DESCRIPTION OF A NEW FORM.<sup>1</sup>

BY ROBERT T. MOORE.

The changes in characters of forms of *Pipilo fuscus*, as we go south through Mexico, proceed differently from those of most plastic species, in which, generally, the largest races are found on the Central Plateau in the region of Guanajuato. In *P. fuscus* the largest birds are those from the geographical extremes, the northwest and the southeast, while the smallest are those from the southern central portion of the range (*P. f. fuscus* of the states of Michoacan and Mexico). A fine series, recently taken by Mario del Toro Avilés on the arid "Planicie" of eastern Oaxaca, proves that the range of *P. f. fuscus* extends much farther southeast than was believed hitherto. In addition to their large size, *mesoleucus* and *intermedius* of Sonora and Sinaloa, respectively, inhabiting areas chiefly west of the Sierra Madres, differ from all other races in having extremely long tails, much longer than wings, whereas in the rest, to the east, these parts are about equal in length. The palest forms are also found at the geographical extremes, Oaxaca and Chihuahua or Tiburon Island, the former being probably the palest of all, rather than *perpallidus* or *jamesi*. In only one character, the rusty pileum, does a bright color diminish steadily from north-western to southeastern Mexico, for in Oaxaca the crown is gray uniform with the back. This last, palest and large race is described below.

About 100 recently taken specimens, representing all the races from Mexico, except *jamesi*, recognized up to the present time, are found in the Moore Collection, but only 63 are listed in this paper, because these were brought with me to Mexico, where the latter part of this paper has been

<sup>1</sup> A contribution from the California Institute of Technology, Pasadena, California.

written. The rest of the series was moved to a safer location after the beginning of the war. My inspection of the old skins in the British Museum and the museums of the eastern United States shows that post mortem color change is so great in this species that little reliance can be placed on these older skins, most of which were secured from 50 to 70 years ago. It was fortunate that so large a series of recently taken individuals could be assembled at one time for the important first comparisons, which proved that some recent authors had been misled into questionable conclusions. Not only are fresh specimens imperatively requisite, but great care must be taken to compare only birds of the same season and state of wear. This paper was begun four years ago, but all the material listed was compared at one time.

My grateful acknowledgments are made to Mr. Kinnear and the British Museum, Mr. Peters and the Museum of Comparative Zoology, to Doctors Wetmore, Friedmann and the United States National Museum for their continuing courtesies in permitting me to inspect valuable types or series.

***Pipilo fuscus toroi*,<sup>2</sup> subsp. nov.**

OAXACA BROWN TOWHEE.

*Type*.—Male adult in winter plumage, number 30,927, collection of Robert T. Moore; Mitla, Oaxaca, Mexico; January 8, 1942; collected by Mario del Toro Avilés.

*Subspecific characters*.—Not closer to one race than another, it differs in winter plumage from *Pipilo fuscus fuscus* of the southeastern portion of the Central Plateau in having upper parts much paler, purer gray without tinge of brown; pileum *uniform* in coloration with back, only a few specimens showing a trace of brown; underparts paler and much less buffy on chin, throat, sides of breast and flanks; center of breast and abdomen purer white; size larger, tail proportionately and actually longer. Differs in the same way from *P. f. polosinus* of the middle portions of the Central Plateau, and in addition *toroi* lacks the dark gray mottling across the upper breast. Although purer light gray, apparently, than any of the northwestern races of Mexico (*mesoleucus*, *intermedius* and *perpallidus*) *toroi* differs markedly from them all in lacking the rusty pileum of all three and the very long tail of the first two. The nuptial plumage of *toroi* is not known.

*Range*.—All specimens were taken at Mitla, but *toroi* probably ranges throughout the eastern portions of the arid, elevated plateau of Oaxaca, known locally as the "Planicie."

---

<sup>2</sup> I take pleasure in naming this race for Señor Mario del Toro Avilés, who seems to have collected the only specimens extant and has made expeditions into the more remote portions of Mexico without regard for difficulties or dangers.



Average Measurements in Millimeters of *Pipilo fuscus* and Races.

Males	Wing	Tail	Ex. Culmen
4 Ads. <i>toroi</i> (Oaxaca).....	94.7 (93.8-95.6)	98.3 ( 94.3-101.7)	14.9 (14.7-14.9)
7 Ads. <i>f. fuscus</i> (Michoacan-Mexico)....	89.8 (85.9-93.7)	89.0 ( 84.9- 91.2)	14.7 (14.0-16.2)
8 Ads. <i>potosinus</i> (Queretaro-Guanaj.) ...	94.0 (92.6-96.0)	95.7 ( 92.3-99.4)	14.3 (13.0-15.4)
4 Ads. <i>potosinus</i> (Atoyac, Jalisco).....	94.3 (90.6-97.3)	93.1 ( 90.7- 98.0)	13.9 (13.4-14.6)
4 Ads. <i>potosinus</i> x <i>perpallidus</i> (Dur.).....	97.2 (96.5-98.4)	98.3 ( 97.8- 98.8)	14.7 (14.4-15.3)
3 Ads. <i>intermedius</i> (N. Sinaloa).....	91.5 (90.8-91.8)	103.1 (102.6-103.6)	14.9 (14.7-15.2)
4 Ads. <i>mesoleucus</i> (Arizona).....	95.5 (91.7-99.0)	105.9 (100.0-108.2)	15.3 (15.1-15.6)

*Specimens examined.*—*toroi*—Oaxaca: Mitla 4♂ 1♀ (Jan. 8-11); *fuscus fuscus*—Mexico: Temascaltepec 1♂ (topotypical June 14 breeding); San Botholo 1♀ (Oct. 8), Texcoco 1♂ (Sept. 27) Contreras 1♀ (Dec. 26); District Federal: Desierto de Leones 1♀ (Dec. 11), Tlalpan 1♂ (Aug. 31), Ixtapalapa 2♀ (Apr. 26, Oct. 27); Morelos: Ocotepec 1♀ (June 19 breeding); Michoacan: Rancho La Cofradia near Uruapan 3♂ 2♀ (June 10-25 breeding), Zacapu 1♂ 1♀ (Aug. 26 breeding-Sept. 12); *Potosinus*—Queretaro: El Caracol near San Juan del Rio 2♂ 2♀ 1 im♂ (Nov. 30-Dec. 7); Guanajuato near Irapuato: 3♂ 2♀ (Sept. 9-26 breeding, Jan. 9), Rancho Enmedio 17 miles N. E. of Guanajuato 3♂ 1♀ (Jan. 28-Apr. 30 breeding); Puerto de Guadalupe 1♂ 1♀ (May 10-20, breeding); Michoacan: San Augustin near Lago de Cuitzeo 1♂ 4♀ (Feb. 13-23); Jalisco: near Atoyac 4♂ 3♀ (Feb. 21-Mar. 15); *potosinus* x *perpallidus* (?)—Durango: Ojito 4♂ 2♀ (Aug. 19-25 breeding); *intermedius*—Sonora: Guirocoba 2♂ (Aug. 5-6); Sinaloa: El Fuerte 1♀ (May 11), Yecorato 1♂ (May 3). *mesoleucus*—Arizona: Fresnal 3♂ (Apr. 30 breeding-June 21), Sells 1♂ (Apr. 29 breeding).

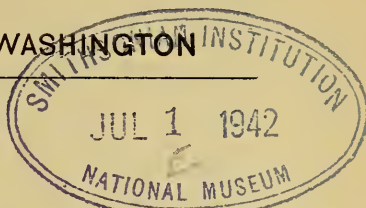
The measurements, given above, are those of adults only in the Moore Collection of the 63 mentioned in this article. All the individuals, listed under "Specimens examined," are in the Moore Collection. No specimens from the older collections are listed, nor are their measurements given. The unlisted individuals of the Moore collection were taken in Sinaloa and other Mexican states, in addition to a few from Arizona.

*Toroi* is one of the most distinct of the races of *fuscus*, being the only one with pileum uniform with back. It may well be the palest, but I have not seen fresh specimens of *perpallidus* from Chihuahua, the series in the Museum of Comparative Zoology being badly faded and "foxed." Described on the basis of this assemblage by van Rossem, this race is probably valid because of its difference from *mesoleucus* in wing-tail formula alone, although the describer does not state how it differs from his other race of *texanus* from Kerr County, Texas. For although the worn breeding birds in the Moore Collection from Durango, taken immediately south of the range of *perpallidus*, resemble similarly worn individuals of *mesoleucus* from Arizona, they differ in having the tail and wing about the same length. These Durango birds may be pure *perpallidus*, for they

have rusty crowns like *mesoleucus* and are much closer to it than to the dark-crowned *potosinus* to the south.

The new race, *P. f. tenebrosus*, recently described by van Rossem (Bull. Brit. Orn. Cl. 58, p. 132, July, 1938) from two localities in Jalisco near Lago de Chapala, may be also valid. However, it should be pointed out that these nearly adjacent localities lie *between* the range of *potosinus* (type locality "Guanajuato") and Atoyac, a few miles southwest of Chapala, an area from which I have a series of four males and three females, which minutely resemble an immense series of *potosinus*, for the most part in the same plumage, taken from Guanajuato to Queretaro. Still more perplexing is van Rossem's statement he has seen four specimens from Bolaños north of Lago de Chapala, which agree "minutely with" *fuscus fuscus* "in colour and measurements." In view of the great age of most of these skins it seems that a final decision must await the collecting of an adequate fresh series from Lago de Chapala and Bolaños. Not excluding the unlikely possibility that *tenebrosus* may be a race restricted to the shores of Chapala, it seems probable that the range of *potosinus* extends from Queretaro through Guanajuato and the extreme northern fringe of Michoacan to Atoyac. At any rate it is reasonably certain that *P. fuscus fuscus* has been given a far too extensive a range to the west, since my birds from Atoyac show a definite change towards a larger, grayer race (not "smaller, darker," the characters assigned to *tenebrosus*), as compared with the small size and buff-cinnamon underparts of true *fuscus*.

It should be added that my series of 35 individuals from the entire range of *potosinus* all possess the characters given by the describer Ridgway (Bull. 50, U. S. Nat. Mus. I, p. 431) when comparing it with typical *fuscus*, except the "smaller" triangular spots about the gular area, and they have an important character, not mentioned by Ridgway, a conspicuous mottling of dark gray on the sides and partly across the breast, as well as darker gray flanks. This character is exhibited by the Atoyac birds.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTONA NEW FROG FROM THE ANAMALLAI HILLS, WITH  
NOTES ON OTHER FROGS AND SOME SNAKES  
FROM SOUTH INDIA.

BY GEORGE S. MYERS.

Since the days of Jerdon and Beddome the Anamallai, Nilgiri and other hill regions of Southern India have produced a succession of strange batrachian and reptilian novelties that have made the Southern Indian Peninsula a herpetological promised land, comparable in its rich fauna to the Organ Mountains of Brazil, the eastern slopes of the Ecuadorian Andes, the mountains of New Guinea, Cameroon, the Shan Plateau and the interior of Madagascar. It was for this reason that I asked Dr. Albert W. Herre, when preparing for his recent Asiatic journey, to make an especial effort to obtain amphibians and reptiles during his stay in the Anamallais. Although the weather was most unfavorable, his time was short, and his principal efforts were ichthyological, the material he obtained bears witness to his ability as a collector and to the continued herpetological productiveness of the hills of South India. Not all of the Anamallai collection has yet been examined, but no purpose is served by withholding description of one strange new frog. I have also added records of some other frogs and of two Uropeltid snakes from South India.

***Nannobatrachus anamallaiensis*, new species.**

*Diagnosis.*—A *Nannobatrachus* with a rounded or horizontally ovoid pupil; tympanum entirely concealed; tibiotarsal articulation not or barely reaching eye when leg is brought forward; vomerine teeth behind the choanae, in transverse or somewhat oblique patches, each with a single row of teeth; tongue without a button-like structure in front; and the upper surface of the femur and tibia with dark crossbars.

*Holotype*.—Stanford Amphibian Catalogue No. 7197; Puthutotam Estate, Valparai P. O., Anamallai Hills, Southern India; January 9, 1941; Dr. A. W. Herre, collector.

*Paratypes*.—Seven specimens; Cat. No. 7198–7204; taken at same place and on same date as holotype; one specimen in Field Museum.

*Description*.—Pupil rounded or horizontally ovate in all specimens; on one side of two of the specimens there is a trace of a point at the lower median border of the pupil, but in none is there any definite trace of such a point above, or of the “erect” or “squarish” form of pupil ascribed to *N. beddomii*. Eyes bulging, directed outward, forward, and upward, the upper eyelid narrow, its width equal to slightly more than half that of the interorbital space. Vomerine teeth weak and inconspicuous, scarcely or not at all evident in specimens of 12.5 mm. In the larger specimens the vomerine tooth patches are transverse or slightly oblique, originating at the inner anterior corner of the eye sockets, far behind the choanae; the patches are short, each bearing a single row of four to six blunt teeth, and are separated by a space slightly less than the length of one series. The tooth row of each patch is strictly single and regular; in most of the specimens the rows are straight but in 7199 they are curved, the convexity directed posteriorly. Choanae separated by a distance equal to the interorbital width. Tongue oval or elongate-oval, without a papilla or a button-like structure in front and with a shallow but distinct nick behind. Lower jaw with the usual central and two flanking projections, but the lateral ones are not produced into odontoids. Eustachian tubes conspicuous.

Body moderately stout, somewhat elongate, rather similar to a small *Dendrobates* in form, the legs moderately short and massive. Head short and as broad as body but not greatly flattened, the profile rather sharp and similar in general appearance to that of *Nyctibatrachus major*. Head length from basis cranii to snout tip slightly less than its greatest width. Snout short, decurved, rounded in front, slightly projecting beyond the mouth, its oblique length from either eye to the middle of the tip greater than the interorbital width or the eye. No canthus rostralis, the extremely short loreal region very oblique, forming (in cross-section of the head) no area really distinct in its configuration from the even convex curve of the top of the head. The nostril is considerably nearer to the eye than to the middle of the tip of the snout. Distance between the nostrils equal to interorbital width. Tympanum entirely obscured by the rough integument of this area. An extremely poorly defined post-tympanal fold. The line of the upper lip curves slightly upward near the end of the mouth, producing a faintly “smiling” expression.

Fingers slender, free, first considerably shorter than second, which reaches the proximal end of the penultimate phalanx of the third. Fourth finger barely longer than second. Subarticular tubercles of fingers very weak except those at base of each finger. A flat but well developed, curved, inner palmar tubercle and a similar outer one. Palm otherwise smooth except for the interdigital grooves. Disks of fingers little developed, scarcely wider than penultimate phalanges of fingers, equal on all fingers,

each pad with a median longitudinal groove on the distal part of the dorsal surface. Arms relatively robust.

Toes slender, free or with the barest rudiment of a web, first reaching proximal articulation of penultimate phalanx of second, second not reaching same point on third, but third reaching same point on fourth. The fifth toe barely reaches the proximal articulation of the third from last segment of the fourth. Subarticular tubercles plain but not strongly projecting. Disks of same structure as those of fingers, but somewhat larger, that of first toe little developed. Outer metatarsals separated by a groove only. A very weakly developed but perfectly evident outer metatarsal fold running from base of first finger to distal end of tarsus. A small, oval inner metatarsal tubercle, connected by a strong dermal fold with a smaller tubercle (or flap) placed near the distal end of the tarsus in the middle of its postero-inferior surface.

Legs relatively stout and short, the heels meeting but not overlapping when femur and tibia are placed at right angles to body axis, the tibiotarsal articulation reaching to the tympanal area or rarely to the middle of the eye when leg is brought forward along body. Only in the two smallest paratypes does the tibiotarsal articulation fully reach the center of the eye. Thigh from groin to knee considerably longer than fourth toe. Breadth of tibial part of leg slightly less than three times in its length, which goes about twice in distance from nares to anus. Tarsus (without metatarsals) short, about twice interocular width.

Skin rather smooth on dorsum, but when slightly dried it appears strongly areolated; posterior part of back with scattered small warts. Along the sides the skin is rougher, sometimes with longitudinal chains of weak elongated warts. Upper eyelid weakly areolated, somewhat rougher posteriorly. Upper surfaces of thighs like dorsum, but the surface of the tibia bears several small rounded warts in some of the specimens. Tympanal and rictal area somewhat rougher than dorsum, with a remnant of a post-tympanal fold running down towards arm. Some of the examples have a few enlarged post-rictal warts. An enlarged white glandular wart (weak in some) just above insertion of arm. A strong glandular fold from lower posterior rim of eye downward and backward to the rictus. Under surfaces smooth.

General coloration brownish. The dorsum is lighter brown above a line on each side from eye to groin (in the position of the dorsolateral glandular fold of frogs possessing such a structure). Mesad of this the dorsum becomes gradually dark and bears irregular darker markings, thus giving the appearance in some examples of a light dorsolateral line down each side separating the dark middorsal area from the dark sides. A triangular area, its base between the eyes and its point near the snout tip, is also light. Legs light brown, with four or five dark crossbands which cross the femur, tibia, and tarso-metatarsus. Belly clear light yellowish, the gular region and under surfaces of the legs with a brown wash. One example (No. 7198) has the color pattern intensified by a peculiar lightening of all the lighter areas and a darkening of the dark ones. It is a pale yellowish, with a dark dorsolateral line down each side, the light dorsal area between

marked with irregular dark hieroglyphics and the sides still more heavily covered with these markings; the arms, fingers, legs, and toes are all pale, with brilliantly contrasted dark cross bands, even upon the toes. This example lacks the brownish wash on the throat.

Length of holotype, from snout tip to vent, 17 mm. Head, from snout tip to basis cranii, 6. Greatest width of head 6.7. Length femur from midline of body 7.7. Length tibia 7.2. Length free portion fifth toe 5.

The specimens range downward in size from that of the type to a length of 12.5 mm. Three of the paratypes (7198-7200) are as large as the type, and one (7204) was evidently originally a millimeter or more longer, but this example was received in a very badly damaged condition. The rest of the series is most beautifully preserved, having been killed, fixed and shipped in 3 or 4 per cent formalin; they are now in 65 per cent alcohol.

*Habitat.*—Dr. Herre tells me that he collected these frogs in and out of the water in a marshy pasture through which a small brook was running. They were taken with young *Rana verrucosa* and young *R. temporalis*. The elevation was 3,600 to 3,800 ft.

*Comparisons and discussion.*—Two species of the genus *Nannobatrachus* have been described. The genus was erected by Boulenger (1882, *Cat. Batr. Sal.*, p. 470) for a small species from Malabar, *N. beddomii*. The brief specific diagnosis contained an error in regard to the comparative dimensions of the upper eyelid and interorbital, which was corrected by Boulenger in 1883 (*Ann. Mag. Nat. Hist.*, ser. 5, vol. 12, p. 163, footnote). Little has subsequently been added to our knowledge of this tiny frog. The first item in Boulenger's generic description was "pupil erect" (*i. e.*, vertically elongated). However, Noble, who had probably examined Boulenger's types in the British Museum, diagnosed *Nannobatrachus* as "a small *Rana* having a squarish pupil" (1931, *Biol. Amph.*, p. 519). In 1937 (*Proc. Indian Acad. Sci.*, ser. B, vol. 6, no. 6, p. 401, pl. 24) Narayan Rao described *N. kempholeyensis* from the Kempholey Ghats, Mysore, as possessing a horizontally ovate pupil. The systematic value of a vertical versus a horizontal pupil has been pondered by many herpetologists. Rao has remarked that the condition of the pupil in life may bear little relation to that in preserved examples, but in batrachian classification the shape of the pupil has been used almost exclusively in work with preserved specimens, and I know of no instance in which preserved examples of a single species exhibit a variation from a vertically "erect" pupil to a horizontally elongate one. In view of Noble's correction of Boulenger's description of the pupil of *beddomii* it is evident that that species does not possess the extreme type of vertical pupil exhibited by *Nyctibatrachus*, and, taking into account *kempholeyensis* and *anamallaiensis* as well, *Nannobatrachus* can no longer be considered to be characterized by an "erect" pupil. It is interesting to note that my series of *anamallaiensis* and the specimens of *Nyctibatrachus major* recorded below were fixed and preserved in the same manner (by dropping them alive into 3 or 4 per cent formalin, in which they were shipped home), yet exhibit the greatest distinctiveness in form of pupil.

The form of the pupil in my series of *anamallaiensis* varies from almost

circular to a somewhat elongate oval, one or two frogs showing a very slight inferior median projection. The pupils are all small, and are plainly not greatly dilated, the frogs having been caught and preserved in the daytime, when the pupils are normally contracted into the characteristic shape. I therefore believe that the absence of any approach toward a squarish form indicates some specific difference between this species and *beddomii*. In *beddomii* the tibiotarsal articulation is said to reach or nearly reach the tip of the snout, and the vomerine tooth patches are described as oval, rather than linear. Except for these characters *anamallaiensis* agrees with the lamentably brief and incomplete diagnosis of *beddomii*, but the differences in leg length and vomerine teeth are considerable for such small and relatively characterless frogs, and direct comparison will probably bring to light still other differences.

Certainly *anamallaiensis* is much more closely related to *beddomii* than to *kempholeyensis*, which differs sharply from the two former in the presence of a button-like papilla on the tongue, in the much more anterior vomerine teeth (arising from the anterior borders of the choanae), in the more anterior nares, in the less oblique lores, and in the absence of distinct cross-bars on the legs.

With the removal of the "vertical pupil" from the diagnosis of *Nannobatrachus*, the question of the validity of the genus inevitably arises. Cope (1889, *Bull. U. S. Nat. Mus.*, no. 34, p. 391) and Roux (1905, *Zool. Anz.*, vol. 28, pp. 777-785) both separate *Nyctibatrachus* widely from *Nannobatrachus* and *Nannophrys* on the basis of the cartilaginous sternum of the two latter genera. This character is certainly of only minor value in evaluating Ranid phylogeny, and both Cope's and Roux's systems are now considered too artificial for use. Both include in the Ranidae genera now known to belong to widely different families. Nor does Deckert's recent review of Ranid classification (*Sitzb. Gesellsch. Naturforsch. Freunde*, 1939, pp. 127-184) help, since he has not considered these three genera.

*Nyctibatrachus* seems to have bony styles to both sternum and omosternum (Boulenger, 1882; Noble, 1931). Boulenger described the sternal styles of *Nannophrys* as like those of *Nannobatrachus*, but Noble gives a cartilaginous omosternum and bony sternum for *Nannophrys*. Of the three genera, *Nyctibatrachus* alone has separated outer metatarsals, but this genus agrees with *Nannobatrachus* and not with *Nannophrys* in the bifurcated terminal phalanges. *Nyctibatrachus* has webbed toes, the others free. Other species of *Nyctibatrachus* and *Nannobatrachus* described since 1882 tend to obliterate other differences that apparently held in the species Boulenger had at that time. For example, the eyes of his original two *Nyctibatrachus* were directed partly upward and they had covered tympana, while the two *Nannophrys* had lateral eyes and visible tympana, but these differences are now broken down (see Rao, 1937; and others). It is evident that some revision of the generic relationships is necessary, but enough characters are still available to allow us to recognize all three genera. Of course both *Nannophrys* and *Nannobatrachus* might both be referred to *Rana* (*sensu lato*) but to anyone who has seen these strange little frogs they are even more unlike *Rana* than *Stauroids* (*sensu stricto*), *Nanorana* or *Altirana*.

*Nyctibatrachus major* Boulenger.

A fine example of 30 mm., a young of 21 mm., and a newly transformed specimen of 19 mm. still with the tadpole tail (Nos. 7254-7256), all collected near Valparai, on January 8-9, 1941. *Nyctibatrachus major* is hereby designated the type species of the genus *Nyctibatrachus* Boulenger 1882.

*Rana verrucosa* Günther.

Dr. Herre obtained a number of these exceedingly warty frogs near Valparai, on January 8 and 9, the smallest 13 and the largest example 61 mm. in length from snout tip to vent (Nos. 6660-6662, 7243-7249). The smallest shows no sign of the tadpole tail, but must be a young of the year. This frog evidently metamorphoses at a very small size. The tadpole has been described by Annandale.

In a recent paper on the pectoral osteology and classification of the Ranid frogs, Deckert (*Sitzb. Gesellsch. Naturforsch. Freunde*, Berlin, 1938, pp. 127-184, 49 figs.) has referred *Rana verrucosa*, together with *cyano-phlyctis*, *limnocharis*, *tigerina*, *occipitalis*, *cancrivora*, *galamensis*, *grayi*, *grunniens*, *brevipalmatus*, *kuhlii*, *microtyimpanum*, *doriae*, *microdisca*, *modesta*, *macrodon* and *corrugata*, to the resurrected genus *Dicroglossus* Günther 1860. Deckert defines this principally upon the *overlapping* fusion of the mesial ends of the coracoid bones with the median cartilage, a character ("Arzizonie" of Deckert) which he finds among other Ranidae only in *Arthroleptides*, *Scotobleps*, *Astylosternus* (including *Trichobatrachus*) and the *Pyxicephalus* group of *Rana*.<sup>1</sup> Other Ranids, it would appear, have the mesial ends of the coracoids meeting the median cartilage upon the same plane and not overlapping ("Laxizonie" of Deckert). While I am not at all sure that Deckert's rather drastic reclassification of the Ranids has done much to solve several vexing problems (*e. g.*, the true phylogenetic delimitation of *Hylarana* and *Staurois*), the character of the coracoid articulation would appear to be of considerable importance. Certainly most of the species Deckert places in *Dicroglossus* are closely related, this showing up not only in the hypertrophy of the odontoids of the mandible but also in such apparently trivial characters as the frequent appearance of a pair of elongate diverging folds or warts on the middle of the back (*macrodon*, *blythii*, *doriae*, *microdisca*, *leytensis*, *verrucosa*). The group is probably a truly phylogenetic one, but since in taxonomy phylogenetic arrangement is everything and the nomenclature relatively immaterial, it does not seem necessary to give *Dicroglossus* generic rank, at least until many species not seen by Deckert have been examined. Noble (*Biol. Amphib.*, 1931) likewise made out an excellent case for the generic recognition of *Hylarana*, even placing it in a subfamily different from that in which he placed *Rana* (a move which I think rather ill founded), but until a number of species not available to Noble have been examined, with care and a phylogenetic insight not always evident among some recent batra-

<sup>1</sup> See also Noble, 1926, *Amer. Mus. Novit.*, no. 230, p. 12, fig. 6. It would be interesting to determine whether the tadpoles of the "arzizon" *Ranas* differ as a group from those of other *Ranas*.



chologists who have worked upon the Indo-Malayan fauna, I prefer to continue to recognize *Hylarana* as a subgenus only, no matter how "natural" a group it may be. It should be remembered that a subgenus, no less than a genus, can and should express the known phylogenetic relationships.

*Rana beddomii* (Günther).

There are four examples of this forest frog from Puthototam Estate near Valparai, collected January 9, 1941 (Nos. 7257-7260).

*Rana temporalis* Günther.

This species was taken in some abundance near Valparai (Nos. 7250, 7233-7240). This species and the two preceding were reported from the same region by Roux in 1928 (*Rev. Suisse Zool.*, vol. 35, no. 21, pp. 459-461). All of the Valparai *temporalis* have the black tympanal band continued backward, the entire sides being dark.

*Siluboura nigra* Beddome.

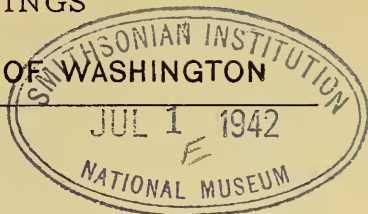
One female (Stanford Rept. Cat. No. 9113) from the Kodai Kanal Hills (elevation 6,000 ft.) in the Palnis was obtained for Dr. Herre by Dr. C. P. Gnanamuthu. Ventrals 182 from chin, subcaudals 7. Under the International Rules of Zoological Nomenclature the original orthography of Gray's generic name must be retained, since there is no evidence that his spelling was a *lapsus calami* or a typographical error. Peters emended the name to *Silybura*, but this is contrary to the Rules.

*Platyplectrurus madurensis* Beddome.

A fine suite of eight specimens of this uncommon Uropeltid were also obtained for Dr. Herre in the Kodai Kanal Hills (6,000 ft.), Palnis, by Dr. Gnanamuthu. The catalogue numbers, sex, and ventral (from chin) and subcaudal counts are as follows: 9114, male, 169-14; 9115, male, 167-13; 9116, female, 178-11; 9117, male, 172-11; 9118, female, 171-10; 9119, female, 175-10; 9120, male, 165-13; 9121, female, 174-11.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



NEW MILLIPEDS FROM MICHOACAN.

BY RALPH V. CHAMBERLIN.

The types of the seven new millipeds here described were collected by Harry Hoogstraal in the State of Michoacan, Mexico, on his "Fourth Mexican Biological Expedition," during the summer of 1941. These types are at present retained in the author's collection.

*Platydesmus cerrobis*, new species.

FIG. 1.

The general color above blackish, without any sharply defined lighter stripes; however, on each side of middle of each tergite a transverse lighter band in which the light area is covered with a network of black lines; keels in part paler, but some entirely dark. Head black, the 2 eyes appearing white by contrast.

The head partly exposed in dorsal view.

First tergite with anterior margin as a whole forming an obtuse reentrant angle, but the angle at middle subrectangular, the lateral portion moderately convex. See further fig. 1.

Tubercles of tergites well developed, those of anterior series extending far out on keels, the posterior series extending only on basal portion; posterior series with near 18 or 20 tubercles, these largest toward median line.

Sternites very broad.

Number of segments, usually 41 to 46.

Length, about 15 mm. with width 3 mm.

Locality—Mexico: Michoacan, Cerro Tancitaro, June 27, 1941. A number of specimens of various ages taken "on path" by H. Hoogstraal.

Characterized by form of first tergite, wide sternites and coloration, etc.

*Sphaeriodesmus michoacanus*, new species.

FIGS. 2 and 3.

In this form the posterior margin of the 18th segment is rounded where keel joins middle region, not definitely angled as, e. g., in *angulifer*, the bend, however, being more pronounced than in *S. robustus* as shown in fig. 2.

In the character of the anterior keels near *S. oniscus* of Vera Cruz; but the fourth keel is somewhat broader antero-posteriorly and the 6th relatively more acute at the lower end. (See fig. 3.)

Surface smooth. Color light yellowish brown, with an area of darker mottling on each side of mid-dorsal region of each segment.

Length, about 11 mm.; width 4 mm.

Locality—Mexico: Michoacan, Tancitaro, Cerro San Miquel. El. 6,750 feet. July 21, 1941. One female taken by H. Hoogstraal under bark.

**Peridotodesmus hoogstraali**, new species.

FIGS. 4-6.

This species agrees with *P. woodianus* (H. & S.) and *P. hirsutus* Pocock in having the antero-lateral tooth of the keels smaller than those following. This tooth, however, is by no means as minute as indicated for *woodianus* in the figure given by the authors of that species. This tooth and the second one are blunter than represented for *hirsutus* and the poriferous tooth is distinctly bifid, e. g., on the 13th keels, whereas Pocock's drawing shows this enlarged tooth entire. See further figs. 4 and 5.

The gonopods of the male are as shown in fig. 6.

The dorsum is dusky brown or blackish with the keels not definitely paler. Length, 9 mm.

Locality—Mexico: Michoacan, Cerro, Tancitaro, el. 7,800 ft. Two males and one female taken "on shrew carcass," June 7, 1941, by H. Hoogstraal and Traub.

Genus **TANCITARES**, new.

Resembling the rhachodesmid genus *Pararachistes*, but differing notably in the form of the male gonopods. These with coxa small and nearly in line with femur, and, instead of being short and stout, with a long flagelliform process from base of the femoral element, are relatively long and slender with a slender process or hook on caudal side of base, and on mesal side below tip with a process which typically terminates in a slender uncate distal division; femoral division with a circular, hair-lined excavation at base on mesal side. Antennae long and slender. Keels all well developed and elevated; lateral margins of keels thickened, convex and smooth, the anterior and posterior margins also upturned; pores opening laterally on the usual segments; only the more posterior keels with posterior angles produced. Sixth segment of legs nearly equal in length to the fourth and fifth taken together.

Genotype—*Tancitaires michoacanus*, new species.

**Tancitaires michoacanus**, new species.

FIG. 7.

General color above brown; caudal border of metazonites yellow over middle portion; keels of first 5 segments laterally yellow, thereafter the

poriferous keels similarly colored while the non-poriferous tend to lack the yellow. Legs light brown proximally, more yellow distally.

Tergites with a shallow transverse sulcus, entire surface between marginal thickenings of keels granular. More anterior keels seem normally to bear, from dorsal surface of marginal thickening on each side in front of middle, 2 setae, the others with 1 seta.

In the male the coxae of second legs bear each a slender process which projects caudad between coxae of third legs, each of these processes notched at apex, with mesal joint the longer; also two small, subconical processes projecting cephalad.

The gonopods of the male as shown in fig. 7.

In the female there are two cylindrical processes, densely covered with fine, short hairs, arising immediately behind the sternite of the second segment, each process with a groove along outer side; behind these processes two slender processes project from the coxae of the second legs.

Length, about 21 mm.; width, 2.8 mm.

Locality—Mexico: Michoacan, Tancitaro, Pedregal, at 6,000 feet elevation. Several females and males taken by H. Hoogstraal, June 28, 1941.

#### Genus **SAKOPHALLUS**, new.

A rhachodesmoid genus characterized by much reduced keels, these narrow on anterior segments and essentially absent, except for poriferous portion, on posterior segments. Pores normal. Processes from coxae of second legs of male small, subconical. Legs with fourth and fifth joints much shorter than third and sixth, these much exceeding the fourth and fifth together. The gonopods of male without coxal calceol; coxal division thick, with a basin-like excavation above in which telopodite fits; telopodite presenting an elongate lamellar division from the base of which a slender process typically distally lying against the inner curved surface of the lamellar division.

Genotype—*Sakophallus simplex*, new species.

#### **Sakophallus simplex**, new species.

FIGS. 8-10.

The male holotype is yellow with legs clearer yellow, in color. In superficial form much resembling some species of *Orthomorpha*, but the keel of the second segment not lower than other, although it descends anteriorly.

Legs as shown in fig. 8.

The features of the gonopods are shown in figs. 9 and 10.

Length, about 9 mm.

Locality—Mexico: Michoacan, Cerro Tancitaro, elevation 7,800 feet. One male taken "on shrew carcass" June 7, 1941, by Hoogstraal and Traub.

**Orthoporus mundus**, new species.

FIG. 11.

Body marked with sharply defined alternating rings of black and narrower rings of yellow or yellowish white, the latter about prozonites, the black on metazonites except a narrow caudal border. Collum black except a narrow anterior and posterior border. Legs ferruginous.

Characterized best by form and sulci of the collum as shown in fig. 11.

Diameter, 6 mm.

Locality—Mexico: Apatzingan, La Majada. One female, lacking caudal end, taken by Hoogstraal August 8, 1941, under bark.

Resembling *O. leonicus* of Nuevo Leon, but a smaller form differing in color and in arrangement and direction of sulci on collum.

**Paraiulus phloibius**, new species.

FIGS. 12 and 13.

Dark brown, sometimes nearly uniform, but occasionally with a bluish or bluish-white stripe across each segment, this often narrowing to a point down each side, but in other cases ending broadly on a lateral dark spot.

Collum in male rather long, with lower end on each side widely rounded, with middle part of curve flattened. Just above margining sulcus two sulci running forward from caudal edge but not crossing anterior border region.

Anal tergite much surpassing the valves, the process straight except the distal mucro, which is a little upcurved.

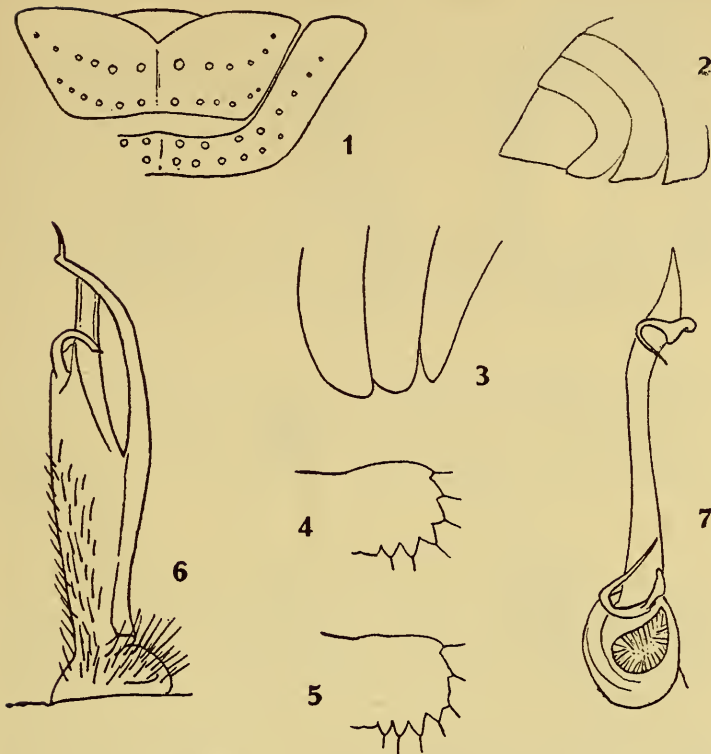
Stipes of male with free end in ectal view deeply excavated with antero-distal corner the more produced.

To be distinguished from *L. schaachti* especially in the details of the gonopods of the male as shown in figs. 12 and 13.

Number of segments in male holotype, 48.

Diameter, 2 mm., being thus considerably less than in *P. schaachti*.

Locality—Mexico: Michoacan, Cerro Tancitaro. One male and anterior end of female taken June 23, 1941, under bark of tree at elevation of 7,800 feet, and a male and several females taken at same place July 2, 1941.



- FIG. 1. *Platydesmus cerrobius*, new species. Anterior end, dorsal view.
- FIG. 2. *Sphaeriodesmus michoacanus*, new species. Last four tergites, lateral view.
- FIG. 3. The same. Fourth, fifth and sixth keels of left side, lateral view.
- FIG. 4. *Peridontodesmus hoogstraali*, new species. Eleventh keel of right side, dorsal view.
- FIG. 5. The same. Thirteenth keel of right side, dorsal view.
- FIG. 6. The same. Left gonopod of male, caudal view.
- FIG. 7. *Tancitares michoacanus*, new species. Telopodite of gonopod of male, mesal view.

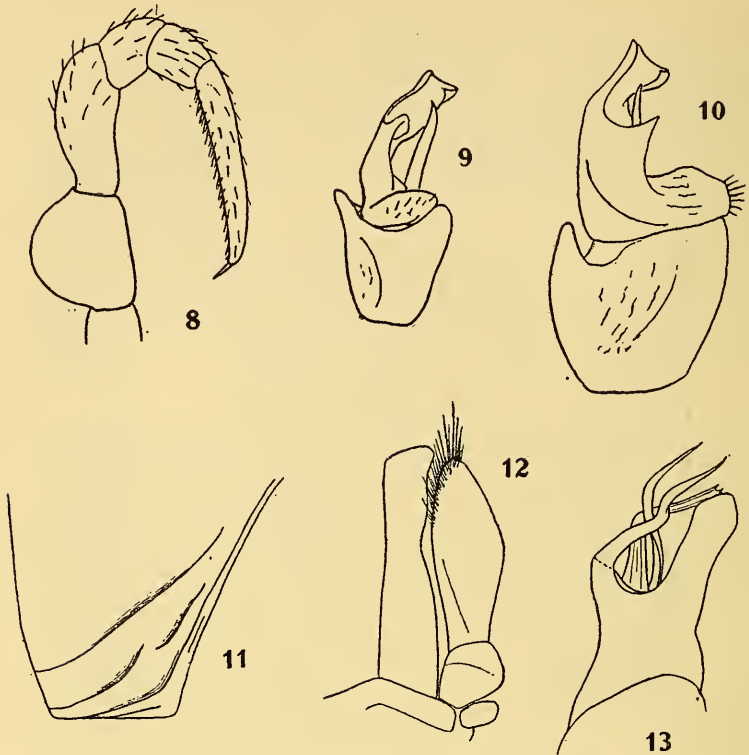


FIG. 8. *Sakophallus simplex*, new species. A leg of fifth segment.

FIG. 9. The same. Left gonopod of male, subcaudal view.

FIG. 10. The same. Left gonopod of male, subcaudal view.

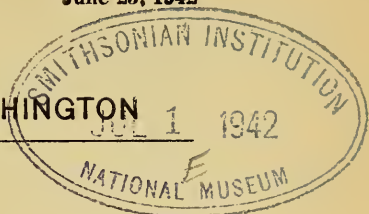
FIG. 11. *Orthoporus mundus*, new species. Collum, viewed from right side.

FIG. 12. *Paraiulus phloibius*, new species. Right anterior gonopod of male, anterior view.

FIG. 13. The same. Right posterior gonopod of male, caudal view.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



A NEW SUBSPECIES OF MEXICAN CORAL SNAKE.

BRYCE C. BROWN AND HOBART M. SMITH.

Two specimens of coral snakes from northeastern Mexico can not be referred to any described form. They appear, however, to be related to *Micrurus fitzingeri* of central Mexico. In reference to the reduction of the yellow rings, we name the race

*Micrurus fitzingeri microgalbineus*, subsp. nov.

*Type*.—E. H. Taylor—H. M. Smith Coll. No. 27,847, 7 kilometers south of Antiguo Morelos, Tamaulipas, Mexico, collected June 21, 1941, by Bryce C. Brown. Adult female. *Paratype*. E.H.T.—H.M.S. No. 5,515, 18 kilometers north of Valles, San Luis Potosi, collected by E. H. Taylor. Adult male.

*Diagnosis*.—A coral snake closely related to *Micrurus f. fitzingeri*; black rings 18 to 19 on body, their length averaging 4.6 (4 to 6) scale lengths dorsally; length of red rings averaging 7 (5 to 10) ventral and 6 (4 to 8) dorsal scale lengths; yellow rings covering no more than one scale length; yellow parietal ring very narrow; black caudal rings 4 to 5; ventrals in male 203, in female 225; caudals in male 43, in female 32; no supra-anal tubercles.

*Description of type*.—Scutellation normal; 7-7 supralabials and infra-labials; one preocular, touching nasal; two postoculars; temporals 1-1-2; anterior chin-shields about two-thirds length of posterior; scale rows 15 throughout length of body; ventrals 203; subcaudals 43, all double; total length 609 mm., tail 54 mm.

Anterior black spot on head covers snout, mental, anterior three and one-half labials, and extends dorsally to and including the anterior two-fifths of the parietals; yellow parietal ring narrow dorsally (a little less than one-third length of parietals), widening laterally to include one-half of the fourth, all of the fifth and sixth, and one-third of the seventh labials; nineteen black bands, the first covering five scale rows on the neck, the posterior tip of the parietals and most of the seventh labial; first black band connecting dimly below with the black on tip of chin; the rest of the black bands covering four to five scale lengths above and three to four

ventrals below; yellow bands no more than one scale length wide dorsally (usually about one-half scale wide); ventrally the yellow is almost absent; dorsally the red bands cover six to eight (average 7.1) scale lengths, and most of the red scales bear black flecks of various sizes; ventrally the red covers 7 to 10 (average 8.4) ventrals, most of which bear black flecks confined to their posterior edges; tail with four black bands and a small black tip; yellow caudal bands covering one-half to one and one-half scale lengths dorsally.

*Paratype*.—The paratype is described by Taylor, Univ. Kans. Sci. Bull., vol. 26, 1939 (1940), pp. 484–485. It has no supra-anal tubercles.

*Remarks*.—*Micrurus fitzingeri microgalbineus* appears to be more closely related to *Elaps fitzingeri* Jan (Rev. Mag. Zool., 1858, p. 521, pl. A, fig. 2 [in color]) than to any other known species of the genus. The latter species is described as follows (a loose translation from the original French): "Anterior part of head black up to the [anterior edge] of the parietals. Temporals 1–1–2; 19 to 21 black rings on the body, each bordered in front and behind by white [yellow], which on the anterior part of the body occupies two rows of scales above and two ventral plates below, but on the rest of the body only one row of scales above and one plate below. In the red spaces some of the scales have a black tip; ventrally the same areas have small black spots. The red is totally absent on the tail, where one observes six black rings separated by white [yellow] rings. Total length of the specimen measured 36 inches; tail, 5 inches. Ventrals 222; subcaudals 55." The figure shows that the black rings cover about three scale lengths on the anterior part of the body, the red rings two to three scale lengths; the yellow band in the temporal region is very broad and covers all except the extreme anterior edge of the parietals. The specimens are said to be from Mexico.

Three specimens of *Micrurus* in the United States National Museum apparently belong to *fitzingeri*. These are Nos. 10,231 and 14,432 from Guanajuato, Mexico (Dugès collector), and No. 111,334 from the highway 12 or 13 kilometers north of Cuernavaca, Morelos, collected by H. M. Smith. The latter was taken at an elevation of about 6,000 feet, well within the evergreen zone. No descriptions of *fitzingeri* have appeared since the publication of several figures by Jan and Sordelli (Icon. Gén., livr. 42, 1872, pl. 2, fig. 3), and therefore it is of interest to record certain data from these specimens. A color description follows:

The snout and chin are black, without light spots; the yellow parietal ring covers all except the extreme anterior and, in two (Nos. 14,432 and 111,334) the extreme posterior tips of the parietals; the yellow rings on the anterior part of the body cover one and one-half or two scale lengths dorsally, but decrease in width posteriorly until they cover from slightly less to slightly more than one scale length. The anterior two or three red rings cover from four to seven scale lengths middorsally but most of the other red rings cover three to five (average 4.3) scale lengths. There are 19 to 24 black rings on the body, 4 to 6 on the tail. The anterior black rings cover five or six scale lengths dorsally, while the remainder cover a minimum of three and a maximum of five (usually about four) scale lengths.

The black rings cover from three to seven ventral scales (in No. 14,432, usually six; in the others, about four; average of all, 4.4) and the interspaces average slightly narrower (in No. 14,432) to a half longer than the black areas. The light rings on the tail cover from one and one-half to three scale lengths.

*Micrurus fitzingeri microgalbineus* differs from *f. fitzingeri* in having (1) the yellow rings covering no more than one scale length on any part of the body, while in *f. fitzingeri* they are a little broader, anteriorly twice as broad; (2) a very narrow, yellow, parietal ring, covering about a third of the length of the parietals (two-thirds or more in *f. fitzingeri*); (3) a somewhat smaller number of black rings on the body (18 to 19 as opposed to 19 to 24 in *f. fitzingeri*); and (4) generally a higher average number of dorsal scale lengths in the red areas (4 to 8, average 6.2, as opposed to 2 to 6, average 4.3 scale lengths, in *f. fitzingeri*). The extent of variation which may occur in these characters can not now be determined; the third and fourth characters may be expected to show a normal overlap greater than that now evident, while the others may not. The differences between the two races are obviously small, and appear significant only because of apparent geographic isolation. For this reason, and since there is no obviously impassible barrier between the indicated ranges of *f. fitzingeri* and *f. microgalbineus*, we believe intergradation highly probable and therefore regard the two forms as subspecies.

The only other species from areas near that where *f. microgalbineus* occurs are *fulvius tenere* and *affinis affinis*, but these show differences so numerous and obvious that the relationship with either does not seem close. *M. f. tenere* has fewer black rings on the body (10 to 15, average 12.4, in 30 specimens); the yellow rings on the body are broad and even, no less than one and one-half scale rows wide; the yellow parietal band includes no less than two-thirds the length of the parietal; the black rings (usually also the red ones) are broader and seldom involve less than six scale lengths on the middorsal line; and the caudal black rings average fewer (two to four, average three, in 29 specimens). In *affinis affinis* the black rings are much narrower, covering two or three scale lengths; the yellow rings may or may not be narrower, and are sometimes obsolete; and in at least the northern specimens the black rings are fewer in number (11 to 14 in four counts).

We are much indebted to Dr. E. H. Taylor for his assistance and for the use of material in his collection.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



NEW BOBWHITE FROM NORTHEASTERN MEXICO.

BY JOHN W. ALDRICH.

The bobwhites of the arid interior of southern Tamaulipas in the intergrading area between the Arid Tropical and Lower Sonoran Life Zones have previously been referred to *Colinus virginianus maculatus*, described by Nelson (The Auk, 16, 1899, p. 26) from Altamira near the coast of extreme southeastern Tamaulipas. However they show marked differences from that form and would better be considered as a distinct race. Sutton and Pettingill (The Auk, 59, 1942, p. 12) commented on certain of these differences in three specimens taken by them in the Gomez Farias region but disposed of the situation by considering them intermediate between *maculatus* and *texanus*. In certain respects this is the case, but the new race is more grayish than either of those subspecies and the greatly reduced reddish pectoral band of the female is in no sense an intermediate character.

*Ortyx graysoni panucensis* Lowe (Bull. Brit. Ornith. Club, 23, 1908, p. 18) was described from a bird taken in the valley of the Panuco River near Tampico. Although the type has not been available to me for comparison it is from a region that is well within the range of *maculatus* and should, therefore, be considered a synonym of that form and therefore unavailable. Inasmuch as there seem to be no other names available I propose to call the interior race:

***Colinus virginianus aridus*, subsp. nov.**

JAUMAVE BOBWHITE.

*Subspecific characters*.—Similar to *Colinus virginianus maculatus* Nelson, of southeastern Tamaulipas, northern Veru Cruz, and extreme southeastern San Luis Potosi, but males paler and more grayish, black areas more restricted above, reddish coloration of underparts paler; in females reddish pectoral band almost obsolete. Similar also to *Colinus virginianus texanus*, of southern Texas and northern Tamaulipas, but more grayish, males with

underparts much more extensively reddish as in *maculatus*, females with less pronounced reddish pectoral band. They are so utterly different from *Colinus virginianus graysoni*, from southwestern San Luis Potosi southward that there is no need for comparison.

*Measurements.*—Adult male (9 specimens from Jaumave Valley, Tamaulipas): wing, 104–109.5 (average, 106.8) mm.; tail, 56–65.5 (60.2); exposed culmen, 13–14 (13.8); tarsus, 29–32.5 (30.8); middle toe without claw 25.5–27.5 (26.4). Adult female (4 specimens from Jaumave Valley, Tamaulipas): wing, 104.5–106.5 (105.6); tail, 58–65 (60.8); exposed culmen, 14–14.5 (14.2); tarsus, 29.5–31 (30.3); middle toe without claw, 25.5–28 (26.5).

*Types.*—Adult male, No. 158,456, U. S. National Museum, Biological Survey's collection; Jaumave, Tamaulipas; June 3, 1898; E. W. Nelson and E. A. Goldman; original number 5,508.

*Geographic distribution.*—Ecotone between the Arid Tropical and Lower Sonoran Life Zones from central and central western Tamaulipas south to the northern part of southeastern San Luis Potosi.

The range of this new quail is so far as known at present confined to the arid regions of the interior portion of the coastal plain and valleys of the eastern foothills of the high tableland in northeastern Mexico, which apparently presents ecologically different conditions from either the Lower Sonoran portion of the coastal plain to the northeast south to Cruz and Soto la Marina that is occupied by *C. v. texanus*, and the Arid Tropical portion to the southeast populated by *C. v. maculatus*. E. W. Nelson and E. A. Goldman in their unpublished field notes on regions within the range of the new form (Jaumave Valley, Forlon, and Valles) in the files of the U. S. Fish and Wildlife Service, and Sutton and Pettingill (The Auk, 59, 1942, pp. 2–6) on the Gomez Farias region, speak of the ecologically intermediate condition between the Tropical and Lower Sonoran Life Zones. Nelson and Goldman describe the Jaumave Valley, whence come the type series of this new race, as a very dry valley about 2,000 feet above sea level, separated from Victoria on the coastal plain by a 4,000-foot range of mountains, which forms an outlying portion of the Sierra Madre Cordillera. The bottom of the valley is clothed with mesquite and cactuses along stream courses and Agaves, Optunias, Yuccas, Mimosas, Cassias, Acacias, and other small shrubs on the arid benches. Of particular note was the unusually great abundance of the Agaves.

On the following critical specimens were based the present concepts of the ranges of the three races of *Colinus virginianus* in northeastern Mexico:

*Colinus virginianus maculatus.*—41 specimens including: Alta Mira, southeastern Tamaulipas (type locality), 18 males and 5 females; Tampico, southeastern Tamaulipas, 1 male and 1 female; Hacienda de Naranjo, 30 miles north of Velasco, southeastern Tamaulipas, 5 males and 4 females; Chijol, central northern Vera Cruz, 4 males; Tancanhuitz, southeastern San Luis Potosi, 1 male; Matalpa, near Tamazunchale, southeastern San Luis Potosi, 1 male; El Bonito, 10 miles south of Valles, southeastern San Potosi, 1 male. The Chijol birds average slightly paler than typical *maculatus* but are nearer that form than to anything else.

The Tancanhuitz and Matalpa birds are typical *maculatus*. The single male specimen in the Conover collection from El Bonito, although closer to *maculatus* than any other known race is extremely blackish on the back and in this respect quite distinct from any of the other specimens examined.

*Colinus virginianus aridus*.—43 specimens including: Jaumave Valley, southwestern Tamaulipas (type locality), 9 males and 4 females; Sabinas near Gomez Farias, central southern Tamaulipas, 2 males; El Limon near Gomez Farias, central southern Tamaulipas, 1 male and 1 female; Forlon, central southern Tamaulipas, 1 female; Victoria, west central Tamaulipas, 6 males and 1 female; Rio Cruz, west central Tamaulipas, 4 males and 4 females; Rio Santa Ingracia, west central Tamaulipas, 1 male; Guiaves, central western Tamaulipas, 2 males; Montelunga, central western Tamaulipas, 1 male; Santa Leonor, central western Tamaulipas, 1 male; Mesa de la Angostura near Colonia Mirador, 9 miles northeast of Llera, Tamaulipas, 1 male and 2 females; 8 miles north of Valles, southeastern San Luis Potosi, 1 male. The Gomez Farias and Valles birds are not typical *aridus*, being in some respects intermediate between it and *maculatus*. Specimens from the plains region including Victoria, Rio Cruz, and Rio Santa Ingracia, are intermediate between *aridus* and *texanus*, but average closer to the former, while specimens from Hacienda San Juan 60 miles north of Victoria are closer to *texanus*.

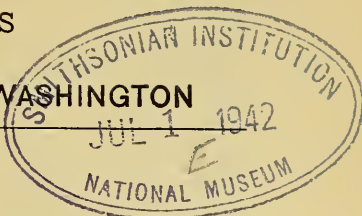
*Colinus virginianus texanus*.—38 specimens including: Brownsville, central southern Texas, 2 males; Rio Grande City, central southern Texas, 1 male; Padre Island, central southern Texas, 1 male and 1 female; Aransas National Wildlife Refuge, central southern Texas, 1 male; Corpus Christi, central southern Texas, 1 male; near former town of Bagdad at mouth of Rio Grande, northeastern Tamaulipas, 1 male and 2 females; Matamoros, northeastern Tamaulipas, 3 males and 1 female; Mier, northwestern Tamaulipas, 1 female; Hacienda San Juan, Cruz, northwest central Tamaulipas, 7 males and 6 females; and Soto la Marina, central eastern Tamaulipas, 6 males and 2 females.

For the use of critical specimens to supplement those in the Biological Survey's collection I am indebted to the authorities of the Field Museum of Natural History, Museum of Comparative Zoology, and Cornell University, and to Mr. H. B. Conover, of Chicago, Illinois. To Major E. A. Goldman of the U. S. Fish and Wildlife Service I have referred for first-hand information on the physiography and ecology of northeastern Mexico.





PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



A NEW FROG OF THE GENUS *MICRIXALUS* FROM  
TRAVANCORE.

BY GEORGE S. MYERS.

Among the frogs collected by Dr. Albert W. Herre for the Natural History Museum of Stanford University during his Asiatic expedition of 1940-41 is a small frog from Travancore which appears to represent an unknown species.

*Micrixalus herrei*, new species.

*Diagnosis.*—A *Micrixalus* with complete dorsolateral folds but no lingual papilla; canthus rostralis very sharp and lores vertical; loreal section of canthal line strongly concave and the tip of the snout bluntly rounded when frog is viewed from above; snout strongly projecting and sharp in profile; eyes very large and as long as the snout measured obliquely from its tip to one of the eyes; upper eyelid slightly wider than interorbital space; tympanum small but distinct except for that part of border near the strong post-tympanal fold; toes fully webbed except for the fourth, which has only a narrow fringe along the penultimate phalanx, the web involving the rather large disks of all the toes except the fourth; tibiotarsal articulation reaching just past snout tip when leg is brought forward; skin of dorsal surface of body, upper eyelids, and upper surface of legs granulated.

*Holotype.*—Stanford Amph. Cat. no. 7,265, an adult male taken at Kallar, 30 miles northeast of Trivandrum, Travancore, South India, in the foothills, by Dr. Albert W. Herre, on June 19, 1941. The river at Kallar broadens into a large pool above the village, the bank of the pool on the side opposite the village being high and rocky. Dr. Herre collected below the pool and the bridge at its lower end, and on the rocky side, but believes that this small frog came from a small swift brook flowing into the river above the high rocky part of the pool bank. Only one example was taken.

*Description.*—Tongue narrow, shallowly bifurcate behind, without any central pointed papilla. Male with two internal vocal sacs, the openings large but inconspicuous. Snout tip scarcely pointed, rather rounded when viewed from above, but this rounded contour is broken at the nostrils; posterior to these the snout contour, as seen from above, is represented by the line of the canthus rostralis, which is distinctly concave from the nostrils to the eyes. The appearance of the snout is therefore very different from

that of *M. fuscus*, which is long and pointed and convex on the sides when viewed from above. In profile, the snout greatly overhangs the mouth, its tip being very acutely pointed, and the profile line from the tip to the upper lip is concave. Canthus rostralis sharply angular, the lores being vertical and somewhat concave. Nostril midway between eye and tip of snout. Eyes very large and prominent, as long as the snout when the latter is measured obliquely from one of the eyes to the snout tip, much larger than those of *M. fuscus*. Upper eyelid wide and prominent, very slightly wider than the interorbital space. Tympanum small, about two-fifths eye, its anterior part perfectly clear but the posterior rim, next to the post-tympanal fold, is obliterated. General body form rather slender, the frog very closely resembling some of the small *Phyllobates* of the *nubicola* type.

Fingers free of web, slender, first slightly shorter than second, which is about equal to the fourth and extends to the proximal end of the penultimate phalanx of the third. Disks large, somewhat flat-ended, that of third toe largest and quite or almost twice as wide as narrowest part of penultimate phalanx. Disks with a deep circum-marginal groove but no transverse inferior one. First finger of male type swollen, with a large, very finely granulated, white nuptial pad on its inner-superior surface.

Toes slender, completely webbed, the web involving the disks of all the toes. On the fourth toe, however, the web is constricted at the base of the penultimate phalanx, and runs up to the disk only as an exceedingly narrow fringe. Disks of toes like those of fingers and of about the same size. Outer metatarsals separated by web only in the distal third or fourth; the rest of the distance they are tightly bound together, with scarcely even a groove separating them. No outer metatarsal fold, but its location is marked by a single rather regular row of tiny white tubercles, which also run out along the base of the outer finger. No outer metatarsal tubercle. A flattened oval inner metatarsal tubercle, its distal end slightly free.

Legs moderately stout, the heels slightly overlapping when femur and tibia are placed at right angles to body, the tibiotarsal articulation reaching just beyond tip of snout when leg is brought forward.

Skin of entire dorsum, head, upper eyelids, upper parts of sides and upper surfaces of legs evenly granular, a few larger granules being present only on the posterior dorsum and tibia; the granulation is rather coarse for so small a frog. All of the dorsal granules, including the slightly enlarged ones on the posterior part of the back and legs, each bears an exceedingly minute erect dark spine. Dorsolateral folds well developed and conspicuous but narrow; they are even and continuous, run from the eye to the groin, and mark the considerable angle between the rather flat dorsum and the down-slope of the sides. A strongly developed tympanal fold from eye, over and down behind tympanum, fading out near insertion of arm. An elongate, oblique, white, glandular wart from near postero-inferior border of tympanum down towards arm. Under surfaces of body and legs perfectly smooth.

Top of head and dorsum between the dorsolateral folds brown, obscurely mottled and marbled with lighter and dark areas, one of the latter forming an obscure interocular bar and another a large, somewhat triangular spot

on the middle of the back. Sides below the dorsolateral folds black, this joining the white ventral color in bold mottling and marbling along the lower sides, especially posteriorly. Sides of snout dark, with irregular light areas on upper lip and subocular region. Antero-inferior edge of tympanum white, forming an oblique white bar with the white elongate wart mentioned above. Undersurface of body white, boldly mottled and marbled with brown on the breast, and increasingly so on throat, which bears a not too well defined median white line. Lower lip barred. Upper surfaces of arms dark, with a few obscure whitish crossbands. Upper surfaces of femur and tibia with three or four irregular, wide, brown crossbands, the interspaces lighter brown and the light interspace nearest the groin almost white anteriorly, perhaps indicating a bright color spot in this region. Posterior surface of thigh solid dark brown with a narrow white line extending from vent to near the undersurface of the articulation of the femur and tibia. This line is like that of *M. fuscus*, but is strongly oblique instead of horizontal. Under side of thighs light, the anterior part becoming mottled. Under side of calf heavily mottled with brown. Hidden part of groin white, probably indicating a bright color spot confluent with the first light interspace between the anterior parts of the superior thigh crossbands.

*Measurements of type*.—Length from snout tip to end of coccyx 17.5 mm. Snout from tip to one of the eyes 3 mm. Horizontal diameter of eye 3 mm. Femur (from coccyx) 11 mm. Tibia 11 mm. Foot (approximate) 13 mm. To indicate how I have made these measurements, the same measurements taken on Boulenger's type figure of *M. fuscus* are as follows: Length 25.5. Snout 4.5. Eye 3.0. Femur 15. Tibia 15.5. Foot (approximate) 18.5. The type of *herrei* is preserved in about the same posture shown in Boulenger's figure and my measurements have been taken without changing the positions of the limbs.

*Comparisons*.—Other than the five South Indian species of *Micrixalus* treated by Boulenger in 1890 (*Fauna Brit. India*, Rept. Batr., pp. 464–467) I know of only four species having been described. They are:

*Micrixalus borealis* Annandale, 1912, *Rec. Ind. Mus.*, vol. 8, no. 1, p. 10, pl. 2, fig. 2 (Rotung, on the Dihang River of the Brahmaputra System, Abor Country, N. E. India).

*Micrixalus dimunitiva* Taylor, 1922, *Philippine J. Sci.*, vol. 21, no. 3, p. 267, pl. 1, figs. 3–4, pl. 2, figs. 2–3 (near Pasananka, Zamboanga, S. W. Mindanao; Jolo, Sulu Islands).

*Micrixalus torrentis* Malcolm Smith, 1923, *J. Nat. Hist. Soc. Siam*, vol. 6, pp. 195–212 (Wuchih Mts., Hainan).

?*Micrixalus tenasserimensis* (Slater), *Proc. Zool. Soc. London*, 1892, p. 345, pl. 24, figs. 4–4a (Tenasserim). This small frog was described by Slater as a *Rana*. Annandale (loc. cit. supra) says that some examples have vomerine teeth, others not, and presumes it to be close to his *M. borealis*. Boulenger (1918, *Ann. Mag. Nat. Hist.*, ser. 9, vol. 1, p. 373) places it in *Cornufer*, but Malcolm Smith (1930, *Bull. Raffles Mus.*, no. 3, p. 102) says it is related to the South Indian *Rana beddomii* and refers it to the subgenus *Discodeles* of *Rana*.

None of these four species seems to be at all close to *Micrixalus herrei*,

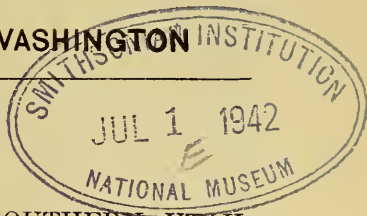
and Taylor's description and figures lead me to believe that *dimunitiva* does not belong in a genetic series with the other species.

Of the five hitherto known South Indian and Ceylonese species, *saxicola* and *sarasinorum* lack the dorsolateral glandular folds, and *opisthorhodus*, which has them, possesses a lingual papilla. These can not be close to *herrei*, which lacks the papilla but possesses the folds. Of the two remaining species, *silvaticus* has the toes only one-third to two-fifths webbed, and the legs much shorter than *herrei*. *M. fuscus* (Boulenger, 1882, *Cat. Batr. Sal.*, p. 96, pl. 10, fig. 3) agrees most closely with *herrei* and is undoubtedly its closest known relative. *M. herrei* differs distinctively from *fuscus* in (1) the longer legs, (2) the granular dorsum, (3) the very differently shaped snout, (4) the much larger and more prominent eyes, (5) the much smaller size, and (6) the narrower and more oblique white line on the hindside of the thigh, as well as in other details of coloring. Of these, numbers 3 and 4 are probably the most distinctive. I am quite aware that some of these apparent differences may be due to Boulenger having used his larger specimens (females) for most points in his description, while my only example is a male, and of the danger of basing new forms on single specimens. However, the differences shown by my frog are very clear-cut and I do not believe that sexual differences will account for all of them, especially the eye size. It may be added that little has been published in regard to these little South Indian frogs save for the very brief, formal original descriptions, and if the true situation in regard to their specific status is in any way similar to that in their New World analogues, the forms of *Phylllobates*, the species are doubtless more numerous than now realized and their true specific characters are probably not fully brought out by the short, formalized descriptions in vogue when they were named.

*Notes on the genus.*—I am not aware that a type has been designated for *Micrixalus* and I hereby name *Ixalus fuscus* Boulenger 1882 as type of the genus. Roux (1905, *Zool. Anz.*, vol. 28, p. 779) reduces *Micrixalus* to the synonymy of *Stauroids*, a genus whose limits have been agreed upon by but few authors. *M. herrei* rather strikingly reminds one of such rough, mottled species of *Stauroids* as *natator*, *afghana*, and *larutensis*. Noble (1931, *Biol. Amphib.*, p. 521) says of *Micrixalus*: “. . . a group of small species of *Hylarana* lacking vomerine teeth. It grades into *Stauroids* and differs from some species of that genus only in its *Rana*-like tadpole.” I am not at all sure that all the species of *Micrixalus* form a phylogenetic unit. The loss of the vomerine teeth is a very superficial character that has appeared time and again in the frogs. I have indicated above that I do not believe the Philippine *dimunitiva* is directly related to the other species, and the difficulty with *tenasserimensis* has been mentioned. It has seemed to me that the strange, pointed lingual papilla that so often crops up in Asiatic Ranids may be of more importance than suspected, and it is possible that proper investigation of it and of a number of other known but neglected characters might change considerably our ideas of the phylogenetic relationships of many of the Ranidae.

I take great pleasure in naming this strange little frog for my friend and colleague, Dr. Albert W. Herre, Curator of Ichthyology in the Natural History Museum of Stanford University.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



THREE NEW RODENTS FROM SOUTHERN UTAH.

BY E. A. GOLDMAN.

Two hitherto unrecognized pocket gophers and a grasshopper mouse are here described. One of the pocket gophers is a representative of the *Thomomys townsendii* group which has not, as far as I am aware, been previously recorded from Utah. The other is a member of the widely-dispersed *Thomomys bottae* group, based on a series of specimens collected many years ago. The grasshopper mouse is a desert representative of the *Onychomys leucogaster* group. For the loan of specimens of described forms required for comparison I am indebted to Dr. E. Raymond Hall, of the Museum of Vertebrate Zoology, University of California.

*Thomomys townsendii lenis*, subsp. nov.

*Type*.—From Richfield, Sevier County, Utah. No. 264805, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection); collected by A. W. Moore, March 11, 1928. X-catalogue number 28835.

*Distribution*.—Known only from the type locality in the upper part of the Sevier River Valley, southern Utah.

*General characters*.—A cinnamon buffy subspecies, the smallest of the known members of the *Thomomys townsendii* group. Most closely resembling *Thomomys townsendii nevadensis* of central Nevada, but smaller; general coloration distinctly "cinnamon-buff" (Ridgway, 1912), instead of "pinkish buff"; cranial details, especially the more massive development of the supraoccipital behind the interparietal and consequent straightening of lambdoid crest, distinctive. Differs from both *Thomomys townsendii elkoensis* of the Humboldt River Valley, Nevada, and *Thomomys townsendii similis* of the upper Snake River Valley, Idaho, in decidedly smaller size and richer buffy coloration.

*Color*.—*Type* (partially molted): Upper parts near "cinnamon-buff," purest on sides of head, sides of neck, and upper base of tail, finely mixed with black on top of head and over back; sides of body, forearms, and

upper part of thighs "pinkish buff"; under parts overlaid with "pinkish buff," except on inguinal area where the hairs are pure white to roots; muzzle blackish; fore feet and hind feet to well above ankles white; tail light buffy above, whitish below, becoming white all around near tip.

*Skull*.—Similar in general to that of *nevadensis*, but smaller and lighter in structure; upper surface of supraoccipital extends farther behind the interparietal, and rises more steeply from foramen magnum, without the deep median concavity usually present in *nevadensis* and the other subspecies of *townsendii*; nasals relatively longer and narrower and reach farther posteriorly beyond anterior plane of zygomata; incisors longer, more strongly decurved; molariform teeth smaller. Compared with *elkoensis*, *similis*, and other subspecies of *townsendii*, the skull is much smaller and differs otherwise in about the same characters as from *nevadensis*.

*Measurements*.—*Type*: Total length, 257 mm.; tail vertebrae, 89; hind foot, 32. Average of three adult male topotypes: 251 (248–255); 82 (74–86); 32 (31–32). *Skull* (type and an adult male topotype, respectively): Occipital-nasal length, 43, 43.9; zygomatic breadth, 28, 28.7; width across squamosals (over mastoids), 22.5, 23.2; interorbital constriction, 6.7, 6.9; length of nasals, 15.4, 15.6; maxillary toothrow (alveoli), 7.8, 8.4.

*Remarks*.—As no other specimens of the *Thomomys townsendii* group appear to have been recorded from Utah, it seems possible that an isolated colony of a formerly more widely ranging species has remained in the Sevier River Valley. *T. t. lenis* is remarkable for its small size. It seems more convenient to treat the animal as a subspecies of *townsendii*, but well-marked cranial features suggest that it may be worthy of full specific recognition.

*Specimens examined*.—Total number, 6 (1 skin without skull and 2 skulls without skins), all from the type locality.

#### ***Thomomys bottae levidensis*, subsp. nov.**

*Type*.—From Manti, Sanpete County, Utah (altitude about 5,500 feet). No. 191962, ♂ adult, skin and skull, U. S. National Museum (Merriam collection); collected by Vernon Bailey, December 6, 1888. Original number 427.

*Distribution*.—Known only from the type locality in the San Pitch River Valley, south-central Utah.

*General characters*.—A rather small "cinnamon-buff" subspecies of the *Thomomys bottae* group. Closely allied to *Thomomys bottae absonus* of Houserock Valley, northern Arizona, but smaller; under parts more uniformly suffused with buff; skull shorter and slenderer in structure. Differs from *Thomomys bottae albicaudatus* of Provo, Utah, in smaller size and lighter general coloration; upper parts, especially along median line, less extensively mixed with black; skull smaller.

*Color*.—*Type* (winter pelage): Upper parts in general "cinnamon-buff"; purest along sides, the top of head and median dorsal area finely, but inconspicuously mixed with black; forearms, thighs, and under parts

“pinkish buff”; muzzle blackish; cheek pouches lined with white; feet whitish; tail light buffy, somewhat paler below.

*Skull*.—Similar to that of *absonus*, but smaller and of lighter proportions; distinctly shorter; nasals shorter; zygomatic slenderer and relatively more widely spreading; auditory bullae smaller, less inflated; temporal ridges weakly developed as in *absonus*. Compared with that of *albicaudatus*, the skull is similar in general form, but decidedly smaller, with relatively wider spreading but slenderer zygomatica.

*Measurements*.—*Type*. Total length, 227 mm.; tail vertebrae, 67; hind foot, 27. Two adult male topotypes, respectively: 209, 220; 65, 70; 27, 27. Average of eight adult female topotypes: 202 (194–222); 65 (60–73); 26 (24–27). *Skull* (type): Occipito-nasal length, 39.4; zygomatic breadth, 25.4; width across squamosals (over mastoids), 20; interorbital constriction, 6.5; length of nasals, 13.1; maxillary tooth row (alveoli), 7.6. Two adult female topotypes, respectively: Occipito-nasal length, 34.4, 34.7; zygomatic breadth, 21.6, 21.8; width across squamosals (over mastoids), 17.1, 17.3; interorbital constriction, 6.4, 6.5; length of nasals, 10.8, 10.9; maxillary tooth row (alveoli), 7.5, 7.4.

*Remarks*.—*Thomomys bottae levidensis* appears to be most closely allied to *Thomomys bottae absonus*, a geographic neighbor on the south. It has not been compared with *Thomomys bottae tivius* or *Thomomys bottae convexus*, but as both of these were described from localities west of the main ranges of mountains in south-central Utah, substantial differences in detailed characters are to be expected.

*Specimens examined*.—Total number, 13, all from the type locality.

#### *Onychomys leucogaster aldousi*, subsp. nov.

*Type*.—From Desert Range Experiment Station, 50 miles west of Milford, Millard County, Utah. No. 266502, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection); collected by C. M. Aldous, April 18, 1941. X-catalogue number 30165.

*Distribution*.—Known only from the type locality, but may have an extensive range in the desert region of southwestern Utah and adjoining territory in Nevada.

*General characters*.—A small, pallid subspecies; ears conspicuously whitish at anterior base; tail white except a faintly dusky median line along upper side. Similar in size to *Onychomys leucogaster brevicaudus* of southern Idaho, but tail apparently shorter; contrasting strongly in paler coloration. Differing from *Onychomys leucogaster melanophrys* of the plateau region of southeastern Utah in decidedly smaller size, as well as paler coloration.

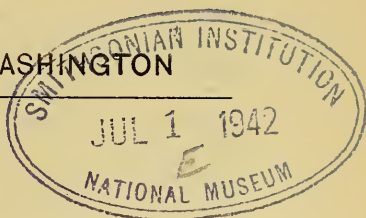
*Color*.—*Type* (winter pelage): Upper parts in general near “avallaneous,” varying to pale “vinaceous-buff” on face and along sides; entire under parts, forearms, cheeks, sides of neck, and feet white; ears dusky across middle, with conspicuous whitish patches on anterior base, and whitish tips; tail white, except a very narrow, faintly dusky median line along upper side.

*Skull*.—About as in *brevicaudus*.

*Measurements*.—*Type*: Total length, 134 mm.; tail vertebrae, 32; hind foot, 19. *Skull*.—Greatest length, 26.3; condylobasal length, 24.1; zygomatic breadth, 14.3; interorbital constriction, 5; width across squamosals (over auditory bullae), 11.6; length of nasals, 10.1; maxillary tooth row, 3.9.

*Remarks*.—This subspecies is based on a single specimen which presents characters apparently well beyond the range of individual variation in *brevicaudus*, the neighboring race on the north. It requires no close comparison with *melanophrys*, the much larger subspecies inhabiting the plateau region to the eastward. Specimens from Nephi and Kelton, Utah, are somewhat intermediate, but seem nearer to *brevicaudus*, to which they were referred by Hollister (Proc. U. S. Nat. Mus., vol. 47, p. 443, October 29, 1914). The new race is named for the collector, Clarence Moroni Aldous, in recognition of his meritorious field investigations of wildlife.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTONNOTES ON THE COATIS OF THE MEXICAN  
MAINLAND.

BY E. A. GOLDMAN.

The general range of *Nasua narica*, transcontinental in tropical Central America, is split in southern Mexico by the great wedge formed by the interior highlands. The coatis as a group favor the warmer territory at elevations up to about 4,000 feet. From a point a short distance north of the Isthmus of Tehuantepec, diverging branches extend northward along the Gulf slope to southern Texas and near the Pacific coast and the warm western flank of the Sierra Madre to southeastern Arizona. A review of accumulated material indicates that the coatis of Mexico are assignable to six closely allied, but fairly well marked, geographic races. Three of these inhabit sections along the Atlantic side and three are restricted to the Pacific slope of the continent.

In the coatis of this group, the color pattern is nearly uniform, but individual variation in the ground color may extend from very dark brown to light buffy tones. Those inhabiting extremely humid regions are generally darker than those living in drier areas. *Nasua narica narica* ranges over the lowlands and lower mountain slopes in Vera Cruz, Tabasco, northern Oaxaca, and northern Chiapas. Most of its habitat is subjected to heavy rainfall, and cloud forests along the mountain slopes are included. As might be expected, it is characterized by dark coloration. The skull is of medium size, with retreating frontal profile, widely spreading zygomata, and light dentition. *Nasua narica yucatanica* inhabits the low, flat peninsula of Yucatan, comprising the states of Yucatan, Campeche, the Territory of Quintana Roo, northern Guatemala, and probably northern British Honduras. It is paler than typical *narica*, and the skull is usually narrower, with decidedly narrower zygomata. *Nasua narica molaris* is widely distributed from Jalisco south through Colima, Michoacan, Guerrero, Morelos, and adjoining parts of the states of Mexico and Puebla to southwestern

Oaxaca. It is the largest of the Mexican races and moderately dark in color, some specimens resembling those of typical *narica*; but the skull differs notably in the more swollen and convex frontal region and much heavier dentition. *Nasua narica pallida* is the coati of the lower western slopes of the Sierra Madre from Sinaloa north to southeastern Arizona. This race is smaller and usually paler than *molaris*, to which it is closely allied. The following descriptions of two subspecies, hitherto unrecognized, brings the total number of Mexican forms to six, as already mentioned.

***Nasua narica tamaulipensis*, subsp. nov.**

TAMAULIPAS COATI.

*Type*.—From Cerro de la Silla, near Monterrey, Nuevo Leon, Mexico (altitude 2,600 feet). No. 116754, young ♂, with first permanent molars in place, skin and skull, U. S. National Museum (Biological Survey collection); collected by E. W. Nelson and E. A. Goldman, March 28, 1902. Original number 14974.

*Distribution*.—Warmer, low mountain slopes and other forested parts of Coahuila, Nuevo Leon, and Tamaulipas; rarely along the Rio Grande Valley from Brownsville west to near the Big Bend above the mouth of the Pecos River in Texas.

*General characters*.—Size medium; colors pale; skull with low, somewhat flattened, instead of distinctly convex, frontal region; dentition rather light. Very similar in general to *Nasua narica narica* of Vera Cruz, but color paler; dentition heavier. Differs from *Nasua narica pallida* of the lower western slopes of the Sierra Madre of Chihuahua and Sonora mainly in cranial details, especially the less swollen frontal region.

*Color*.—*Type* (March, unworn pelage): Ground color of upper parts near "wood brown, Ridgway, 1912," the hairs along the median line of back with a dark brown subapical band, giving way to "cinnamon-buff" tips which thin out on the rump; top of head and neck "cinnamon"; sides of neck and edges of ears white; outer sides of forearms overcast with dull white; throat, chest, inner sides of forearms, and narrow median line of under parts to base of tail dull whitish, becoming "wood brown" abruptly along sides of abdomen; white facial markings as in allied subspecies; feet "Hay's brown"; tail near "cinnamon"; slightly darker toward tip, the white and dark annulations very faintly discernible. A nearly full grown male from Soto la Marina, Tamaulipas, and an adult female from Brownsville, Texas, are still paler, the upper parts mainly "cinnamon buff" in color.

*Skull*.—Similar in size and general form, including the retreating frontal profile, to that of *narica*, but dentition heavier. Comparison with *pallida*: Size similar; braincase and rostrum lower; frontal profile straighter, and somewhat flatter, less swollen and convex; dentition similar.

*Measurements*.—*Type*: Total length, 850 mm.; tail vertebrae, 420; hind foot, 110. A nearly full grown male from Soto la Marina, Tamaulipas: 1050; tail vertebrae, 515; hind foot, 112. *Skull* (type and a nearly full grown male from Soto la Marina, Tamaulipas, respectively): Greatest length, 107.2, 129; condylobasal length, 100.8, 124.3; zygomatic breadth,

50.8, 65.2; height of cranium (from palatal shelf to median point over postorbital processes), 31.3, 35.7; depth of rostrum (behind canines), 15, 17.9; interorbital breadth, 20.8, 25.4; maxillary tooth row (alveoli), —, 48.5; upper carnassial, crown length, —, 7.8, crown width, —, 7.8. An adult female from Brownsville, Texas; Zygomatic breadth, 65.1; height of cranium (from palatal shelf to median point over postorbital processes), 35.5; depth of rostrum (behind canines), 15.1; interorbital breadth, 27; maxillary tooth row (alveoli), 44.7; upper carnassial, crown length, 8.1, crown width, 7.9.

*Remarks.*—*N. n. tamaulipensis* intergrades on the south with typical *narica*, the only form with which close comparison is required. It is based on few specimens, but field observations indicate that this coati is not uncommon locally in the more extensively wooded sections south of the Mexican border, throughout Tamaulipas and suitable parts of the adjoining states on the west. Stanley P. Young reports its occurrence as far north and west as the foothills of the Carmen Mountains in Coahuila, just south of the Big Bend of the Rio Grande. According to Taber (*Jour. Mamm.*, vol. 21, p. 11, February 14, 1940), a specimen was captured some 20 miles below Boquillas in the Dead Horse Mountains on the Texas side of the Rio Grande, in the same general region, about January 10, 1939. Bailey (*North Amer. Fauna No. 25*, p. 192, October 24, 1905), referred to *Nasua narica yucatanica* a specimen collected at Brownsville, Texas, by J. C. Merrill in 1877. J. A. Allen, the describer of *yucatanica*, was given as authority for the identification, and the suggestion was made that the specimen might have been an imported animal that escaped from captivity. It is now obvious that the identification was erroneous, and there is no reason for assuming that the Brownsville specimen was not native.

*Specimens examined.*—Total number, 6, as follows:

Nuevo Leon: Cerro de la Silla, 1 (type); Monterrey, 1 (skull only).

Tamaulipas: Ciudad Victoria, 2 (skulls only); Soto la Marina, 1.

Texas: Brownsville, 1.

### *Nasua narica isthmica*, subsp. nov.

#### TEHUANTEPEC COATI.

*Type.*—From Santa Efigenia, an hacienda about eight miles northwest of Tapanatepec, southeastern Oaxaca, Mexico (altitude 1,200 feet). No. 74681, ♂ adult, skin and skull, U. S. National Museum (Biological Survey collection); collected by E. W. Nelson and E. A. Goldman, July 29, 1895. Original number 8246.

*Distribution.*—Southern Oaxaca and southeastward along the Pacific coast to Salvador.

*General characters.*—A medium-sized, light-colored subspecies; dentition rather heavy. Similar in general to *Nasua narica narica* of Vera Cruz and *Nasua narica yucatanica* of Yucatan, but larger and paler; skull larger and differs in detail. Similar in size to *Nasua narica molaris* of Colima, but color paler; skull narrower. Differs from *Nasua narica richmondi* of Nicaragua mainly in much paler coloration.

*Color.*—*Type* (worn pelage): Upper parts in general a mixture of "pinkish buff" or "cinnamon-buff," brown, and dull whitish, the whitish tips of hairs over dorsum producing a coarsely grizzled pattern; under color over dorsum near "pinkish buff"; top of head clearer "cinnamon-buff"; sides of neck and upper part of forearms pale "pinkish buff"; ears edged with white; white and dusky facial markings, as usual in the group, the white line uninterrupted over eye; under parts in general "wood brown," thinly overlaid with white; chin whitish; feet brownish black; tail much worn, "cinnamon-buff," with rings faintly indicated.

*Skull.*—Most closely resembling that of *molaris*, but narrower; zygomata decidedly narrower; frontal region less swollen and convex, sloping downward more directly to rostrum; dentition less heavy. Comparison with typical *narica*: Skull larger, more elongated; zygomata less widely spreading; dentition heavier. Comparison with *yucatanica*: Skull decidedly larger; zygomata similarly narrow; dentition much heavier. Comparison with *richmondi*: Similar in size and spread of zygomata, but lambdoid crest less prominent than in the type; dentition heavier.

*Measurements.*—*Type*: Total length, 1,194 mm.; tail vertebrae, 588; hind foot, 113. *Skull* (type and an adult male from Tehuantepec, respectively): Greatest length, 136.2, 133.2; condylobasal length, 128.7, 128.9; zygomatic breadth, 72.1, 74.6; height of cranium (from palatal shelf to median point over postorbital processes), 39.5, 39.9; depth of rostrum (behind canines), 20, 20; interorbital breadth, 26.9, 27.3; maxillary tooth row (alveoli), 52.5, 50.8; upper carnassial, crown length, 8.3, 7.6; crown width, 7.7, 7.6.

*Remarks.*—*N. n. isthmica* is based on very limited material presenting a combination of detailed characters that seems to warrant the segregation of a regional race. In size and rather heavy dentition it approaches *N. n. molaris*, but in the narrowness of the zygomata and slight swelling of the frontal region, relationship to *N. n. yucatanica* is suggested. No close comparison with the larger race *Nasua narica bullata* of Costa Rica seems necessary. A young female from Lagoon of Ilopango, Salvador, is small, but is tentatively referred to *isthmica* owing to similarity in pale coloration.

*Specimens examined.*—Total number, 6, as follows:

Oaxaca: Guichicovi, 2; Santa Efigenia (type locality), 1; Tehuantepec, 2 (skulls only). Salvador: Lagoon of Ilopango, 1.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

## A NEW SPECIES OF SPHACELOMA ON POINSETTIA.

BY ANNA E. JENKINS,

*Bureau of Plant Industry, Washington, D. C., and*

GEORGE D. RUEHLE,

*Sub-tropical Experiment Station, Homestead, Fla.*

A taxonomic study of the *Sphaceloma* recently discovered on Poinsettia in Florida<sup>1</sup> and Honolulu<sup>2</sup> has shown that this is apparently a distinct species. A technical description therefore is provided as follows:

***Sphaceloma poinsettiae*, n. sp.**

Spots on foliage often limited to nerves and leaf margins; on nerves raised, pale buff at the center surrounded by a purple, occasionally nearly black, margin, up to at least 4 x 2 mm., on leaves, circular, usually raised below and concave above, pale buff to "liver brown"<sup>3</sup> reaching 3 mm. in diam., on leaf margins more or less hemispherical, causing an inrolling of the leaf; cankers on stems often numerous, circular to elliptical or elongate, raised, sometimes becoming depressed at the center, bright colored, often "pinkish buff,"<sup>3</sup> the margin sometimes of a deeper hue, sometimes purple, area around the canker not discolored, or red or purple, 1 mm. to 1 cm. or more in length, by 1 mm. to at least 8 mm. wide, by confluence cankers occupying greater or less areas of the stem, this sometimes becoming swollen where encircling the stem, killing the part above. Conidial stage not noticeable on the spots or forming a more or less gray to "olive-brown"<sup>3</sup> covering over them; hyphae hyaline to pale yellow, forming a more or less loose stroma, mingled with remnants of host tissue, conidiophores arising from the stroma, forming a more or less continuous compact layer, or small isolated groups, straight or bent, pointed at the apex, usually continuous or 1-septate, pale to brown, reaching 15-30 $\mu$  in length by 3-5 $\mu$  broad,

<sup>1</sup> Ruehle, G. D. Poinsettia scab caused by *Sphaceloma*. *Phytopathology* 31: 947-948. 1941.

<sup>2</sup> Jenkins, A. E. Poinsettia scab discovered in Honolulu. *Phytopathology* 32: 336-337. 1942.

<sup>3</sup> Ridgway, R. Color standards and color nomenclature. 45 p., 42 pl. Washington, D. C. 1912.

conidia elliptical to oblong, occasionally cylindrical or spherical with 1-2, rarely 3 cells, often constricted at the septum, 7-20 $\mu$  long by 2.5-5.3 $\mu$  broad, pale or sometimes as dark as the conidiophores.

Maculae in foliis saepe ad nervos marginesve limitatae, in nervis elevatae, centro pallide luteae margine purpureo, interdum fere nigro cinctae, usque admodum 4 x 2 mm., in lamina circulares vulgo inferne elevatae et superne depressae, pallide luteae vel hepaticae, 3 mm. in diam., in margine subhemisphaericales, folium involventes; cancri in caulibus saepe numerosi, circulares, elliptici vel elongati, elevati, interdum centro depressi, laete colorati, margine interdum purpureo, area cancrum circumdantia non decolorata vel rubro vel purpurea, 1 mm.-1 cm. vel magis longae, 1 mm. usque admodum 8 mm. lati, quando confluentes partem majorem caulis occupantes, interdum caulem tumefacientes vel caulem cingentes et superne necantes. Status conidicus in maculis inconspicuus vel tectum plus minusve continuum griseum vel olivaceum formans; hyphae hyalinae vel pallide flavidulae, stroma laxum textura metricis intermixtum sub superficiem formantes; conidiophora stratum compactum plus minusve continuum formantia vel in caespitibus isolatis, recta curvatave, acuminata, continua vel septata, pallida vel brunnea, usque 15-30 $\mu$  longa, 3-5 $\mu$  lata; conidia elliptica vel oblonga, interdum cylindrica vel spherica, 1-2-(rare 3-) cellularia, ad septum saepe constricta, 7-20 $\mu$  longa, 2.5-5.3 $\mu$  lata, pallida vel brunnea ut in conidiophoris.

*Distribution.*—Producing the disease termed "poinsettia scab" on leaves and stems of *Euphorbia pulcherrima* Wild. var. *plenissima* Hort. in Florida and Hawaii. This horticultural variety was highly susceptible both in Florida and Honolulu, although in Florida a certain strain appeared to be resistant. In that State mild infection was observed in one instance on *E. poinsettia*, but none on the horticultural variety *albida*.<sup>4</sup>

*Specimens examined:*

Dade Co., Fla., Goulds, July, 1940, and December 9, 1941 (type), and Redlands, December 15, 1940, G. D. Ruehle.<sup>5</sup>

Honolulu, T. H. November, 1939, E. C. Zimmerman, comm. E. A. Bessey.

---

<sup>4</sup> The history of the discovery and introduction of *Euphorbia pulcherrima* and the two varieties named is assembled in the following article: [P. A. Kolb] The poinsettia. Mo. Bot. Gard. Bull. 13: 143-148. 1925.

<sup>5</sup> Poinsettia scab was troublesome in a nursery in Miami several years prior to the dates just given. This was learned by the junior author in a recent conversation with the nurseryman.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



A NEW TANAGER FROM VENEZUELA.

BY HERBERT FRIEDMANN.<sup>1</sup>

A study of a good series of specimens of the Orange-headed Tanager, *Thlypopsis sordida*, reveals that the birds of the middle Orinoco Valley are different from those inhabiting Brazil, eastern Ecuador and eastern Peru, and Bolivia.

Hellmayr (Cat. Birds Amer., pt. ix, 1936, p. 388) notes that birds "... from various parts of Brazil appear to be inseparable from a typical Bolivian series (of *sordida*). I am, however, not quite so certain that those from the Orinoco basin are exactly the same. The few specimens, mostly in rather worn plumage, that we have been able to examine are on an average smaller and less whitish in the middle of the abdomen, but their unsatisfactory condition makes them unfit for definite decision. At all events, Venezuelan birds are, however, not referable to *T. s. amazonum*." To these notes, I may add the testimony of additional specimens which fully corroborate the small size of these northern birds and also reveal a difference in the dorsal coloration. Brazilian birds (other than from the range of *chrysoptis*, of which *amazonum* is a synonym) agree with Bolivian birds and are, therefore, typical *sordida*. The Venezuelan form may be known as

***Thlypopsis sordida orinocensis*, subsp. nov.**

*Type*: U. S. Nat. Mus. 316,653, ad. ♂, collected at Isla Orocopiche, near Soledad, Orinoco River, Venezuela, December 1, 1929, by Ernest G. Holt.

*Characters*.—Similar to *T. s. sordida*, but with the upperparts purer gray, less olivaceous, the general tone deep grayish olive as opposed to dark citrine in the nominate form; and slightly smaller (wings in males, 67-68 mm. as opposed to 70-71 mm. in *sordida*).

*Range*.—The middle Orinoco Valley; Isla Orocopiche, Soledad, El Fraile, and Capuchin.

The range of the nominate form as now restricted is as follows: eastern Bolivia and northern Argentina, north and east through Matto Grosso to Goyáz, Minas Geraes, and Rio de Janeiro, to Ceará, Piauhy, and Maranhão.

<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution.

The race *chrysopsis*, in which the males are much more grayish, less buffy, on the sides and breast than in either of the other two subspecies, is confined to eastern Peru and eastern Ecuador and upper Amazonia east to the Rio Madeira and the Rio Machados, in western Brazil. It therefore cuts off *orinocensis* from *sordida*, but a wide gap in the range still exists between these west Brazilian birds and their Venezuelan representatives.

*Specimens examined.*—*T. s. sordida*: Bolivia 4, Brazil (Matto Grosso and Bahia) 6; *T. s. orinocensis*—Venezuela 5; *T. s. chrysopsis*—Ecuador 4. For the loan of part of this comparative material, I am indebted to Mr. J. T. Zimmer of the American Museum of Natural History.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



THREE NEW RODENTS FROM SOUTHERN UTAH.

BY ROSS HARDY,

*Dixie Junior College, Saint George, Utah.*

Field work in southern Utah during the last three years has revealed the presence of three previously unrecognized rodents of the genera *Tamiasciurus* and *Dipodomys*. Descriptions for these races are provided below. The capitalized color terms in this paper are after those used by Ridgway, Color Standards and Color Nomenclature, 1912. The type specimens have been placed in the Museum of Zoology of the University of Utah and some paratypes in the Museum of Zoology of the University of Michigan.

My thanks are given to H. H. T. Jackson, Biological Survey collections; E. Raymond Hall, Museum of Vertebrate Zoology, University of California; S. D. Durrant, Museum of Zoology, University of Utah; and Emmet T. Hooper, Museum of Zoology, University of Michigan, for the use of comparative materials. I wish also to express my appreciation to W. H. Burt, University of Michigan, for suggestions which were of aid in the preparation of this paper.

***Tamiasciurus fremonti dixiensis*, new subspecies.**

DIXIE CHICKAREE.

*Type*.—Male, adult, skin with skull; Museum of Zoology, University of Utah, no. 4,374; about 9,500 feet, near Further Water, Dixie National Forest, Pine Valley Mountains, Washington County, Utah; August 23, 1941; collected by Orlo Hall and Ross Hardy; original no. 2,223.

*Distribution*.—Known from the spruce belt of the Pine Valley Mountains, the Markagunt Plateau and the Beaver Mountains (also known as Tushar Mountains) of southwestern Utah.

*Diagnostic characters*.—Size large for the species; dark, with much black and comparatively little yellow in either summer or winter pelage; hind foot, nasals, and maxillary tooth row long.

*Measurements (in mm.)*: Type: total length, 339; tail vertebrae, 131;

hind foot, 53; ear from notch, 28. Skull: basal length, 44.0; palatilar length, 22.4; zygomatic breadth, 27.2; cranial breadth, 20.6; interorbital breadth, 15.5; breadth at postorbital constriction, 14.7; nasal length, 16.0; maxillary tooth row, 8.4; diastema, 11.9; width of palate between second and third molars, 6.5; length of line of union of maxilla and premaxilla on the dorsal surface, 3.1

In this form, the hind foot, six males, 53.3 (52-55), and other body measurements are about the same as in *mogollonensis*, three males, 54 (53-55), thus averaging larger than in *fremonti*, three males, 49.9 (47-52). The palatilar length of four specimens, 22.5 (21.4-23.2), is less than in three *mogollonensis*, 23.6 (23.5-23.7), averaging about the same as in three *fremonti*, 22.7 (22.3-23.2). The nasals, 16.3 (16.0-16.7), average longer than in *mogollonensis*, 15.2 (15.0-15.4), or *frenonti*, 15.6 (15.0-16.6); also the maxillary tooth row, 8.4 (8.3-8.4), averages longer than in *mogollonensis*, 8.1 (8.0-8.3), or in *fremonti*, 8.0 (7.8-8.5). The length of the line of union of the maxilla and premaxilla on the dorsal surface of the skull averages longer in this form: 3.2 (3.0-3.3); *mogollonensis*, 2.9 (2.6-3.3); *fremonti*, 2.5 (2.0-3.3).

Two female topotypes of *dixiensis* measured: hind foot, 50.5 (49-52); palatilar length, 22.0 (21.3-22.7); nasal length, 16.1 (15.5-16.6); maxillary tooth row, 8.25 (8.2-8.3); line of union of maxilla and premaxilla on dorsal surface, 3.2 (2.8-3.6).

In addition to the above, the average and extreme measurements of topotypes are: Skin, 6 males and 1 female, respectively: total length, 335.6 (298-340), 330.0; tail vertebrae, 130.0 (117-138), 130.0; ear from notch, 26.3 (22-28), 27. Skull, 4 males and 2 females, respectively: basal length, 43.9 (43.3-44.3), 43.1 (42.9-43.3); zygomatic breadth, 27.3 (27.0-27.8), 26.95 (26.9-27.0); greatest breadth of cranium, 20.7 (20.6-21.0), 20.6 (20.3-20.9); interorbital breadth, 15.8 (15.5-16.0), 15.2 (15.0-15.4); postorbital breadth, 15.3 (14.7-15.5), 14.75 (14.7-14.8); diastema, 12.3 (11.9-12.7), 12.3 (12.2-12.4); width of palate between second and third molars, 6.7 (6.5-6.9), 6.75 (6.7-6.8).

*Comparisons of pelages.*—From Colorado specimens of *T. f. fremonti*, in comparable summer pelage, this form differs in being much more blackish except on the dorsal surface of the legs and feet. This appearance is caused by the narrower and paler yellowish band and the wider black band on each hair as shown by microscopic examination. The light band is near Isabella Color instead of Ochraceous-Tawny. The top of the head is much more nearly black. The subterminal band on the lateral and end hairs of the tail has more deep black and less brownish-black than in *fremonti*.

From San Francisco Mountain, Arizona, summer pelage specimens of *mogollonensis*, this form differs even more than from typical *fremonti*. *Dixiensis* is darker, for the Cinnamon-Rufous band is replaced by a narrower band of Isabella Color, thus leaving the larger amount of black to dominate the pelage tone.

In winter pelage, *dixiensis* differs from both adjoining races in the

replacement of the yellowish bands by gray, thus producing a grizzled appearance more pronounced than in either of the other races.

*Remarks.*—Specimens from the Markagunt Plateau and the Beaver Mountains are not typical, but tend towards *fremonti* in a few size and color characteristics. Inasmuch as adults are closer to *dixiensis*, they are placed with this race. One male from 6,500 feet, at Vermillion Castle Forest Campground, Dixie National Forest, Iron County, is much more nearly typical *dixiensis* than are other specimens from the Markagunt Plateau. The Beaver Mountains population, as would be expected from its geographic position, grades toward *fremonti* more than do the other populations.

Typical *dixiensis* in the Pine Valley Mountains seems to be much more shy than usual for this species. Instead of chattering and scolding the human intruder as the chickaree commonly does in other parts of Utah, these squirrels hide and remain quiet upon one's approach, making collection rather difficult. Many piles of spruce cone chips suggest a fairly good population in the Pine Valley range.

*Specimens examined.*—UTAH. Total number: 24, as follows: *Washington Co.*:—from an altitude of over 9,500 feet, near Further Water, Dixie National Forest, Pine Valley Mountains, 8. *Iron Co.*: Parowan Canyon, Vermillion Castle Forest Campground, Dixie National Forest, 6,500 feet, 1. *Kane Co.*: near Navajo Lake, Dixie National Forest, about 10,000 feet, 7; near Duck Creek Forest Campground, Dixie National Forest, about 9,500 feet, 2. *Beaver Co.*: near Puffer Lake, Fishlake National Forest, about 10,500 feet, 6.

#### ***Dipodomys microps woodburyi*, new subspecies.**

WOODBURY KANGAROO-RAT.

*Type.*—Male, adult, skin with skull; Museum of Zoology, University of Utah, no. 4,376; about 3,500 feet, in *Clistoyucca* area on Beaverdam Slope west of Beaverdam Mountains, Washington County, Utah; altitude 3,300 feet; October 19, 1940; collected by Ross Hardy; original no. 2,169.

*Distribution.*—Known only from the west slope of the Beaverdam Mountains in Washington County, Utah.

*Diagnostic characters.*—Size large for the species, being close to *celsus* in this respect; tail long; a light-colored form with paler and less extensive dark markings than the nearby dark-colored races of southern Utah.

*Measurements (in mm.)*—Type: total length, 302; tail vertebrae, 177; hind foot, 43; ear from notch, 14. Skull: basal length, 27.5; length of nasals, 13.4; greatest breadth, 24.3; maxillary breadth, 19.4; interorbital breadth, 12.5; maxillary tooth row, 4.9.

Average and extreme measurements of 5 male and 3 female topotypes are, respectively: total length, 289.4 (278–302), 286.5 (284–289); tail vertebrae, 169.0 (164–177), 169.0 (167–171); hind foot, 44.0 (43–46), 43.6 (41–45); ear from notch, 14.8 (14–17), 14.7 (14–15). Skull: basal length, 27.6 (26.9–28.9), 27.8 (26.9–28.4); length of nasals, 13.8 (13.3–14.4), 13.1 (12.7–13.5); greatest breadth, 24.2 (23.5–25.4), 24.1 (23.6–25.0);

maxillary breadth, 20.1 (19.4–21.3), 20.7 (20.0–21.5); interorbital breadth, 12.3 (11.6–12.6), 12.4 (12.0–12.8); maxillary tooth row, 5.0 (4.8–5.5), 4.9 (4.6–5.2).

*Description of pelage.*—Color of type: Upperparts Fawn and Buffy Brown mixed with blackish. The Dark Gull Gray base of the hair on the upperparts has a terminal (on some hairs, subterminal) band of Light Vinaceous-Cinnamon, this latter color being clearer on the sides. Some hairs are black tipped. Underparts, hip stripe, lateral tail stripes, small supra-ocular spots, postauricular spots, fore limbs and dorsal surface of hind feet, and tail at extreme base all around, pure white.

*Comparisons:* *D. m. woodburyi* differs from *celsus* in lighter coloration, the underfur being Dark Gull Gray instead of Deep Neutral Gray; brownish-gray instead of black dorsal and ventral tail stripes, soles of hind feet, and dark hairs on the ears; and longer average tail. The skulls of the two races are much the same although that of *woodburyi* is slightly smaller throughout. The upperparts of immature individuals, immediately before receiving the first adult pelage, present a general tone of Pale Mouse Gray instead of Deep Mouse Gray as in *celsus*. Differs from *leucotis* chiefly in lighter coloration and slightly larger size, being midway between *celsus* and *leucotis* in skull and external measurements. The length of the hind foot of *woodburyi* averages greater than in *leucotis*.

*D. m. woodburyi* is similar to *bonnevillei* in color but differs in larger size, longer tail, longer nasals, and narrower tips of upper incisors. Differs from *centralis* in larger size, longer hind foot, larger skull with longer nasals, and slightly lighter coloration. Some specimens of *centralis* from Penoyer Valley, Lincoln County, Nevada, approach *woodburyi* in color, but most specimens of *centralis* are darker. From *occidentalis*, *woodburyi* differs in larger size, longer hind foot, larger skull, and longer nasals. The two races are similar in color.

*Remarks.*—Most likely the Beaverdam Mountains have served to isolate the race *woodburyi* on the light-colored soils to the west and prevent mixing with the dark-colored animals on the red and black soils to the east. These mountains have served to prevent the spread of the Joshua tree (*Clis-toyucca brevifolia*), and the desert tortoise (*Gopherus agassizi*) both of which are found on the west, but not on the east side, although they easily survive when moved over the range. Also, this mountain range separates *Neotoma l. lepida* on the west from *N. l. monstrabilis* on the east.

For many reasons, not the least of which is his extensive work on the biology of southern Utah, it is a pleasure to name this race for Prof. A. M. Woodbury of the Zoology Department of the University of Utah.

*Specimens examined.*—14, all from the type locality.

#### ***Dipodomys ordii panguitchensis*, new subspecies.**

PANGUITCH KANGAROO-RAT.

*Type.*—Male, adult, skin with skull; Museum of Zoology, University of Utah, no. 4,375; one mile south of Panguitch, Garfield County, Utah; altitude 6,666 feet; August 31, 1940; collected by Ross Hardy; original no. 2,151.

*Distribution.*—Known only from the sagebrush and lava areas near Panguitch, Garfield County, Utah.

*Diagnostic characters.*—A race closely allied to *Dipodomys ordii columbianus* but slightly larger in size and with skull somewhat wider in proportion to length. This form can be most readily separated from other races of this species on the basis of its dark coloration.

*Measurements (in mm.).*—Type: total length, 257; tail vertebrae, 145; hind foot, 41; ear from notch, 14. Skull: basal length, 25.2; length of nasals, 13.4; greatest breadth, 23.0; maxillary breadth, 20.0; interorbital breadth, 12.3; maxillary tooth row, 4.7.

The average and extreme measurements of 2 male and 2 female topotypes are, respectively: total length, 254.5 (252–257), 241.5 (240–243); tail vertebrae, 140 (135–145), 132.5 (132–133); hind foot, 40.5 (40–41), 38.5 (38–39); ear from notch, 14.5 (14–15), 14 (14–14). Skull: basal length, 25.2 (25.2–25.2), 25.15 (24.8–25.5); length of nasals, 13.5 (13.4–13.6), 12.95 (12.6–13.3); greatest breadth, 23.1 (23.0–23.2), 22.6 (22.0–23.2); maxillary breadth, 19.95 (19.9–20.0), 19.05 (18.6–19.5); interorbital breadth, 12.15 (12.0–12.3), 11.7 (11.6–11.8); maxillary tooth row 4.65 (4.6–4.7), 4.35 (4.2–4.5); diastema, 8.35 (8.3–8.4), 8.35 (8.3–8.4).

*Description of pelage.*—Color of type: General tone of upperparts near Olive-Brown mixed with blackish; cover hairs with subterminal band of Light Pinkish Cinnamon, tipped with black; Light Pinkish Cinnamon clearer on the sides; dorsal hair pure Slate-Gray at base; dorsal and ventral black stripes on tail wider than lateral white markings and extend to end of tail; soles of hind feet and heel blackish; remaining underparts white; anterior portion of white hip stripe narrow; extensive arietiform markings of face, skin and most of hair on posterior half of ears, black.

*Comparisons.*—From near topotypes of *columbianus*, this race differs in greater body length, slightly longer hind foot, and slightly shorter and wider skull. The interparietal bone is shorter, wider anteriorly and more nearly pointed posteriorly, resembling *celeripes* in this respect. Differs from *celeripes* in larger size, longer tail, and, on the average, shorter and narrower skull with greater interorbital width. Differs from *cupidineus* in shorter, narrower skull and shorter diastema. The interparietal bone is larger and less pointed posteriorly in *panguitchensis* than in Arizona and southern Utah specimens of *cupidineus*. Differs from *fetusus* in larger size, longer tail, slightly smaller foot, smaller skull with greater interorbital breadth, and narrower across bullae.

From the four above named races, *panguitchensis* differs in its much darker pelage, with vibrissae, arietiform markings, skin and hair of ears, and soles of feet all more nearly black. The white markings are less extensive throughout.

*Specimens examined.*—Four, all from the type locality.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW GRASSES FROM FLORIDA AND TEXAS.

BY JASON R. SWALLEN



The species described below include a new *Panicum* collected by W. A. Silveus at Bonita Springs, Florida, and a new *Paspalum* collected by Gerald O. Mott near Port Lavaca, Texas.

***Panicum pinetorum* Swallen, sp. nov.**

Culmi 55-65 cm. alti, graciles, glabri; vaginae internodiis breviores, glabrae vel infimae appresso-pilosae; ligula 0.2-0.5 mm. longa, dense ciliata; laminae 6-9 cm. longae, 2-3 mm. latae, planae vel involutae, glabrae; paniculae 7-9 cm. longae, 2-3 cm. latae, ramis adscendentibus usque ad 3 cm. longis; spiculae 2.3-2.5 mm. longae, acutae, pubescentes; gluma prima 0.7-1 mm. longa, subobtusata, glabra; lemma fertile 1.6-1.7 mm. longum, suborbiculatum vel obovatum, glabrum, lucidum; culmi autumnales erecti vel decumbentes, ramosissimi, laminis involutis non reductis, paniculis parvis, paucifloris, 1 cm. longis, inter folia occultis.

Vernal culms 55 to 65 cm. tall, slender, erect, glabrous; sheaths shorter than the internodes, glabrous or the lowermost appressed pilose; ligule densely ciliate, 0.2 to 0.5 mm. long; blades 6 to 9 cm. long, 2 to 3 mm. wide, flat or soon becoming involute in drying, glabrous; panicles 7 to 9 cm. long, 2 to 3 cm. wide, the branches ascending, not more than 3 cm. long, usually less; spikelets 2.3 to 2.5 mm. long, the second glume and sterile lemma pointed beyond the fruit, pubescent; first glume 0.7 to 1 mm. long, subobtusate, glabrous; fruit 1.6 to 1.7 mm. long, suborbiculate or slightly obovate, smooth and shining; autumnal phase erect or top-heavy reclining, freely branching, the blades involute, not much reduced, the panicles small, few-flowered, about 1 cm. long, partly included in the sheath, obscured by the foliage.

Type in the herbarium of the U. S. National Arboretum no. 145,101 collected in open pine woods near Bonita Springs, Florida, October 14, 1940, by W. A. Silveus (no. 6604).

This species suggests *Panicum fusiforme* Hitchc. in having the second glume and sterile lemma pointed well beyond the fruit. The spikelets in *P. fusiforme*, however, are much larger, 3-3.5 mm. long, more attenuate at the base, and the fruit is 2.5 mm. long. The panicle is also wider and more open with widely spreading branches.

JUL 1

***Paspalum texanum* Swallen, sp. nov.**

Culmi 70–110 cm. alti, erecti, glabri, rhizomatosi; vaginae elongatae internodiis multo longiores, glabrae vel papilloso-hirsutae, vagina suprema efoliata; ligula 2–4 mm. longa, membranacea, fusca; laminae elongatae usque ad 50 cm. longae, 2–6 mm. latae, planae, papillosae vel papilloso-hirsutae; racemi 4–6, 6–9 cm. longi adscendentes vel appressi; rachis 1–1.5 mm. lata; spiculae binae, 2.4–2.7 mm. longae, 1.4–1.6 mm. latae, glabrae; gluma secunda et lemma sterile rugosum tenuia, fusca; lemma fertile 2.3–2.4 mm. longum, fuscum, minute striato-scabrum.

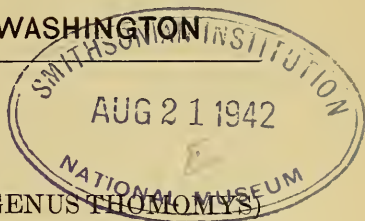
Culms 70 to 110 cm. tall, erect from long relatively strong rhizomes, glabrous; sheaths elongate, much longer than the internodes, glabrous or papillose-hirsute toward the summit and on the collar, flattened and keeled at least toward the summit, the uppermost one bladeless, nearly reaching the base of the inflorescence; ligule brown, membranaceous, 2 to 4 mm. long; blades elongate, as much as 50 cm. long, 2 to 6 mm. wide, flat, papillose or papillose-hirsute on both surfaces, especially near the base, with no tuft of long hairs back of the ligule; racemes 4 to 6, 6 to 9 cm. long, ascending or appressed, the common axis 6 to 13 cm. long, hairy in the axils; rachis 1 to 1.5 mm. wide, straight or sometimes flexuous; spikelets usually paired, 2.4 to 2.7 mm. long, 1.4 to 1.6 mm. wide, oval or narrowly obovate, glabrous, the pedicels often as much as 2 mm. long; second glume and sterile lemma thin, brownish, covering the fruit or sometimes slightly pointed beyond it, the lemma usually cross wrinkled inside the margins; fruit 2.3 to 2.4 mm. long, chestnut brown at maturity, minutely scabrous in lines.

Type in the U. S. National Herbarium no. 1614874 collected on grassland seven miles north of Port Lavaca, Calhoun County, Texas, October 24, 1935, by Gerald O. Mott (no. 261).

*Paspalum texanum* belongs to the *Plicatula* group, related rather closely to *P. wrightii* Hitchc. & Chase of the West Indies. The latter is stouter, much more succulent, and rhizomes are not evident in available material. The racemes are closer together on the axis, on the average longer and more numerous, with the rachis about 2 mm. wide. The ligule is only 1 mm. long with the blades bearing a tuft of long hairs just back of the ligule. In addition to the type, this species has also been found at College Port, Matagorda County (Tharp 7272), and near La Ward, Jackson County (Muñoz 1209).



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



THREE NEW POCKET GOPHERS (GENUS *THOMOMYS*)  
FROM WESTERN WASHINGTON.

BY WALTER W. DALQUEST AND VICTOR B. SCHEFFER,

*Museum of Vertebrate Zoology, University of California, Berkeley, and U. S.  
Fish and Wildlife Service, Seattle, Washington.*

Preliminary to a report on the immigrational history, variation and relationships of the pocket gophers of the State of Washington, it is desirable to provide names and diagnoses for three new subspecies of *Thomomys talpoides* from the Puget Sound area.

The first subspecies of pocket gopher to be made known from the Puget Sound area was *Thomomys douglasi* [sic] *yelmensis*, described by Merriam in 1899. In 1919 Taylor described *Thomomys douglasii tacomensis*, and pointed out that the isolated populations of pocket gophers around Puget Sound differed from one another. Taylor considered the subspecies *douglasii*, which occurs along the Columbia River, to represent one of these variants. Our studies indicate that *douglasii* originated through about the same process as the kinds of gophers around Puget Sound, but from another stock and in a different area. In 1939, Goldman named a third race, *Thomomys talpoides couchi*, from the Puget Sound area.

These three kinds, subspecies of the wide ranging *Thomomys talpoides*, plus the three here newly named, make a total of six races for the Puget Sound area. The presence of so many subspecies of mammals in such a small area deserves an explanation.

Pocket gophers, early in Recent (Post-Vashon) times, seem to have migrated westward from Mount Rainier along the outwash trains of certain valley glaciers. These outwash trains connected with the extensive outwash aprons of the Puget Lobe of the Continental Vashon Glacier. Pocket gophers presumably multiplied, spread and occupied the entire area of outwash apron. The growth and spread of forests split this area into numerous isolated, grassy prairies. Upon nine of these prairies, gophers still exist. Probably the gophers had a continuous range on the area of outwash apron and we deduce: (1) this range was separated first by the Nisqually River into a northern and a southern part; (2) the

spread of forest in the Chehalis River Valley soon divided the southern part into eastern and western sections; (3) similarly, growth and spread of forest on a ridge of terminal moraine again divided the eastern section of the southern part into central and southernmost parts; (4) a little later, the area north of the Nisqually River was separated into eastern and western parts by invasion of forest. Continued invasion of the outwash prairies by forest has reduced the range suitable for pocket gophers. Largely as a result of this reduction, only nine isolated populations of pocket gophers, so far as known, remain in the Puget Sound area.

Gophers from two localities east of the Southern part of Puget Sound are referable to *couchi*, known to us from 48 specimens. Gophers from the western prairies of the area north of the Nisqually River are referable to *tacomensis*, of which we have 41 specimens. Gophers from the Southernmost area, of which we have 146 specimens from three localities, are referable to *yelmensis*. Gophers from two localities of the central area, and those from the eastern part of the northern area, differ from each other and from other named forms so markedly as to merit separate subspecific designation. The three may be named and described as follows:

***Thomomys talpoides tumuli*, new subspecies.**

*Type*.—Adult male, skin and skull, number 272034, U. S. National Museum (Biological Surveys Collection), collected 7 miles north of Tenino, Thurston County, Washington, by W. W. Dalquest, January 2, 1942; original number 2781.

*Range*.—Known only from Rocky Prairie, of about one square mile in extent, 7 miles north of Tenino, Thurston County, Washington.

*Diagnosis*.—Size large; color blackish brown with dusky areas on the neck, laterally, posterior to the postauricular patches; skull large, relatively long and narrow; zygomatic arches angular and moderately heavy.

*Comparison*.—Compared with *T. t. tacomensis*, *tumuli* is much duller—blackish brown rather than rich hazel in color. The underparts of *tumuli* are grayish buff in color, while those of *tacomensis* are pale orange. The blackish color and dusky neck patches distinguish *tumuli* from *yelmensis*. The small, red *couchi* could scarcely be confused with any other race of gophers occurring in the Puget Sound area (see table 1).

*Specimens examined*.—Total number 36, all from the type locality.

***Thomomys talpoides pugetensis*, new subspecies.**

*Type*.—Adult male, skin and skull, number 272032, U. S. National Museum (Biological Surveys Collection), collected 4 miles south of Olympia, Thurston County, Washington, by W. W. Dalquest, December 31, 1941; original number 2022.

*Range*.—Known only from prairies three to four miles south of Olympia, in Thurston County, Washington.

*Diagnosis*.—Size large; color much like that of *tumuli* but less grayish; dusky neck-patches present; tail and hind foot short; rostrum long.

*Comparison*.—This race is much like *tumuli*, from which it differs as follows: color yellower, less gray; skull shorter, relatively wider; rostrum longer; nasals wider; weight less (see table 1).

*Specimens examined*.—Total number 54, all from the type locality.

***Thomomys talpoides glacialis*, new subspecies.**

*Type*.—Adult male, skin and skull, number 272033, U. S. National Museum (Biological Surveys Collection), collected two miles south of Roy, Pierce County, Washington, by W. W. Dalquest, December 19, 1941; original number 2672.

*Range*.—Known only from the prairie, south of Roy, Pierce County, Washington. This prairie is about one square mile in area.

*Diagnosis*.—Size large; color of upper parts yellowish brown; underparts buffy tinged with ochraceous; skull large, wide and heavy; zygomatic arches flaring and angular; jugal especially heavy.

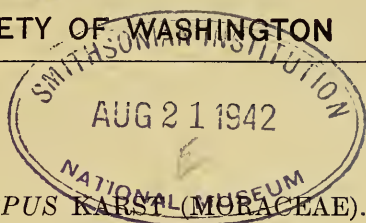
*Comparisons*.—In color of upper parts, *glacialis* is paler and more yellowish than *tacomensis*, *tumuli*, and *pugetensis*, and is slightly more brown than *yelmensis*. The underparts of *glacialis* are distinctly more ochraceous than those of *yelmensis*. The especially wide and flaring zygomatic arches are unlike those of any other race of gophers from the Puget Sound area (see table 1).

*Specimens examined*.—Total number 50, all from the type locality.

TABLE 1. AVERAGE MEASUREMENTS (MILLIMETERS) OF ADULT, MALE *Thomomys talpoides* FROM THE PUGET SOUND AREA.

Subspecies	Number of animals	Total length	Length of tail	Length of hind foot	Weight in grams	Condyl- obasal length	Length of rostrum	Zygo- matic breadth	Inter- orbital breadth	Width of rostrum	Width of nasals	
<i>glacialis</i> . . .	20	225	71.8	30.7	128	37.9	17.7	23.0	6.6	8.1	4.3	
<i>tacomensis</i> . .	13	224	70.5	30.9	127	37.5	17.0	21.9	6.5	8.1	4.5	
<i>pugentensis</i> . .	14	223	61.5	29.7	123	37.0	17.9	22.4	6.6	7.8	4.2	
<i>tumuli</i> . . . .	11	225	67.9	31.1	140	37.7	17.1	22.0	6.4	7.9	4.5	
<i>yelmensis</i> :												
Vail . . . .	12	216	61.7	30.4	126	36.2	17.6	21.3	6.8	8.0	4.2	
Tenino . . . .	21	213	63.9	28.9	121	36.8	17.6	21.7	6.5	7.7	4.3	
Rochester . . .	16	215	63.2	30.1	117	36.3	17.6	21.1	6.9	7.7	4.1	
<i>couchi</i> . . . .	13	196	54.9	27.2	87	34.5	16.4	20.3	6.2	7.3	4.0	

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



THE GENUS *BATOCARPUS* KARST. (MORACEAE).

BY F. R. FOSBERG,

*Division of Plant Exploration and Introduction, Bureau of Plant Industry,  
Washington, D. C.*

An attempt to place a Peruvian plant which seemed to go to *Anonocarpus* but did not fit the single known species *A. amazonicus* Ducke, directed attention to the related, but evidently never recollected genus *Batocarpus* Karst. The plant in question is an obvious match for Karsten's plate and description.

This raised questions as to the distinctness of these genera. A fair amount of material of *Anonocarpus amazonicus*, including duplicates, photographs and fragments of Ducke's specimens, and excellent material collected by B. A. Krukoff, is available. Only the Skutch collection and Karsten's plate of *Batocarpus orinocensis* are available, neither of which provide staminate inflorescences. Thus it is only possible to compare the plants vegetatively, in pistillate flower and fruit.

The differences evident are slight ones in leaf shape and pubescence, and a more important one in the opening of the perianth. In *Anonocarpus* the opening is a conspicuous slit, while in *Batocarpus* it is reduced to a hole just large enough for the exertion of the stigmas. This may, however, in fruit rarely become more or less distended. The fleshy truncate apex of the fruiting perianth is more expanded in *Batocarpus* than in *Anonocarpus*.

These differences are scarcely of generic importance, even in the Moraceae. I therefore propose combining them under the older name, *Batocarpus* Karst.

The relationship of this genus is clearly with *Sahagunia* Liebm., which is, itself, too poorly known. Both are members of the Artocarpoideae-Euartocarpeae of Engler's system. The more obvious distinctions are as follows: The staminate spikes are solitary in *Batocarpus* and in pedunculate clusters in *Sahagunia*, and the staminate flowers with a vestigial perianth in the former (at least in *B. amazonicus*), without it in *Sahagunia*. In *Batocarpus* the fruiting perianth becomes greatly thickened, fleshy and truncate above, forming a large Annonalike syncarp, while in *Sahagunia*

they are thin, *ovoid*, pointed at apex, forming an irregular cluster, united only at bases, with only part of the ovaries fertile. When the species of these two genera become better known, they may prove difficult to maintain as separate genera.

The fruits of both species of *Batocarpus* are said to be sweet and edible, while the latex, at least of *B. orinocensis*, is said to be used to mix with that of *Hevea* for rubber and possibly as a substitute for chicle.

A synopsis in English may be of some use, with the following brief description of the genus.

BATOCARPUS Karst. Fl. Columb. 2:67, Pl. 134, 1862.

*Anonocarpus* Ducke, Arch. Bot. Rio Jan. 3:38, 1922.

Lactiferous trees up to 30 m. tall, with entire chartaceous to coriaceous leaves; dioecious, staminate flowers with a minute 2-4 lobed perianth and one stamen, crowded on long cylindric, shortly pedunculate spikes superficially like those of *Piper*; pistillate inflorescence, a shortly pedunculate subglobose or ellipsoidal head, pistillate flowers with a tubular, truncate fleshy perianth, ovary superior, free from but enveloped in perianth, style short, stigmas 2, short, exserted, reflexed; fleshy; fruiting head enlarged, densely sericeous, Annona-like, the fleshy accrescent perianths closely crowded together on a fleshy receptacle, slightly coherent but not grown together; fruit with thin wall, persistent or subpersistent style and stigmas; seed with a very thin coat, no endosperm, and large fleshy-oily (hard when dry) cotyledons. The more obvious contrasting characters of the two species may be summarized:

Leaves narrowly oblong, caudate acuminate, glabrous beneath, veins numerous, not all of equal prominence, pistillate perianth with a very small orifice, stigma pubescent.—*B. orinocensis*.

Leaves oblong to obovate, shortly acuminate, tomentulose beneath, veins fewer, more or less equally prominent, pistillate perianth with a long slit-like orifice, stigma glabrous.—*B. amazonicus*.

BATOCARPUS ORINOCENSIS Karst. Fl. Columb. 2:67, Pl. 134, 1862.

Young parts and petioles somewhat strigose or "tomentose-pilose," leaves up to 23 cm. long, mostly oblong, caudate-acuminate, acute to rounded at base, chartaceous, glabrous except the short petioles, veins numerous, stipules ovate-lanceolate, unequal, the smaller one early caducous sericeous-strigose; staminate flowers unknown; pistillate heads subglobose, perianth with a small opening, barely sufficient for the exertion of the style, densely velutinous; stigmas pubescent; fruiting heads sericeous up to about 3 cm. thick, the apices of the perianths enlarged, fleshy, truncate, with the orifice rarely enlarged and the tip of the fruit somewhat exerted, usually completely concealed, upper portion thinly pubescent.

Type loc. Colombia: "Littora saepe inundata silvestria fluminis Metae prope Jiramene." Specimens seen: Peru: Huánuco: Tingo Maria, alt. 2,300 ft.; in fruit Aug. 29, 1940, *A. F. Skutch 4960* (USNA; F).

Called locally "*Leche Caspi*"<sup>1</sup> according to Skutch, and the latex is

<sup>1</sup> Simply a Spanish-quechua compound which may be translated "milk tree."

used locally to mix with *Hevea* latex in making rubber. A gum has been offered for sale recently in Peru under the name *leche de caspi*, or *leche caspi*, which may possibly come from this tree, though its origin and uses are still doubtful.

*BATOCARPUS AMAZONICUS* (Ducke) Fosberg, n. comb.

*Anonocarpus amazonicus* Ducke, Arch. Jard. Bot. Rio Jan. 3:39, 1922.

Young parts and petioles rusty pilosulous; leaves up to 20 cm. long, mostly smaller, thinly coriaceous, with about 10–13 pairs of rather prominent veins, puberulent or tomentulose beneath especially on the veins; stipules "lanceolate-subulate, canotomentellous," caducous; staminate spikes up to 12 cm. long, 5 mm. thick, on tomentose peduncles 1 cm. long; pistillate heads shortly ellipsoid, densely velutinous, on tomentulose peduncles 3–5 mm. long, perianths with a slit-like opening through which the style is exerted; stigmas glabrous; fruiting heads silky-velutinous, up to 5 cm. long and 4 cm. thick, on peduncles 1 cm. long, the slit-like openings of the perianths up to 1 cm. long, open, the thickened top edge of the perianth about 1 mm. thick in dried specimens; fruit somewhat compressed toward apex, pubescent, stigmas only sub-persistent.

Brazil: Para: Obidos: near Parana de baixo de Obidos, *Ducke 15922* (US; F, photo and fragm.) (stam.); Cacaol Imperial, *Ducke 16924* (US; F, photo and fragment) (pist.), *Ducke 11006* (US; F, photo and fragm.) (fr.): Amazonas, basin of Rio Madeira: Mun. Humayta, near Tres Casas, *Krukoff 6422* (F; US).

Peru: Loreto: lower Rio Huallaga, Puerto Arturo, Yurimaguas, alt. 155–210 m., *Williams 5334* (F; US).

Bolivia: Prov. Sara: Dept. Santa Cruz: Bosque del Japacani, alt. 400 m., *Steinbach 7207* (F).

Called locally in Peru "mashunasti."

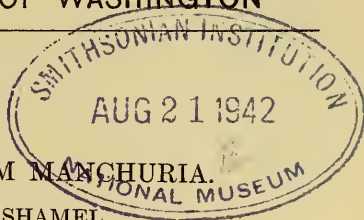
The Brazilian collections are all from "varzea" or periodically flooded land. The Bolivian plant is more nearly glabrous and has smaller leaves than the others. It is in flower, and the stigmas are very prominently exerted, more so than on Ducke's specimen. This may be a matter of age, or further collections may prove the plant to be distinct.

The specimens cited are in the U. S. National Herbarium (US), the Field Museum (F), and the herbarium of the U. S. National Arboretum (USNA).





PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



A NEW MYOTIS FROM MANCHURIA.

BY H. HAROLD SHAMEL

In a small series of mammals recently purchased from A. S. Loukashkin by the U. S. National Museum, I have found a bat which is new to science. It is named for its collector.

*Myotis petax loukashkini*, subsp. nov.

*Type*.—Adult female, skin and skull, No. 270561, U. S. National Museum, collected at Wutalienchich, Third Lake, Heilungkiang Province, North Manchuria, June 25, 1937, by A. S. Loukashkin, original No. 487.

*Geographic distribution*.—Known only from the type locality.

*Diagnostic characters*.—Smaller and paler than *M. petax petax* Hollister from Kosh-Agatch, Altai.

*Color*.—The color of the back is Drab (Ridgway, 1912), rather glossy in some lights. The hairs are dark brown at the base, but the drab tips are so long that the brown does not show through. The general tone is silvery drab. The underparts are white. The brown bases of the hairs have a tendency to show through in places. In *M. p. petax* the ground color of the back is near Cinnamon-Brown (Ridgway, 1912), and the light tips of the hairs are shorter and less conspicuous.

*External characters*.—In all external characters, except color and smaller size *loukashkini* is like *petax*. The wing membrane is attached to the metatarsus near the base of the toe. The interfemoral membrane is haired only a short distance outward from the base of the tail. There are a few scattered long hairs on its margin near its tip, whereas its under side is more or less covered with scattered hairs. The metacarpals are of about equal length and are slightly shorter than the forearm. The tibia is free of hairs, but there are a few long hairs on the toes. The ear is short, hardly reaching to the end of the nostrils.

*Skull*.—The skull is like that of *M. p. petax*. Compared with skulls of *M. mystacinus* it is larger and broader, especially in the braincase.

*Teeth*.—The small middle premolar in both jaws stands in the tooth row. In the upper jaw the two small premolars are set close to each other and crowded against the canine, thus leaving a considerable gap between  $pm^3$  and  $pm^4$ . This is true in the type but not in the paratype. The middle

premolar is about three-fourths the height of the first. The upper canine is of normal height, i. e., it reaches well beyond the tip of  $pm^4$ . In the lower jaw the canine is short, of about the same height of  $pm^4$ , and the small middle premolar is slender and pointed.

*Measurements.*—Of the type (1), paratype (2), and type of *petax* (3): head and body, 40.0, 40.0, 50.0; tail, 35.0, 34.0, 37.0; ear, 12.5, 13.0,—; tibia, 15.5, 15.0, 15.5; forearm, 36.6—, 40.5; third metacarpal, 33.0, 33.2; 36.0; foot, 10.2, 10.0, 10.0. Skull, greatest length, 14.8, 14.8, 14.5; condylobasal length, 13.2, 13.0, 13.2; interorbital breadth, 4.0, 4.5, 4.2; breadth of braincase, 7.8, 7.5; 7.6; depth of braincase, 5.8, 6.2, 5.6; maxillary tooth row, 5.2, 5.2, 5.2; mandibular tooth row, 5.5, 5.4, 5.5.

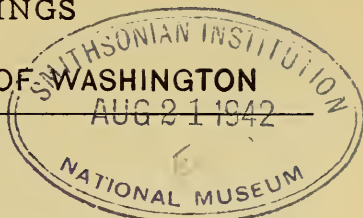
*Specimens examined.*—The type and one paratype (No. 270562), both from the type locality.

*Remarks.*—This bat belongs to that group of *Myotis* with small middle premolar normally in the tooth row, wing membrane attached to the side of the metatarsus, and ear short—the *emarginatus* group. This group includes *mystacimus*, *nattereri*, *emarginatus*, *siligorensis* and other species.

Hollister, in his description of *M. petax*, compared it with *M. daubentonii*; but the latter species belongs to the *daubentonii* group, the members of which have the wing membrane attached to the ankle instead of to the metatarsus, and whose ears extend beyond the nostril when laid forward. He records the upper tooth row ( $c-m^3$ ) of *M. petax* as 6.1, but I find it to be 5.2.

This bat has a superficial resemblance to *M. capaccinii*, which, however, is distinctly larger and otherwise quite distinct.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



DESCRIPTIONS OF THREE ADDITIONAL BIRDS FROM  
SOUTHERN VERACRUZ.

BY ALEXANDER WETMORE.

The previously unrecognized birds described below add two more to the peculiar forms restricted to the isolated Sierra de Tuxtla, and include an interesting local subspecies of *Saltator atriceps*. The material is found in the collections resulting from work based at the archeological camp of the National Geographic Society-Smithsonian Institution Expeditions to Veracruz in 1939 and 1940.

FAMILY COMPSOTHTYPIDAE.

*Myioborus miniatus molochinus*, subsp. nova.

*Characters*.—Similar to *Myioborus miniatus miniatus* (Swainson)<sup>1</sup> but decidedly darker on dorsal surface, including wings and sides of head and neck; crown patch brighter brown; breast and abdomen brighter red; under tail-coverts more extensively white; white markings on outer rectrices less in extent; tail shorter than wing, instead of longer.

*Description*.—Type, U. S. National Museum catalog number 360,161, ♂ adult, collected between 3,000 and 4,000 feet elevation on Volcán San Martín, Sierra de Tuxtla, Veracruz, México, April 17, 1940, by M. A. Carriker, Jr. (original number 759). Forehead and fore part of the crown black; rest of crown kaiser brown, with an obscure overwash of liver brown on the tips of the feathers; lores and sides of head to posterior margin of eye dusky neutral gray; rest of sides of head, hindneck and sides of neck, back and rump, dark neutral gray; longer upper tail coverts black, shorter ones dark neutral gray; lesser and middle wing coverts dark neutral gray edged externally with blackish; greater and primary coverts dusky neutral gray; remiges and rectrices dull black; throat, foreneck and a narrow obscure line along sides of upper breast black; breast and abdomen scarlet; sides and flanks dark neutral gray with an edging of Morocco red on some of the feathers; edge of wing deep neutral gray; under wing coverts dull white, grayish at base; under tail coverts dull white; outer web of outer rectrix white for a little more than half of length with the white spot on

<sup>1</sup> *Setophaga miniata* Swainson, Phil. Mag., vol. 1, May, 1827, p. 368 (Woods of Valladolid, tableland of México).

inner web 20 mm. long along shaft; a lesser amount of white on the next two rectrices and a bare hint of white on the tip of the fourth one from the outside. Bill black; tarsus and feet brownish black (from dried skin).

*Measurements.*—Three males, wing 66–67.6 (66.7), tail 63.2–65 (64.2), culmen from base 12.1–13 (12.5), tarsus 17.8–18.8 (18.3) mm.

One female, wing 62.4, tail 61.5, culmen from base 12.5, tarsus 18.7 mm.

Type, male, wing 66.6, tail 65, culmen from base 13, tarsus 18.3 mm.

*Range.*—Known only from the upper levels (above 2,500 feet) on Volcán San Martín, Sierra de Tuxtla, Veracruz, México.

*Remarks.*—Carriker found this beautiful redstart only on Volcán San Martín where it ranged above 2,500 feet. Apparently it is absent from the nearby Cerro de Tuxtla, though on more intensive work it may be found there. Most of the differentiation in the species *Myioborus miniatus* comes in the coloration of the breast, the various forms marking steps in intergradation between the red-breasted style of México and the yellow-breasted bird of Venezuela. The differences in *molochinus* are more pronounced and varied, and it appears that it may represent a more ancient form in the species, preserved in the Tuxtla range through its isolation. The different proportion of the wing and tail is especially to be noted.

#### FAMILY FRINGILLIDAE.

##### *Saltator atriceps suffuscus*, subsp. nova.

*Characters.*—Similar to *Saltator atriceps atriceps* (Lesson)<sup>2</sup> but with throat brown instead of white.

*Description.*—Type, U. S. National Museum cat. no. 360,410, male, from Tres Zapotes, Veracruz, México, collected March 5, 1940, by M. A. Carriker, Jr. (orig. no. 367). Pileum black with a narrow line of gray extending back from the base of the bill at the nostril over the eye as a superciliary stripe, mixed with white above the eye; rest of dorsal surface bright yellowish olive-green, brighter than citrine; secondaries, primaries and primary coverts dusky, edged with the same bright color as the back; lores dark neutral gray; side of head neutral gray, mixed with blackish in the auricular region; throat, sides of neck and broad band across upper breast black, surrounding a large throat spot of auburn with the feathers white at base; auburn tipping reduced anteriorly so that the white shows indistinctly; breast, sides and upper abdomen light neutral gray; lower abdomen buckthorn brown; crissum and under tail coverts slightly browner than ochraceous-tawny; flanks washed with buffy citrine; under wing coverts ochraceous-tawny, becoming dull gray exteriorly, and bright yellowish olive green on the wing margin. Bill black; tarsus and toes blackish brown (from dried skin).

*Measurements.*—15 males, wing 115–125.5 (120.3), tail 114.1–125.3 (117.6),<sup>3</sup> culmen from base 22.7–25.8 (24), tarsus 28–29.6 (28.9) mm.

8 females, wing 113.5–118.3 (116.3), tail 112.4–119.3 (115),<sup>4</sup> culmen from base 23.1–25.1 (23.9), tarsus 27.8–29.5 (28.9) mm.

Type, male, wing 125.5, tail 125.3, culmen from base 24, tarsus 29.1 mm.

<sup>2</sup> *Tanagra (Saltator) atriceps* Lesson, Cent. Zool., 1832, p. 208, pl. 69 (México).

<sup>3</sup> 14 specimens.

<sup>4</sup> 7 specimens.

*Range.*—Confined to a limited area in southern Veracruz from Tres Zapotes across to Paso Nuevo, extending from those points toward the coast.

*Remarks.*—The present race is strikingly marked from other forms of *Saltator atriceps* by the deep brown instead of white color of the throat. This peculiarity has been noted rather casually in a few specimens by other authors, but for various reasons has been considered an individual variation. P. L. Sclater<sup>5</sup> described *atriceps* as having "a large white (sometimes dark chestnut) guttural patch," remarking further that the "throat-spot, clear white in most specimens, is dark chestnut in some Mexican examples, and in others tinged with rufous." Salvin and Godman<sup>6</sup> wrote that "a rarer form of variation is in the color of the throat, which in some specimens, usually Mexican, is of a rich chestnut instead of white; but intermediate forms occur connecting the two." Ridgway<sup>7</sup> noted of *atriceps* that "this white throat patch is sometimes tinged with tawny or chestnut, and according to Dr. Sclater is even occasionally dark chestnut." I have seen no other statements on this subject.

The color of the throat is easily seen in these birds in life and the brown color is characteristic of them in the Tres Zapotes area. In our twenty-four skins from this point there is one male (no. 360,403) with the throat completely white, one female (no. 360,407) with the throat white except for a slight ticking of brown in two or three feathers on the lower margin of the patch, and one male (no. 360,404) with the brown suffusion covering the lower half of the patch with a brownish wash extending beyond. All others have the throat area deep brown. There are in addition in our collections two skins from Paso Nuevo near the Río San Juan about 35 miles southeast of Tres Zapotes that are typical *suffuscus*. A similar skin from the same locality is found in the Museum of Comparative Zoölogy. One in the National Museum from Buena Vista, about 15 miles farther up the valley of the San Juan, has the throat white as does another without certain locality that probably comes from near this same point. These two, with one from Frontera, Tabasco, are very slightly paler than *atriceps*, indicating intergradation toward the pale breasted *S. a. raptor* of the Yucatán Peninsula. The brown-throated *suffuscus* seemingly is restricted to a region between Tres Zapotes and Paso Nuevo, extending for an undetermined distance toward Catemaco, and so occupies a very limited range which remains to be outlined fully. In the collection of P. W. Shufeldt I have seen five specimens of *atriceps* from La Buenaventura, Acayucan, Veracruz, of which four are typical *atriceps*, while one, a female, has the throat brown, of a paler shade than typical *suffuscus*. It seems to represent an intermediate. In the collection of the Academy of Natural Sciences there is one old specimen, no. 7816, with the brown throat of *suffuscus*, a female without locality from the Rivoli (Massena) collection presented by Dr. T. B. Wilson. We have one bird from Motzorongo that has a very slight suffusion of brown on the throat, the quantity being sufficient

<sup>5</sup> Cat. Birds Brit. Mus., vol. 11, 1886, pp. 283-284.

<sup>6</sup> Biol. Centr.-Amer., Aves, vol. 1, February, 1884, pp. 326-327.

<sup>7</sup> U. S. Nat. Mus. Bull. 50, pt. 1, 1901, p. 661.

to be worth remark especially since this locality is near the area of the brown-throated birds.

In specimens throughout the range of *atriceps* occasional individuals show a little brown, usually in the lower margin of the throat patch. In the Tres Zapotes region this tendency becomes intensified to a point where the brown submerges the normal white color of the throat. The whole anterior part of the body tends to be more heavily pigmented also since the black breast band averages heavier than in other sections. This latter character, however, is one subject to much individual variation.

***Atlapetes apertus*, sp. nova.**

*Characters.*—Similar to *Atlapetes brunnei-nucha* (Lafresnaye)<sup>8</sup> but with no black band across the breast, and without the paler bordering line along the sides of the brown pileum. Similar also to *Atlapetes inornatus* (Sclater and Salvin)<sup>9</sup> but with less white on the lower surface, the sides of the breast and of the abdomen being more extensively gray; brown of crown darker and extending farther back as in *brunnei-nucha* without the paler bordering line at the side; darker green above; and with the black on the side of the head extending farther posteriorly; slightly smaller.

*Description.*—Type, U. S. National Museum Cat. no. 360,425, male, taken at about 2,500 feet elevation on Cerro de Tuxtla, Sierra de Tuxtla, Veracruz, México, March 19, 1940, by M. A. Carriker, Jr. (orig. no. 519). Anterior third of crown and sides of head black; a narrow longitudinal white line extending back from the base of the culmen, and an elongated white spot above the loreal region on each side; remainder of pileum between chestnut and auburn; rest of dorsal surface olive-green; wings and tail fuscous; edge of wing strontian yellow; throat, foreneck, center of breast and abdomen white; sides neutral gray; flanks olive-green; under tail coverts dark greenish olive, tipped indistinctly with reed yellow; under wing coverts dull neutral gray, edged with deep olive buff. Iris brown; bill black; tarsus dusky brown (from collector's label).

*Measurements.*—2 males, wing 81–81.8 (81.4), tail 72.8–75 (73.9), culmen from base 16.8–17.4 (17.1), tarsus 28.2–28.7 (28.4) mm.

3 females, wing 76.8–78.2 (77.7), tail 70–72.9 (71.2), culmen from base 16.7–16.9 (16.8), tarsus 26.2–28 (27.3) mm.

Type, male, wing 81.8, tail 72.8, culmen from base 17.4, tarsus 28.7 mm.

*Range.*—Higher elevations of Volcán San Martín and Cerro de Tuxtla, Sierra de Tuxtla, southern Veracruz, México.

*Remarks.*—In the unbanded breast the bird here described resembles the far distant *Atlapetes inornatus*, which is restricted to the subtropical zone on the Chimbo and Chanchan River systems of Ecuador, so that we find two plain breasted forms lying at either end of the extended range of *Atlapetes brunnei-nucha*. The three are evidently of the same stock, and are representative of one group, but differ in such a manner that I incline for the present to treat them as species rather than as representative races. *Atlapetes apertus* is one of the most remarkable of the forms discovered by Carriker in the forests of the Sierra de Tuxtla.

<sup>8</sup> *Embernagra brunnei-nucha* Lafresnaye, Rev. Zool., 1839, p. 97 (México).

<sup>9</sup> *Buarremon inornatus* Sclater and Salvin, Ibis, 1879, p. 427 (Pallatanga, Ecuador).

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



NOMENCLATORIAL CHANGES IN GLOSSOPETALON  
(CELASTRACEAE).

BY HAROLD ST. JOHN,  
*University of Hawaii, Honolulu.*

The correct name of a genus of plants is easily ascertained in many groups, but for others with an involved history, it is determined only by a careful application of the laws of nomenclature. These laws are intricate and their details are tedious, but taxonomists must follow them to reach the goal of stability in nomenclature.

Miss Margaret Ensign has recently published a revision of the genus *Forsellesia* (Am. Midl. Nat. 27: 501-511, 1942). She adopted this as the valid generic name and rejected *Glossopetalon*. The writer, a few years ago, decided otherwise and published a new species of this group under the generic name *Glossopetalon*. He has now reexamined the data and reapplied the nomenclatorial laws and his conclusions still differ from those of Ensign.

The genus is of anomalous structure, simulating several families, but it is now placed in the Celastraceae. It was first described by Dr. Asa Gray and named *Glossopetalon* with the single species *G. spinescens* from New Mexico (Plantae Wrightianae 2: 29-30, tab. 12B, 1853).

After Gray had added a second species to the genus, Prof. Edward L. Greene called attention to a name which he said was an earlier homonym, and proposed the new name *Forsellesia* to replace Gray's generic name (Erythea 1: 206, 1893). Greene wrote as follows, "*Glossopetalon*, A. Gray, Pl. Wright. ii. 29 (1853), not of Schreber, Gen. i. 205 (1789)." Actually, the genus published by Schreber was *Glossopetalum* (Schreber in Linnaeus, Gen. Pl. ed. 8, 1: 205, 1789), an invalid synonym of *Gouppia* of Aublet (1775), a member of the Celastraceae from Guiana. Gray worked in accord with the Kew Rules of Nomenclature. By his practice the existence of an earlier invalid homonym did not prevent the use of a later valid homonym.

Greene was an independent worker, following his own standards. Still, he sympathized with many of the nomenclatorial ideas of the leaders of

the group that framed the American Code. He attended the Madison Congress and was its first choice for president, but he did not consistently follow their code. However, in this instance, he did so. The article VI of the Rochester Code is as follows, "Similar generic names are not to be rejected on account of slight differences, except in the spelling of the same word; for example *Apios* and *Apium* are to be retained, but of *Epidendrum* and *Epidendron*, *Asterocarpus* and *Astrocarpus*, the latter is to be rejected." (Torrey Bot. Club, Bull. 19: 291, 1892). On this basis Greene rejected *Glossopetalon* Gray (1853) because of the earlier *Glossopetalum* Schreber (1789), and he renamed Gray's genus as *Forsellesia*.

When the writer first prepared his manuscript describing as new *Glossopetalon stipuliferum*, the International Rules of Botanical Nomenclature, Vienna (1905) and Brussels (1910) were in force. The applicable provisions were clear and definite, "Art. 57. . . . When the difference between two names, especially generic names, lies in the termination, these names are to be regarded as distinct even though differing by one letter only. Examples: *Rubia* and *Rubus*, *Monochaete* and *Monochaetum*, *Peponia* and *Peponium*, *Iria* and *Iris*." Article 50 also was applicable.

Before the writer's book was printed, the new International Rules, Cambridge (1930) and Amsterdam (1935) were available, and he checked all names in his manuscript by these altered rules. *Glossopetalon* Gray still seemed the valid name for the genus.

Now we have a new revision of the genus by Ensign who seems to have done a good job taxonomically on this difficult group with mostly very minute and rather technical characters. On the other hand, on its nomenclature, her judgment seems questionable. The pertinent parts of her discussion are quoted. "The genus *Forsellesia* was first described as *Glossopetalon* by Gray, *Plantae Wrightianae* 2:29. 1853. However, E. L. Greene discovered that the name was a homonym (*Glossopetalum*, Schreb., *Gen.* 1:205. 1789) and proposed that the group should be given the generic name *Forsellesia*, *Erythea* 1:206. 1893. . . . Since the International Rules of Nomenclature do not list *Glossopetalon* in the *Nomina Conservanda*, and since they do not recognize orthographic variants (Art. 70, note 4; Greek 'petalon,' Latin 'petalum'). I am using the name *Forsellesia* in this paper."

As Ensign indicates, the rule of the Cambridge Congress applicable to this case is Article 70. This expands the brief, definite provisions of the earlier Vienna (1905) rules, introducing qualifications and many examples. Unfortunately, some of these examples were ill chosen, and as listed partially confuse the applications of the law. Many times the writer has studied this new wording and he has tabulated the examples hoping to find complete agreement and clarity, but in vain.

Fortunately, for the particular nomenclatorial problem in question, there seem to be no complications. The rule reads, "Art. 70. The original spelling of a name or epithet must be retained, except in the case of a typographic error, or of a clearly unintentional orthographic error. When the difference between two generic names lies in the termination, these names must be regarded as distinct, even though differing by one letter



only. This does not apply to mere orthographic variants of the same name." If a name is a later homonym, it is rejected under the provisions of Article 61. There were two amendments to the Article 70 adopted at Amsterdam (1935) but they are not pertinent to this problem. The question is, whether *Glossopetalum* and *Glossopetalon* are different names, or orthographic variants and hence homonyms. We quote in full from Article 70, Note 4,

"Examples of orthographic variants:—Generic names: *Astrostemma* and *Asterostemma*, *Pleuripetalum*, and *Pleuropetalum*, *Columella* and *Columellia*, both commemorating Columella, the Roman writer on agriculture, *Eschweilera* and *Eschweilera*, *Skytanthus* and *Scytanthus*. The four generic names *Bradlea* Adans., *Bradlaeia* Neck., *Bradleja* Banks ex Gaertn., *Bradleya* Vell., all commemorating Richard Bradley (1675–1732), must be treated as orthographic variants because each of them has been spelt by subsequent authors both as 'Bradlea' and as 'Bradleya' and one only can be used without serious risk of confusion." If these variants are examined it will be seen that they differ from each other either in the connecting vowel used between the two word roots or in the particular vowel or consonant used within the word in latinization, as a *c* for a *k*, etc.

"Examples of different names:—*Rubia* and *Rubus*, *Monochaete* and *Monochaetum*, *Peponia* and *Peponium*, *Iria* and *Iris*, *Desmostachys* and *Desmostachya*, *Symphostemon* and *Symphostemon*, *Gerrardina* and *Gerardiina*, *Durvillea* and *Urvillea*, *Elodes* and *Elodea*, *Peltophorus* (Gramineae) and *Peltophorum* (Leguminosae)." Two of these pairs, including *Symphostemon* and *Gerrardina* show different connecting vowels or different rendering of the internal consonants. They are comparable to the orthographic variants, and had they been listed with that group, these examples would have been consistent. All the other examples have the paired names differing only by one or two initial or final letters usually due to the gender indicated by the termination or by the different Greek or Latin termination. Among the examples, only three pairs are comparable to ours, *Monochaete* closely follows the Greek,  $\mu\omicron\nu\omicron$ , one, and  $\chi\alpha\iota\rho\eta$ , bristle or hair; while *Monochaetum* is the latinized equivalent. *Desmostachys* is like the Greek roots,  $\delta\epsilon\omicron\mu\omicron\varsigma$ , bond, and  $\sigma\tau\acute{\alpha}\chi\upsilon\varsigma$ , spike; while *Desmostachya* is the Latinized form. *Elodes* is directly from the Greek,  $\epsilon\lambda\acute{\omega}\delta\eta\varsigma$ , marshy; and *Elodea* is its Latinized form. Like unto these is the pair *Glossopetalum* with its Latin termination, and *Glossopetalon* with its Greek termination. Under Article 70 and as illustrated by three pairs of examples under its Note 4, these two are to be considered different names, and not homonyms or orthographic variants. Thus, *Glossopetalon* Gray is to be accepted as a different name. It was effectively published, and is the valid name for this genus of some eight species of the arid regions of the western United States and northern Mexico. To make the names available under *Glossopetalon*, the following new combinations are proposed:

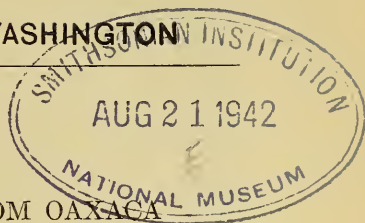
*Glossopetalon pungens* Brandg. var. *typica* (Ensign) comb. nov.

*Forsellesia pungens* (Brandg.) Heller var. *typica* Ensign, Am. Midl. Nat. 27: 503, 1942.

- G. *pungens* Brandg. var. *glabra* (Ensign) comb. nov.  
*F. pungens* (Brandg.) Heller var. *glabra* Ensign, Am. Midl. Nat. 27:  
 503, 1942.
- G. *Clokeyi* (Ensign) comb. nov.  
*F. Clokeyi* Ensign, Am. Midl. Nat. 27: 504, 1942.
- G. *nevadensis* Gray forma *typica* (Ensign) comb. nov.  
*F. nevadensis* (Gray) Greene forma *typica* Ensign, Am. Midl. Nat. 27:  
 506, 1942.
- G. *nevadensis* Gray forma *glabra* (Ensign) comb. nov.  
*F. nevadensis* (Gray) Greene forma *glabra* Ensign, Am. Midl. Nat. 27:  
 506, 1942.
- G. *planitierum* (Ensign) comb. nov.  
*F. planitierum* Ensign, Am. Midl. Nat. 27: 509, 1942.
- G. *spinescens* Gray var. *typica* (Ensign) comb. nov.  
*F. spinescens* (Gray) Greene var. *typica* Ensign, Am. Midl. Nat. 27:  
 510, 1942.
- G. *spinescens* Gray var. *mexicana* (Ensign) comb. nov.  
*F. spinescens* (Gray) Greene var. *mexicana* Ensign, Am. Midl. Nat. 27:  
 510, 1942.
- G. *texensis* (Ensign) comb. nov.  
*F. texensis* Ensign, Am. Midl. Nat. 27: 510-511, 1942.

Ensign summarizes the geographic range of the genus (p. 502) but omits Mexico, though she describes one variety from Coahuila (p. 510). She states (p. 502) that, "The genus apparently grows best in dry limestone regions . . ." For *G. stipuliferum* (p. 507) she gives the habitat as "Growing on limestone from 2,000—5,500 ft." Several of the species may well favor habitats on limestone, but not all do. For instance, *G. stipuliferum* has its type locality at Lewiston, Idaho, on basalt. The collection St. John 9289 was on limestone cliffs as Lime Point, Asotin Co., Wash. That of Constance et al. 1012 was on diorite cliffs at Granite Creek, Idaho Co., Idaho. The species is one of the most abundant shrubs of the Grand Canyon of the Snake, and the writer observed it for years. Besides the above he has collections or records of it at twenty-three localities, all on basalt. The Californian localities which are listed by Ensign may be on limestone, though the habitat data printed does not so state. Certainly the species is not restricted to a limestone habitat; instead, it is much more abundant and widespread on volcanic rocks, especially on basalt.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



FIVE NEW ASTERACEAE FROM OAXACA  
COLLECTED BY W. H. CAMP.

BY S. F. BLAKE.

Of the new Asteraceae here described, four are from Mt. Zempoaltepetl (also known as Zempoaltepec; 10,543 ft. = ca. 3,200 m.), the highest mountain in Oaxaca, and one from Tlaxiaco. An interesting account of the expedition on which these plants were collected, with a map and other illustrations, is given by Dr. Wendell H. Camp in the *Journal of the New York Botanical Garden*, vol. 38, pp. 129-144, 153-170. 1937. Dr. Camp informs me that all his specimens from Zempoaltepetl were collected along the ridge which goes from the village of Tlahuitoltepec to the summit, and that he used "top" on his labels to indicate the last few hundred feet below the summit, "upper slopes" for the region about 500-1,000 ft. below the summit, and "middle slopes" for that extending several thousand feet lower down.

*Oxylobus oaxacanus* Blake, sp. nov.

Suffrutex remosus dense foliosus; caulis anceps bifariam pilosus; folia elliptica obtusa breviter petiolata v. subsessilia flavo-viridia inconspicue crenata glabra triplinervia nervis supra impressis; capitula 8-9-flora numerosa apicibus caulis et ramorum arcte cymosa; pedicelli stipitato-glandulosi; involucri 3.5-4.3 mm. alti phyllaria oblonga obtusa v. acutiuscula; achenia sparse hispidula; pappus coroniformis fimbriatus 0.2 mm. longus.

Decumbent undershrub 3 dm. high, with erectish branches; stem 2.5 mm. thick below, glabrate and denudate below, above bifarious-pilose with brown hairs, not glandular; internodes nearly uniform, 3-12 mm. long, the upper not elongated; larger leaves 2.2-2.5 cm. long, 6-9 mm. wide, narrowed into a petioliform sparsely pilose-ciliate base 3-4 mm. long, obtuse and with a dark truncate or emarginate gland at tip, slightly revolute on margin, coriaceous, prominulous-reticulate beneath, the upper and those of the branches similar but smaller, sessile, mostly 8-14 mm. long, 1.5-4

mm. wide; cymes compound, close, 1.8–3 cm. wide, flattish, many-headed, stipitate-glandular with dark glands as are also the bracteal leaves, the pedicels mostly 3–8 mm. long; involucre slender-campanulate, 2-seriate, equal, stipitate-glandular like the pedicels, the phyllaries 6–7, obtuse or the inner acute, substramineous, rather strongly 2–4-ribbed; disk 5–5.5 mm. high, 2.5–3.5 thick; receptacle flat, naked; corollas “white, rarely pale lavender,” glabrous but papillose all over on inner surface of teeth, 3.7–4 mm. long (tube slender, 1.5 mm., throat campanulate, 1.5 mm., teeth ovate, acutish, 0.7–1 mm. long); achenes black, with short whitish crustaceous base, 5-ribbed, sparsely hispidulous on the nerves chiefly above, 1.7 mm. long; pappus a fimbriate crown 0.2 mm. long, not separable into distinct squamellae; style branches 1.9 mm. long, the distinct stigmatic lines 0.8 mm., the linear obtuse papillose appendage 1.1 mm. long.

Mexico: Upper slopes of Mt. Zempoaltepetl, Oaxaca, 19–27 Feb. 1937, *W. H. Camp* 2634 (type, N. Y. Bot. Gard.; photo. and fragments, Nat. Arb. Herb.).

Of the three species of *Oxylobus* now known, *O. arbutifolius* (H.B.K.) Gray is the closest ally of the new species. *O. arbutifolius*, known from high elevations in the states of Mexico, Puebla, and Veracruz, is readily distinguished by its larger heads (involucre 5 mm. high, with mostly acute to acuminate phyllaries) with more numerous flowers (about 20–25) and phyllaries (10–11), its much better developed pappus (of about 5–7 distinct squamellae about 0.5 mm. long), and its dark- or blue-green color.

The description of *Phania trinervia* DC. (“ramulis glabris, foliis integerrimis, invol. 8-phylo, capitulis 15–16-floris”) somewhat suggests *O. oaxacanus*. It was known to DeCandolle only from a colored plate of Moçino, which has been reproduced in outline in the *Calques des Dessins* (pl. 527), and it is definitely referred by Robinson to the synonymy of *O. arbutifolius* on the ground that the sketch shows no differences which can not be readily explained by the crudeness of the draftsmanship.

In the set of mounted Sessé and Moçino plants lent me for study by the Field Museum were 3 sheets of *Oxylobus*. Two of the original labels bore the name “*Ageratum?*,” one with an unpublished specific name, and the third an unpublished specific name under the genus *Ethulia*. They are all definitely *O. arbutifolius*. The single head dissected was 25-flowered, with a pappus of about 10 unequal squamellae, the longest about 1 mm. long and linear-acuminate. These specimens afford collateral evidence that Robinson’s reference of the name *Phania trinervia* to the synonymy of *O. arbutifolius* was justified.

#### ***Erigeron mihianus* Blake, sp. nov.**

Perennis biuncialis stoloniferus; folia basalia rosulata bipinnatifida antrorse pilosa segmentis spathulatis v. oblanceolatis subacate callosopapiculatis 1–2 mm. latis, caulina linearia integra; caulis simplex 1-capitatus patenti-pilosus; capitulum 2.5 cm. latum radiatum, radiis albis; involucri ca. 3-seriati paullum gradati 6–7 mm. alti phyllaria lineari-lanceolata acuminata medio pilosa subscarioso-marginata; pappus subsimplex.

Stolons becoming buried and woody, 1–2 mm. thick, those of the year procumbent, whitish, 5–8 cm. long, pilose with mostly antrorse hairs, leafy, their leaves narrowly spatulate, obtusely callous-pointed, narrowed into a petioliform base, antrorse-pubescent, about 1 cm. long, 1–1.5 mm. wide, normally with 1–2 pairs of small antrorse callous-tipped teeth above the middle; leaves of the basal rosette numerous, 2–3 cm. long (including the slender petiole, this 1–2 cm. long), the blade ovate in outline, pinnatipartite into 2–3 pairs of lobes, the lowest pair usually entire and often toothlike, the others normally with 1–3 lateral teeth or lobes, the terminal lobe of the leaf usually 3-parted; stems 1–3, decumbent, 3–5.5 cm. high, slender, whitish, leafy practically to apex, the lowest leaves linear-spatulate, usually with a lateral tooth or lobe on each side, the others linear, sessile, acutely callous-pointed, 5–8 mm. long, 0.5–0.8 mm. wide; peduncle 3–5 mm. long; disk about 5 mm. high, 9 mm. wide (as pressed); phyllaries erectish, with brownish-green or purplish body (pilose medially nearly to apex) and narrow to (in the inner) rather broad subscarios whitish margin, this glabrous except for some slight ciliation; rays about 60–75, “white or lavender-tinted, particularly on under surface,” fertile, 11 mm. long (tube 1.5 mm., sparsely puberulous toward apex, lamina linear, 9.5 mm. long, 0.8–1 mm. wide, 4-nerved, tridenticulate); disk flowers numerous, their corollas yellow, essentially glabrous, 4 mm. long (tube 1.2 mm., throat slender, 2 mm., teeth triangular, acute, 0.8 mm. long); ray and disk achenes (immature) similar, linear-oblong, 1–1.3 mm. long, erect-hirsutulous, 2-nerved; pappus essentially simple, whitish, of about 25–28 slender hispidulous bristles 3.5 mm. long; style appendages short, deltoid, obtuse.

Mexico: Beside the high altar, summit of Mt. Zempoaltepetl, Oaxaca, 19–27 Feb. 1937, *W. H. Camp* 2668 (type, N. Y. Bot. Gard.; photo. and fragments, Nat. Arb. Herb.).

This interesting little plant is well distinguished by its stoloniferous habit and once to twice pinnatifid basal leaves. One of the specimens shows a series of 3 rosettes in connection, 2 of them flower-bearing. The specific name is taken from the Mihi tribe, near whose sacrificial altar on the summit of Zempoaltepetl the plant was collected (see *Camp, Journ. N. Y. Bot. Gard.* 38: 166–170. 1937). The type and only known collection of *Erigeron oaxacanus* Greenm., from San Mateo del Mar, Oaxaca, is somewhat suggestive of this species, particularly in the stem leaves which closely resemble those of the stolons of *E. mikianus*. The plant, however, has diffusely branched stems, with no stolons and no indication of the basal tuft of pinnatifid leaves of *E. mikianus*, and its heads are much smaller.

#### *Archibaccharis campii* Blake, sp. nov.

Herbacea (?), caule piloso pilis pluriloculatis non glanduliferis; folia oblonga-elliptica subsessilia v. brevissime petiolata acuminata basi cuneata serrata papyracea; capitula pro genera majuscula subdense cymoso-paniculata femina 35–40-flora (flor. 2–3 hermaphroditis), mascula 43-flora;

involucric 4.5–5 mm. alti gradati 5–6—seriati phyllaria saepius acuta chartacea supra linea viridi praedita e lanceolato-ovatis in anguste lanceolata transeuntia ciliata dorso inconspicue glandulari-puberula; corollae fl. hermaph. dentibus ca.  $2\frac{1}{2}$ -plo tubo longioribus.

“Plant 6 dm. high,” the stem (or branch) unbranched below the inflorescence, herbaceous (so far as seen), straight, subterete or slightly angled, solid, pithy, purple-brown, rather densely pilose with spreading many-celled acuminate eglandular hairs; leaves alternate; internodes mostly 1–3 cm. long; petioles 2 mm. long to essentially wanting; blades elliptic-oblong or lance-oblong, 6–11 cm. long, 2–3.7 cm. wide, callous-serrate or -serrate-dentate above the cuneate base (teeth 0.5–1.5 mm. high, mostly 3–8 mm. apart), above evenly and rather densely tuberculate-hirsute-pilose with several-celled tuberculate-based eglandular hairs, somewhat roughish to the touch, beneath pilose-hirsute on veins and veinlets but scarcely on surface, penninerved (chief lateral veins about 6–9 pairs, with the secondaries loosely prominulous-reticulate beneath, scarcely so above); panicles short, flattish or rounded, 6–8 cm. wide, about 28–30-headed, densely glandular-puberulous with several-celled hairs and very sparsely pilose-hirsute, the lower branches subtended by reduced leaves, the bracts lanceolate or linear, subchartaceous, 2–3 mm. long, the pedicels slender, densely glandular-puberulous, mostly 3–7 mm. long; involucre of pistillate and staminate heads essentially similar but the staminate phyllaries rather broader, all with greenish 1-vittate midline above, chartaceous often rosy-tinged body, and narrow subcarious lacerate-ciliate margin, on back rather sparsely puberulous, the hairs several-celled, in part tipped with small pale glands; pistillate heads (moistened) oblong-cylindric, 8 mm. long, 3–3.5 mm. thick; receptacle fimbriate, the margins of the areoles with toothed but not ciliate margins; corollas of pistillate flowers tubular-filiform, obliquely truncate, whitish, 3.5–3.8 mm. long, about 1.5 mm. shorter than the style, puberulous especially toward apex, their achenes compressed, elliptic-oblong with short callous base, 2–3-nerved, erect-hispidulous, about 1.5 mm. long, their pappus whitish, simple, 5.2 mm. long, about equalling the styles; corollas of hermaphrodite flowers (in the pistillate heads) whitish, puberulous on tube, base of throat, and on both faces of the teeth above, 5.5 mm. long (tube 2.8 mm., throat campanulate, 0.8 mm., teeth lance-oblong, acute, 2 mm. long), their achenes linear-oblong, 3–4-nerved, sparsely hispidulous above, 1.3 mm. long, the style branches linear, acuminate, hispidulous outside nearly to the base, without stigmatic lines, 1.8 mm. long; staminate heads (moistened) campanulate, 7.5 mm. high (excluding styles), 8 mm. thick, the staminate corollas whitish, puberulous on tube, base of throat, and toward tip of teeth above outside, 4.8–5.4 mm. long (tube 2.3–2.6 mm., throat campanulate, 1–1.2 mm., teeth oblong, acute, 1.5–1.8 mm. long), their achenes abortive, stipitiform, glabrous, the pappus whitish, 4.2 mm. long, of slender hispidulous not apically thickened bristles, the style branches linear, acuminate, densely hispidulous outside, 1.5–1.7 mm. long.

Mexico: Lower slopes, Mt. Zempoaltepetl, Oaxaca, 19–27 Feb. 1937, W. H. Camp 2700 (pistillate plant; type, N. Y. Bot. Gard., photo. and

fragments, Nat. Arb. Herb.); middle slopes, same locality and date, *Camp* 2685 (staminate plant; N. Y. Bot. Gard., photo and fragments, Nat. Arb. Herb.).

The only near relative of this plant is *Archibaccharis hieracioides* Blake, of central Mexico (State of Mexico and Federal District). In that species the stem is densely glandular-pilose, the leaves are more densely pubescent with partly gland-tipped hairs and borne on definite slender petioles usually about 1 cm. long, and the phyllaries are narrower (linear-lanceolate), acuminate, more herbaceous-tipped, and densely stipitate-glandular.

***Archibaccharis caloneura* Blake, sp. nov.**

Frutex erectus ramis rectis, costa paginae superioris foliorum et ramis inflorescentiae hispidulis exceptis glaberrimus; folia elliptica v. oblongo-ovata petiolata breviter acuminata basi cuneata v. rotundo-cuneata serrata firme pergamentacea penninervia utrinque prominulo-reticulata lucida; capitula mediocria apicibus caulis et ramorum cymoso-paniculata, femina 6 mm. alta 25–26-flora (flor. hermaph. 2–4), mascula 5 mm. alta 30–32-flora; involucri valde gradati phyllaria ovata ad lanceolata ciliolata; corolla fl. hermaph. dentibus ca. 7-plo tubo longioribus.

Shrub 1.5–2.5 m. high; stem subsimple or erectish-branched, subterete, striate, solid, pithy, brown-purple, completely glabrous below the inflorescence or very sparsely and inconspicuously hispidulous with mostly erectish hairs; internodes 1–3 cm. long, much shorter than the leaves; leaves alternate; petioles slender, naked, purplish, sulcate above, obscurely ciliolate, 6–10 mm. long; blades 6–8 cm. long, 2–3 cm. wide, serrate nearly to base with obtuse or sometimes acute callous teeth (about 0.5 mm. high, 5–7 mm. apart), obscurely hispidulous on margin, antrose-hispidulous on costa above, completely glabrous beneath, the chief lateral veins 5–6 pairs, with the veinlets prominulous-reticulate on both sides; pistillate panicles many-headed, rounded, rather dense, 9–11 cm. wide, hispidulous with mostly incurved or erectish hairs, the lowest bracts foliaceous, the upper linear or subulate, minute, the pedicels slender, 2–5 mm. long; pistillate involucre about 6-seriate, strongly graduated, 5 mm. high, appressed, the phyllaries ovate or triangular-ovate (outermost) to linear-lanceolate, (innermost), the outermost mostly acute, the others obtuse to acutish, stramineous, with brownish green 1-vittate midline, whitish body, and subscarios ciliolate border, often purplish toward tip; pistillate heads campanulate, 6 mm. high, 4 mm. thick (moistened), the receptacle fimbriate, the pistillate flowers 21–24, the hermaphrodite 2–4, the pistillate corollas tubular-filiform, whitish, erect-hirsutulous especially toward apex, oblique at tip and obscurely 3-denticulate, 2.2–2.5 mm. long, about 1.2 mm. shorter than the style, their achenes oblong, 2–3-nerved, whitish, erect-hirsutulous, 1.7–2 mm. long, their pappus essentially 1-seriate, of about 30–35 slender hispidulous mostly subequal whitish bristles 4 mm. long, the hermaphrodite corollas whitish, 4 mm. long (tube 2.3 mm., erectish-hirsutulous, throat scarcely wider than tube, 0.2 mm. long, densely hirsutulous, teeth 5, lance-oblong, acutish, 1.5 mm. long, hirsutu-

lous toward apex outside and papillose on margin within toward apex), the hermaphrodite achenes 3-4-nerved, linear or narrowly obovoid, erect-hispidulous, 1-1.7 mm. long, provided with an ovule, the style branches linear, obtusish, densely hispidulous outside; staminate panicles similarly pubescent, 4-6.5 cm. wide, the pedicels 2-6 mm. long; staminate involucre 4 mm. long, similar to that of the pistillate head but with rather broader phyllaries; staminate heads campanulate, 5-5.5 mm. high, 6 mm. thick (moistened), 30-32-flowered, the receptacle fimbriate, the achenes abortive, stipitiform, glabrous, 0.2-0.7 mm. long, the corollas whitish, 3.7 mm. long, (tube slender, sparsely erectish-hirsutulous, 1.5 mm. long, throat broadly campanulate, sparsely hirsutulous, 0.3 mm. long, teeth 5, lance-oblong, acute, obscurely hirsutulous outside toward apex, 1.7 mm. long), the style branches linear, acute, densely hispidulous, 1-1.2 mm. long, the pappus irregular, 3 mm. long, partly of slender apically slightly thickened hispidulous bristles and partly of ligulate or linear-lanceolate papillose structures irregularly connate among themselves and with the pappus bristles into groups.

Mexico: Lower slopes, Mt. Zempoaltepetl, Oaxaca, 19-27 Feb. 1937, *W. H. Camp* 2701 (pistillate plant; type, N. Y. Bot. Gard., photo. and fragments, Nat. Arb. Herb.); same locality and date, middle slopes, *Camp* 2698 (staminate plant; N. Y. Bot. Gard., photo. and fragments, Nat. Arb. Herb.).

Related to *Archibaccharis sescenticeps* Blake and *A. asperifolia* (Benth.) Blake, but distinguished from both by having its leaves completely glabrous beneath, as well as by various other characters.

#### ***Perezia erioloma* Blake, sp. nov.**

Perennis scaposa ca. 6.5 dm. alta; folia basalia rosulata pauca obovata petiolata obtusa basi cuneata repando-denticulata penninervia chartacea subglabra; scapus ebracteatus sparse pilosus; capitula 25-flora mediocria ca. 11 thyrsideo-paniculata, pedicellis brunneo-lanatis setaceo-bracteatis; involucri valde gradati ca. 7-seriati 10-11 mm. alti phyllaria omnia (intimis exceptis) margine brunneo-lanata dorso subglabra, e lanceolatis acuminatis in lineari-lanceolata mucronata transeuntia; achenia dense hispidula.

Rhizome slender, fibrous-pilose toward apex, 4 cm. long, with long fibrous roots; scape solitary, erect, terete, multistriate, pale green, slender, 2 mm. thick at base, naked below the inflorescence except for a couple of subulate brown-lanate bracts 6 mm. long above the middle, essentially glabrous except toward base and above, there thinly pilose; basal leaves about 4, 14-18 cm. long including petiole (this about 2 cm. long), 4-6 cm. wide, obtuse but with a triangular acute tooth at apex about 1 mm. long, cuneately decurrent on the petiole, shallowly repand especially below, callous-denticulate throughout (teeth 0.2-0.5 mm. high, about 3-6 mm. apart), sparsely hispidulous above on costa and very sparsely so on surface with erect hairs, essentially glabrous beneath except for some deciduous brown lanosity on costa, pale green, featherveined, the chief lateral veins



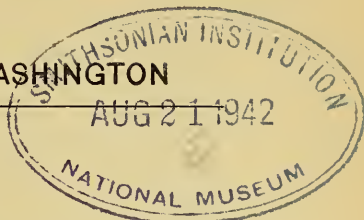
about 10 pairs, prominent, the secondaries obscure; panicle about 19 cm. long, 5 cm. wide, the bracts subulate, 4–6 mm. long, brown-lanate on margin, the branches ascending, 2–3-headed, thinly brownish-lanate, the pedicels 1.2–3 cm. long, slender, setaceous-bracted above; heads (moistened) turbinate-campanulate, in young fruit (excluding corollas) 14 mm. high, 6 mm. thick; the 4 or 5 outer series of phyllaries lanceolate, acuminate, substramineous with greenish midline or tip, nerveless, densely brown-lanate on margin, 1.2–1.6 mm. wide, the next series narrowly lanceolate, short-mucronate from a blunt tip (mucro about 0.2 mm. long), usually with ustulate tip, brown-lanate on margin and on back toward apex, the inmost linear-lanceolate, acuminate, mucronate, ustulate-tipped, the 2 or 3 inner series often reddish-tinged toward apex; receptacle fimbriate; corollas "white," glabrous, 8.5 mm. long (tube 4.3 mm., throat 0.7 mm., outer lip elliptic, 3-dentate, 3.5 mm. long, inner lip 2-divided); achenes subcylindric, densely hispidulous, not glandular, 6-nerved, 5 mm. long; pappus brownish, 6 mm. long, rather copious, the bristles hispidulous, clavellate toward apex.

Mexico: On moist mountain slopes near Tlaxiaco, Oaxaca, 16–19 Dec. 1936, *W. H. Camp* 2225 (type, N. Y. Bot. Gard.; photo., Nat. Arb. Herb.).

Nearest to *Perezia umbratilis* Robins. & Greenm., also a plant of Oaxaca, known to me only from description. In *P. umbratilis* the leaves are lyrate-pinnatifid, the scapes are much shorter and only 2–3-headed, and the phyllaries are membranaceous, sericeous on margin, and mostly obtuse to rounded at apex but often mucronulate, a few of the outermost acutish or barely acuminate.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



SOME NOTES ON THE TAXONOMY OF GRAIN MITES.  
(ACARINA: ACARIDAE, FORMERLY  
TYROGLYPHIDAE).

BY H. E. EWING AND HERBERT H. S. NESBITT.

The term "grain mites" has been applied either to some or all of the members of a group long known under the family name Tyroglyphidae. It is here used in the broader sense as applied to all members of that group. The name "cheese mites" also has been given to members of the same family, but is less appropriate when applied to the entire family, since the mites are not so frequently found in cheese as in grain. These acarids are medium sized, with a soft skin, and bear long and frequently beautifully modified setae. While most of the external structures may be adequately studied with lower magnifications of the compound microscope, the very fine barbs and other structures of these large, modified setae can be properly observed only in specially mounted specimens and with the aid of an oil-immersion lens. It is for this reason that nearly all the earlier descriptions of these mites are inadequate, and also the reason why the synonymy of the different species has become greatly involved.

The notes here presented are the result of the joint studies of the two authors, made at the United States National Museum late in the year 1941. The material at hand was that contained in the National Museum, plus a large collection of Canadian grain mites and some exchanges from abroad. The old types in the National Museum were found usually to have been mounted in balsam and were therefore in rather poor shape for study. Fortunately, however, usually several or even many cotypes of a single species were present, and structures which would have been missed on a single mount were finally fairly well appraised by a study of many specimens mounted in different positions.

## THE PROPER FAMILY NAME FOR GRAIN MITES.

The accepted family name for the grain mites for over half a century has been Tyroglyphidae, based upon the genus *Tyroglyphus*, established by Latreille in 1796, as a monotypical one with *Acarus siro* Linnaeus as type. This genus, however, is a synonym of *Acarus* Linnaeus, hence the family name should be changed to Acaridae. The *Acarus* of Linnaeus contained thirty-one species, among them being *siro*, with two varieties, *farinae* and *scabiei*. No type was originally designated. The first designation of a type was by Latreille in 1810, who selected *siro* Fab.? (= *siro* L.). Previously Latreille (1802) had established *Sarcoptes* as a monotypical genus based on *scabiei*, thus eliminating this variety and making *farinae* a synonym of *siro*, and *Tyroglyphus* an absolute synonym of *Acarus*.

This is in agreement with the interpretation of the International Commission on Zoological Nomenclature as given in Opinion 113, which placed *Sarcoptes* Latreille, 1802, type *scabiei*, in the official list of generic names. This opinion reads in part as follows: "The acceptance of *Acarus scabiei* as type species of *Acarus* is invalidated by Article 30g, according to which *Acarus siro* (syn. *farinae*) is the type of *Acarus*."

## Oudemans' CLASSIFICATION OF THE GRAIN MITES.

The grain mites and a few other groups were included by Oudemans in his cohort Diacrotricha. The grain mites proper, Oudemans (1924a) first divided into ten families, to which others were added (Oudemans, 1924b). These families, while apparently constituting natural groups, are based, for the most part, upon the characters of the skin, claws and dorsal sclerites, characters previously used largely for genera. We are of the opinion that the groups of grain mites recognized as families by Oudemans are, by comparison with these of other suborders of Acarina, more properly to be accorded the rank of subfamilies. Accordingly the family Tyrophagidae is here reduced to the subfamily Tyrophaginae.

## THE GENERA AND SUBGENERA OF TYROPHAGINAE.

When Oudemans (1924b) established the family Tyrophagidae, he included in it five genera, three being new. Four of these genera are very much alike, being largely differentiated upon the nature and position of certain setae, some of which are spinelike. However, one of the new genera, *Ebertia*, differs from the others in a number of characters and particularly in having the skin granulated. It is the belief of the authors that the relationships of the group would be better expressed by reducing three of these five genera to subgenera. This would give the following:

Genus *Tyrophagus* Oudemans, 1924.

Subgenera: *T.* (*Tyrophagus*) Oudemans, 1924.

*T.* (*Tyrolichus*) Oudemans, 1924.

*T.* (*Tyroborus*) Oudemans, 1924.

*T.* (*Povelsenia*) Oudemans, 1916.

Genus *Ebertia* Oudemans, 1924.

THE SCIENTIFIC NAME OF THE BULB MITE.

Since Banks (1906) identified the bulb mite as *Rhizoglyphus hyacinthi* (Boisduval, 1866) this scientific name has been the one usually applied to it in America. Recently, however, Oudemans (1938, p. LXXI) has pointed out that Boisduval's description of *hyacinthi* is such that it could not have applied to the bulb mite. Particularly Boisduval's reference to his *hyacinthi* as being extremely minute and very agile seems inapplicable to the bulb mite. Oudemans regards Boisduval's *hyacinthi* as a species of *Siteroptes*, a genus of Tarsonemidae. If Oudemans is correct in his identification of *hyacinthi* Boisduval, and we believe that he is, then the oldest available name for the bulb mite is *Rhizoglyphus echinopus* (Fumouze and Robin, 1868), a name that is already being used by some European acarologists.

THE AMERICAN MUSHROOM MITE DIFFERENT FROM THAT OF ENGLAND.

Specimens of *Tyrophagus* taken from mushrooms in England have been compared with specimens of the North American mushroom mite, *Tyrophagus lintneri* (Osborn), taken from mushrooms in Eastern United States. We find that the two lots represent very distinct species, those of *T. lintneri* (Osborn) differing from the specimens received from England in the following characters:

1. The sensory microseta of tarsus I is situated closer to the sensory macroseta.
2. The barbs on the posterior abdominal setae are less numerous and less conspicuous.
3. The lateral margins of the male genital armature are almost straight instead of forming a curved arch as in the male of the English species.
4. The inner sclerotizations of the male genital armature are much heavier and of a different shape.
5. In the male, the paragenital and postanal setae are very long, being over twice as long as in the species from England, and the postanal setae are situated much nearer the posterior margin of the abdomen.

STATUS OF *Tyroglyphus americanus* BANKS.

Under the name of *Tyroglyphus americanus* Banks (1906), Banks, many years ago, identified several lots of mites taken chiefly from grain and decaying fruit. A careful examination of this material, particularly of the genitalia of the males, shows that two species were confused. The most common species included appears to be identical in all respects with *Tyrophagus lintneri* (Osborn). The second species, no specimens of which were included in the type material of *americanus*, differs from *T. lintneri* particularly in the characters of the male genital armature. In it the walls of the genital chamber are outwardly rounded and come together at the top forming a "bottle-neck," and at the bottom there is no dark, curved sclerite. In *T. lintneri* the walls of the genital chamber form lateral margins that in dorsal or ventral aspect appear almost straight, while at

the top there is no "bottle-neck" formation. Also in *T. lintneri* there is at the bottom of the genital chamber a posteriorly outcurved, dark sclerite.

Since all of the seven lots included in the type material of *americanus* belong to Osborn's *lintneri*, it appears necessary to regard *Tyroglyphus americanus* as a synonym of *Tyrophagus lintneri* (Osborn).

LIST OF EQUIVALENT NAMES.

(Family Tyroglyphidae) = Family Acaridae.

(Family Tyrophagidae) = Sub-family Tyrophaginae.

Genus *Tyrolichus* Oudemans = Subgenus *Tyrolichus* Oudemans.

Genus *Tyroborus* Oudemans = Subgenus *Tyroborus* Oudemans.

Genus *Povelsenia* Oudemans = Subgenus *Povelsenia* Oudemans.

*Tyroglyphus farinae* (Linnaeus) = *Acarus siro* Linnaeus.

*Rhizoglyphus hyacinthi* Boisduval = *Siteroptes hyacinthi* (Boisduval).

*Tyroglyphus americanus* Banks = *Tyrophagus lintneri* (Osborn), new synonymy.

PROPER SCIENTIFIC NAMES FOR THREE COMMON SPECIES OF ACARIDAE.

Common grain mite, *Acarus siro* Linnaeus.

Bulb mite, *Rhizoglyphus echinopus* (Fumouze and Robin).

American mushroom mite, *Tyrophagus lintneri* (Osborn).

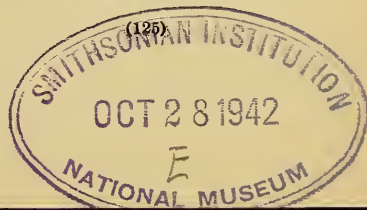
PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

## ON A NEW FAMILY IN THE NOTOSTIGMATA.

BY RALPH V. CHAMBERLIN AND STANLEY MULAİK.

The highly interesting genus *Ophilioacarus* was first made known by the Danish zoologist D. J. With in 1902 in a preliminary paper published in the "Comptes rendus du congrès des Naturalistes et Médecins du Nord" under the title, "A New Acarid. *Ophilioacarus segmentatus*." This form, which presents a very distinctive synthesis of arachnid characters, was regarded as having strongest affinities with the Acarina under which it was placed in the new suborder Notostigmata, a name referring to the distinctive feature presented by the four pairs of tracheal spiracles opening dorsally on the anterior abdominal segments which are well defined. Subsequently (1904) With presented a detailed account of both the external and internal morphology of *O. segmentatus*, the types of which were from Algeria but were found also in Corfu, as well as descriptions of two other species, *O. italicus* from Italy (Sicily) and *O. arabicus* from Arabia. In this paper With proposed to replace the "badly chosen name" *Ophilioacarus* by *Eucarus*, and the family *Ophilioacaridae* by *Eucaridae*; but under the rules of nomenclature the earlier names must stand.

Soon after the appearance of With's paper, F. Silvestri (1904) added a fourth species *O. platensis* from Argentina and Uruguay in South America. In 1936 F. Grandjean published an exhaustive study of the external morphology of *O. segmentatus* based upon abundant material of this species secured by himself in Algeria in 1935, confirming in the main the findings of With. Finally, in 1937, V. Redikorzer described a fifth species from Russian Central Asia ("Semiretobje, Schlucht des Flusses Tujuk, steiniger Absturz"), under the name *Ophilioacarus hexophthalmus*. The specific name refers to the presence in this species of three pairs of eyes in place of the two present in the other forms referred to *Ophilioacarus*, a smaller eye being said to be present on each side between the two of ordinary size. In addition *hexophthalmus* seems to be set off by a difference in the segmentation



of the legs, the first two pairs of which, according to Redikorzer's figures, have no intercalary segment (proximal division of femur) between trochanter and femur proper, although an extra joint, a second trochanter in the nomenclature used by With, is present on the last two pairs.

These differences in eyes and legs would seem to be of generic value. Accordingly, a new genus *Paracarus* is here proposed for reception of the species *hexophthalmus*.

In 1939 and 1940 the junior author secured numbers of the new type of Notostigmata herein designated as *Neocarus* from Texas and Arizona, the first members of the suborder to be recorded from North America. The specimens from Texas were taken in several localities but chiefly in Kerr and Hidalgo counties. Those from Hidalgo County were taken in a region from which during the years from 1932 to 1939 he had collected extensively material of all nine orders of terrestrial arachnids, including the peculiar Ricinulei. This area, about Edinburg, is typical Lower Sonoran mesquite-huisache association. The specimens of *Neocarus* from here were taken under a large piece of sheet iron beneath a dense, shady mesquite tree. This cover had apparently not been disturbed for several years. Under this same cover were found numerous other species of arthropods, among them insects, spiders, scorpions, isopods, phalangids, mites, pseudoscorpions and myriopods. *Neocarus* is believed to be quite common in this area, but its small size and obscure habits have not led to extensive collecting. For a number of years before, specimens were present, but they were mistaken in the field for young of some insect and so were ignored. These arachnids move very slowly, carrying the anterior pair of legs in the air, apparently as feelers whose resemblance to antennae led to the earlier mistaken identity. However, when a cursory examination was made under a microscope, their true nature was revealed.

The specimens from Kerr County were taken in Upper Sonoran cedar-oak association under large rocks along with specimens of *Lacinius* and *Libioides*.

In discussing the ecology of *Opilioacarus segmentatus* as noted by himself in Algeria Grandjean says: "Je n'ae trouvé d'*Opilioacarus* que sous les pierres de grande Taille on fortement enfoncées. Il foute toujours que la pierre adhère bien au sol et qu'il n'y ait sous elle que des fissures ou des passages très surbaiaés dans lesquels un animal un plus gros ne puisse trouver une demeure." In thus securing a certain exclusive dwelling place, *Opilioacarus* contrasts with the habits of *Neocarus* as above noted. *Opilioacarus* would also seem to be a more agile animal, for Grandjean says of it: "Dans la marche normale, d'allure circonspecte, l'animal tate continuellement le sol av ses longues pattes antérieures qui sont pour lieu des antennes. Si l'animal rencontre un obstacle qui l'inquiète il peut courir tres vite à reculons. Alors les pattes antérieures sont lèvees et ne servent pas. Si l'acarien doit fuir en avant il court moins vite mais il est cependant très agile. Les pattes antérieures servent dans ce cas comme les 6 autres ou du moins les aident."

All type specimens of the new forms are at present retained in the collection of the University of Utah,



Family NEOCARIDAE, new.

*Neocarus* is regarded as representing a distinct family primarily on the basis of differences in the number and position of the tracheae. Whereas in all the known species of Opilioacaridae there are four pairs of dorsally opening spiracles, a pair to each of the first four abdominal segments, in *Neocarus* the four corresponding pairs are more closely clustered, with the first on the first abdominal segment, and the other three on the second; in addition there is a small median trachea opening by a mid-dorsal spiracle situated in the furrow between the second and third thoracic segments.

Genus NEOCARUS, new.

With the characteristics noted for the family. In addition the complete lack of a proximal segment to femur II may be of generic significance.

*Genotype*—*Neocarus texanus*, new species.

*Neocarus texanus*, new species.

The size is comparable to the other members of the suborder. The length is about 1.7 mm., the greatest width 0.7 mm. is at the middle of the abdomen.

The head is divided into two parts. The head proper bears the two pairs of eyes and the pseudocapitulum which encompasses the pedipalps and the mouthparts proper. Between the head and the thorax there is a short straight transverse groove.

C. J. With considered this suborder as possessing two thoracic segments. On close examination *N. texanus* shows what appears to be three thoracic segments. The first segment is set off from the head by a short suture. The second segment is very short, being midorsally about one-seventh of the length of the first and set off from it by a short suture. The third segment is about two-fifths as long as the first and set off from the second by a longer straight suture which disappears on the sides, and from the abdomen by a backward curving suture which extends almost to the coxae.

The ten abdominal tergites are marked by more or less distinct bluish crossbands and separated by shallow but nevertheless distinguishable grooves which disappear on the sides.

On either side of the head are black eye-patches in which are two oval eyes. The anterior is slightly larger and separated from the posterior by about half of the diameter of the larger. The interspace between the two pairs is about two-thirds of the head width at a line across the eyes. The head length is about equal to the width. The widest part is a little behind the eyes.

Along the mid-dorsal line in the suture between the first and second thoracic segments is a small spiracle. Along each side of the abdomen are four closely placed spiracles. The first is placed on the first abdominal segment low on the side. The other three form an equilateral triangle and are placed on the second abdominal segment somewhat higher than the first. The most posterior spiracle of the triangular group appears to be in the suture between the second and third segment. The greatest distance

across the four spiracles on a side is about one-thirteenth of the length of the animal. Dichotomous branching tracheae ramify from these spiracles.

The pedipalps are as figured. They lie along the labrum and articulate under the rostrum, and consist of five segments. At the tip are pairs of claws not unlike those on the legs.

The legs vary in length and consist of a coxa, one or two trochanters, femur, patella, tibia, metatarsus, and a tarsus. There are two claws on each. Leg I is slender and longest, being about half longer than the body. There is a single trochanter and a false segment at the base of the femur. Leg II is third in length, but shorter than the body. This also has a single trochanter on the dorsal side of which is a tooth-like process so constructed as to articulate with a rounded prominence on the lateral margin of the thorax. This apparently limits the dorsal movement of the trochanter. Leg III is shortest and provided with two trochanters. The basal one has on its dorsal surface a process similar to that on Leg II. Leg IV is second in length and about a seventh longer than the body. There are two trochanters. On the ventral surface of the legs are transverse grooves varying in number on the different legs. These may have a sensory function. On the dorsal and lateral surfaces of the legs excepting the tarsi are fan-shaped hairs which tend to an arrangement in about five rows. There are fewer such hairs on the ventral surface, and these are less definitely placed. There is a distinct terminal hair on the distal end of the dorsal part of the tarsus of leg IV. Beneath the tarsus is a plumiform setae of about four bristles.

In the area anterior to the sternum, between the coxae of the first legs and posterior to the base of the pseudocapitulum are two stylets which meet along their inner borders and project ventrally. These are about .18 mm. long. The tip of these stylets is equipped with a bristle about a fifth of the length of the stylet, and on the posterior lateral side of each is another bristle placed two-thirds of the distance from the base. This is longer than the terminal bristle and about half the length of the stylet.

On the body beneath there are scattered a number of variously shaped lyriform fissures. There is no definite arrangement of these.

Texas: Hidalgo County, Edinburg, male holotype, May 21, 1939; female allotype, one paratype, January 1, 1935. Kerr County, 16 miles south of Kerrville, two paratypes, December, 1939, one paratype August, 1940, two paratypes September, 1940. Hays County, one paratype, April 15, 1939. Starr County, 5 miles east of Rio Grande City, January 21, 1939.

#### *Neocarus arizonicus*, new species.

This species is similar in many respects to *N. texanus*, new species. The ground color is a pale buff. The pigmented areas on the head are differently arranged and less pronounced. There is only a faint indication of pale brown cross-bands on the segments of the abdomen.

The eyes are in two pairs arranged much as in *texanus*. There is a minute clear spot in the dark eye patch above the two eyes. It is possible that the so-called third eye described by Redikorzer for his *O. hexophthalmus* is a similar spot.

The legs are pale yellow with light blue rings which extend over more than three-fourths of the length of the segments. The plumiform bristle under tarsus IV has only two branches.

The lateral prominences which articulate with the tooth-like structures on trochanters II and III are more pronounced than in *texanus*.

Since this species is represented by only one specimen from which some of the appendages are missing, detailed study was not possible. The authors feel that with more material the differences between the two new species discussed in this paper will be more readily determined.

Arizona: Duncan, one specimen, September 9, 1939.

#### BIBLIOGRAPHY.

- WITH, C. J.—A new Acarid. *Opilioacarus segmentatus*. Sektion VI, p. 4, Compte rendus du congres der Naturalistes et Medecins du Nord. Helsingfors., 1902.
- WITH, C. J.—The Notostigmata, a new suborder of Acari. Vidensk. Meddel. fra naturh. Foren. Kjobenh. 1904. p. 137-192.
- SILVESTRI, F.—Note Arachnologische III, Una nuova specie di Opilioacarus (Acari Notostigmata) dell' America Meridionale. Redia, t. 2, 1904, p. 257-261, Tar. XXIII-XXIV.
- GRANDJEAN, F.—Un acarien synthetique. *Opilioacarus segmentatus* With. Bull. Soc. Hist. Nat. Alger. 1936, 27, 9, p. 413-444, 5 text fig.
- REDIKORZER, V.—Eine neue Opilioacarus Art. Zool. Anzeiger, 1937, 118, p. 10-12.

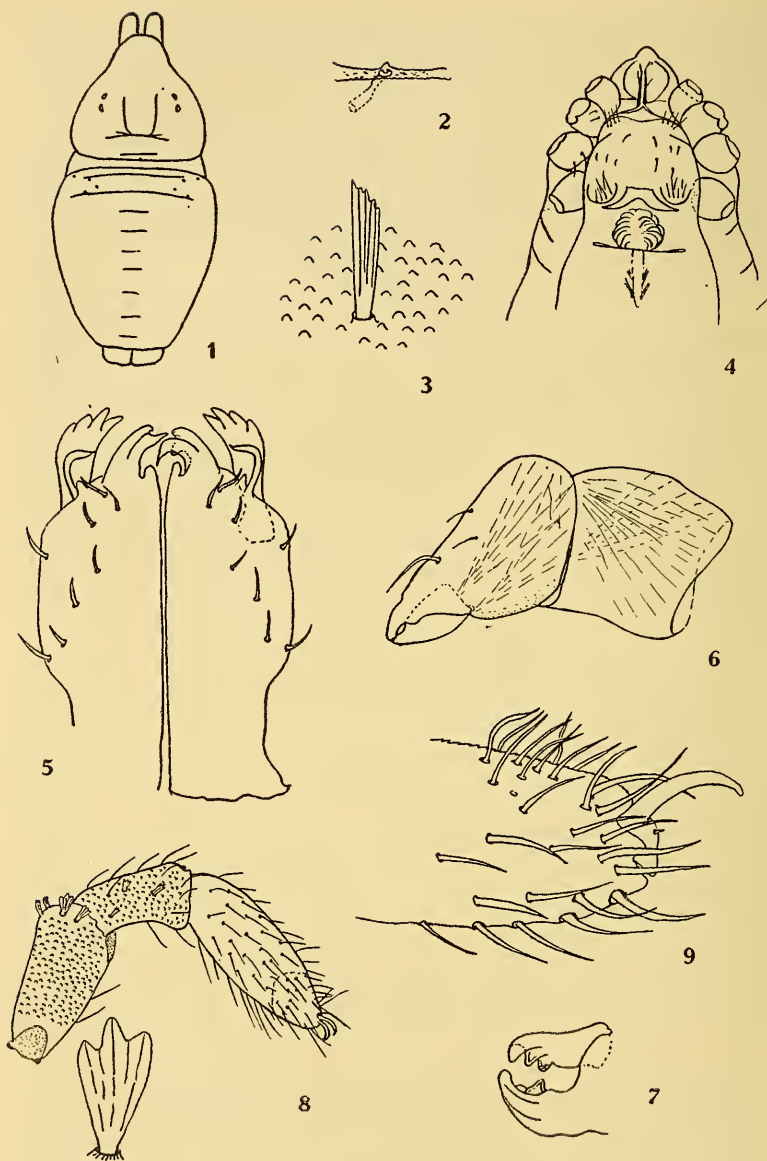
#### EXPLANATION OF FIGURES OF *Neocarus texanus*, sp. n.

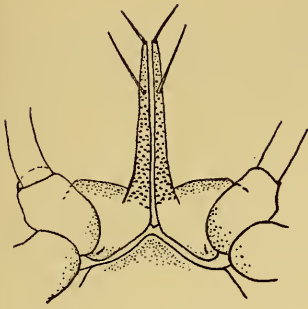
##### PLATE I.

- Fig. 1. Dorsal view of body, showing segmentation and position of spiracles.  
Fig. 2. Detail of median spiracle.  
Fig. 3. Fan hair from side below eyes.  
Fig. 4. Ventral view of anterior portion of body.  
Fig. 5. Maxilla.  
Fig. 6. Left chelicera, lateral view.  
Fig. 7. Claw of chelicera.  
Fig. 8. Pedipalp, mesal view, with fan hair of same shown below.  
Fig. 9. Tip of pedipalp.

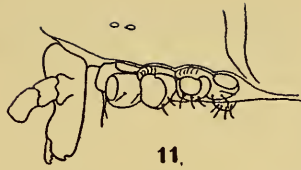
##### PLATE II.

- Fig. 10. Presternal stylelets.  
Fig. 11. View of left side of carapace, showing bases of legs, etc.  
Fig. 12. Schematic view of region through base of second leg and side of body.  
Fig. 13. Ventral view of genital area of what is regarded as the male.  
Fig. 14. Genital appendage (ovipositor) of female, lateral view.  
Fig. 15. Leg II and details of same.  
Fig. 16. Trochanter of leg II, anterior view.  
Fig. 17. Leg III, with detail of fissure on sixth joint of same.  
Fig. 18. Leg IV, with fan hair from same.  
Fig. 19. Apical portion of leg IV.  
Fig. 20. Tip of pedipalp.





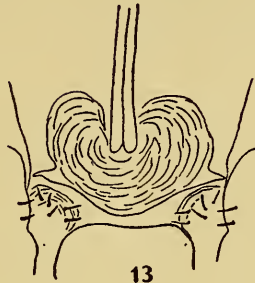
10



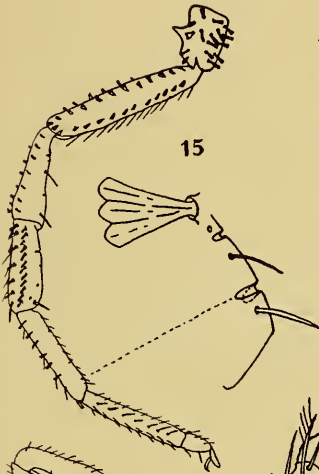
11



12



13



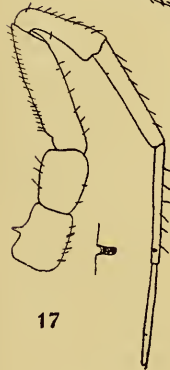
15



14



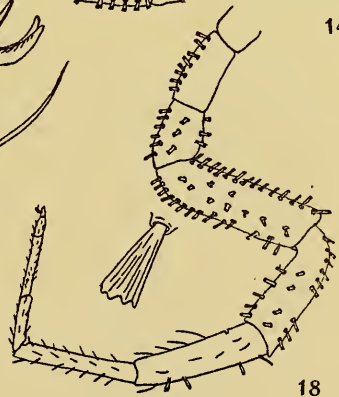
16



17



19



18



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

---

STUDIES OF THE RAT SNAKE, *ELAPHE LAETA*, WITH  
DESCRIPTION OF A NEW SUBSPECIES.

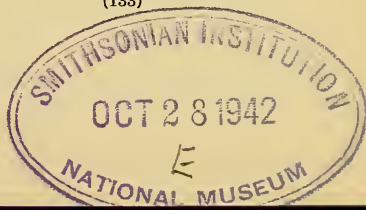
BY ANGUS M. WOODBURY AND DIXON M. WOODBURY.

---

Ever since Baird and Girard described the first known specimen of this species from Red River, Arkansas, in 1853 (Cat. North American Reptiles, Part I, p. 77) gathering of additional specimens has been very slow and information exceedingly meager. Collection of specimens from the Colorado River Basin in Utah and Colorado, effectively separated by the Rocky Mountains from its previously known range stimulated the investigations on which this paper is based. In connection with the present study specimens were borrowed from the U. S. National Museum, Chicago Academy of Sciences, Field Museum of Natural History, University of California at Los Angeles, University of Texas, Baylor University, University of Nebraska, A. J. Kirn and Stanley Mulaik, to all of whom the writers wish to express sincere thanks.

If there is any interbreeding connection between the two contingents of the population, it would be expected to occur either through the South Pass break in the Rocky Mountains in central Wyoming or in northwestern New Mexico, where the continental divide dips so low that it is covered by the pigmy conifer forests of Juniper and Pinon, commonly regarded as belonging to the Upper Sonoran Life Zone. The South Pass in Wyoming is considerably higher, probably in the Transition Zone.

Specimens from the Colorado Basin, so far as known, come from the valleys or canyons along the Colorado and Green rivers in streamside habitats of trees or irrigated fields. A specimen from northern New Mexico was found in a ponderosa pine-boxelder forest. If this is indicative that they are more or less restricted to the vicinity of such watered areas in an otherwise semiarid region, then they are probably more isolated than previously indicated and there may be no regular channel of interbreeding with the more widespread and probably greater numbers of the contingent beyond the mountains.



The senior writer examined the lowest point of the continental divide in northwestern New Mexico in an effort to find a suitable habitat that might serve as an interbreeding channel between the San Juan and the Rio Grande drainages. Unless the snakes are able to leave the streamside forests and take to the open valleys, the pigmy conifers or mountain brush at higher altitudes, it is not likely that any interbreeding channel exists, in which case, it is probable that interbreeding, if any, is only intermittent and accidental. With such effective isolation of the Colorado Basin contingent, geographic variation might be expected.

In all, a total of 31 snakes were examined. Eight were from the Colorado Basin, of which 4 were from Moab, Utah, and 4 from Mesa and Garfield counties in Colorado. Of the balance, two were from New Mexico, 18 from Texas, 2 from Kansas and one from Nebraska. The principal significant characters revealed by this study are summarized in Table I. The tabulation seems to indicate that the greatest extremes of diversification lie in the Colorado Basin and in Central and southern Texas. Specimens from New Mexico, Kansas and Nebraska seem in general to be more or less intermediate.

The characters elucidated in the table indicate varying degrees and directions of divergence between the two contingents. Some characters not shown in the summary are practically uniform in all specimens. The anals were always divided (2). In all cases, there was one loreal, one preocular and 2 postoculars on each side. The upper labials were almost uniformly 8 in number on each side but there were exceptions in both populations. The lower labials were more variable. They ranged from 11 to 13 in the specimens from the Colorado Basin and 12 to 14 in those from Texas.

The scale formulas tend to run a little higher in the Texas specimens where a few had 27 on the neck, 29 on mid-body and a majority had 21 at the anus, as contrasted with the usual 25-27-19 in the Utah and Colorado specimens. The numbers of ventral plates indicated considerable divergence. The Texas specimens are again higher. In the Utah and Colorado specimens the range of abdominals is 203-215 with average of 209 and caudals of 63-69 with average of 67, as contrasted with the Texas specimens which have a range in abdominals of 213-234 with average of 223 and caudals of 60-80 with average of 73.



TABLE I.—SUMMARY OF CHARACTERS.

Locality	Serial Number	Sex	Length Total-Tail	Scale Formula	Ventrals		Labials		Dorsal Blotches		Abd.— Blotch	
					Body-Tail Tot.	Body-Tail Tot.	Upper Lower	Body-Tail Tot.	%			
Moab, Utah	270	♂	845-160	25-27-19	211-69	282	8-9	12-13	48-19	67	59-82	165
Moab, Utah	271	♂	875-160	25-27-19	203-68	271	8-8	12-13	43-18	61	50-92	161
Moab, Utah	3760	♀	658-112	25-27-21	214-67	281	8-8	11-11	52-22	74	56-73	162
Moab, Utah	4691	♀	838-140	25-27-21	205-63	278	8-8	11-11	55-22	77	60-70	160
Lacey, Colo.	FMNH 38225	♀	810-140	25-27-19	207-67	274	8-8	12-12	44-18	62	81-113	163
Grand Junction.	FMNH 38226	♂	885-110?	25-27-19	203-68?	271	8-8	12-12	44	60	60	159
Mesa, Colo.	FMNH 1134	♂	947-166	25-27-19	207-66	273	8-8	12-12	48	60	60	159
	FMNH 26879	♂	450-82	25-27-19	208-67	275	8-8	11-11	50-23	73	44-76	158
Averages.....					209-67	275½			48-20	69	58½-84	161
Superior, Neb.....	U. N. B. 305	♂	940-165	25-27-19	213-73	286	8-8	11-12	50-20	70	34-49	163
Mankato, Kansas.....	USNM 90615	♂	345-60	27-27-21	209-67	276	8-8	11-12	46-16	62	34-49	163
Mankato, Kansas.....	USNM 90616	♂	559-72	27-27-19	223-65?	288	8-8	13-13	45-15	60	39-50	178
Rito Fyovlis, N.M.....	UCLA 198	♂	447-80	25-27-21	214-67	281	8-8	11-11	53-22	75	40-57	161
Las Cruces, N.M.....	USNM 22138	♂	849-152	27-27-21	212-66	278	8-8	11-11	40-19	59	52-51	172
Frijole, Texas.....	Mosauer		980-155	27	213-63	276			52-18	70		161
Red River, Ark.....	Type			29	227-77	304						
Texas												
Floresville.....	UU 2602	♀	1132-177	27-29-21	227-60	287	9-9	12-12	29-11	40	61-94	198
Somersett.....	UU 2601	♂	1200-220	25-27-19	217-77	294	8-8	13-13	36-15	51	32-34	181
Christoval.....	BU 6583a	♀	461-76	25-27-21	227-72	299	8-8	13-13	29-8	37	47-24	198
Christoval.....	BU 6583b	♀	460-78	27-29-21	230-75	305	8-8	14-14	31-12	43	36-38	199
Mercedes.....	BU 6355	♂	455-88	25-29-21	232-80	312	8-8	12-12	38-17	55	39-42	194
Van Ormy.....	UU 2604	♀	406-73	27-29-21	228-77	305	8-8	13-13	29-12	41	38-32	199
Lytile.....	UU 2496	♀	347-59	25-27-21	223-67	290	8-8	12-12	34-14	48	32-45	189
Lytile.....	UU 2499	♀	431-78	25-27-21	215-70	285	8-8	13-13	33-12	45	77-64	182
Lytile.....	UU 2497	♀	328-56	25-27-21	234-73	307	8-8	13-13	37	42	36	209
Lytile.....	UU 2500	♂	1112-210	25-27-19	224-78?	306	8-8	12-12	45-20	65	51-94	179
Lytile.....	UU 2495	♂	1118-205	25-27-21	218-78	292	8-8	13-13	39-17	56	49-62	179
Castroville.....	UU 2603	♂	980-188	25-27-21	217-76	293	8-8	13-13	33-17	60	37-60	178
Peos River.....	USNM 4965	♂	885-177	25-27-21	215-73	288	8-8	13-13	43-18	60	38-60	173
Strong City.....	USNM 3829	♀	870-142	27-27-21	219-63	292	8-8	12-12	45-18	60	37-53	175
Austin.....	U. Texas		1130-118	25-29-21	213-77	290	8-8	14-14	38-20	58	58-58	175
Edinburg.....	Mullalk		960-166	25-27-19	220-66	286	8-8	12-13	37-15	52	46-71	183
Edinburg.....	Mullalk		370-68	25-29-21	227-69	296	8-8	13-13	33-13	46	40-48	194
Edinburg.....	Mullalk		353-68	25-27-19	221-78	299	8-8	12-12	36-18	54	58-66	185
Averages.....					223-73	295			35-15	50	46-58	188½

‡ Tail incomplete, number estimated.

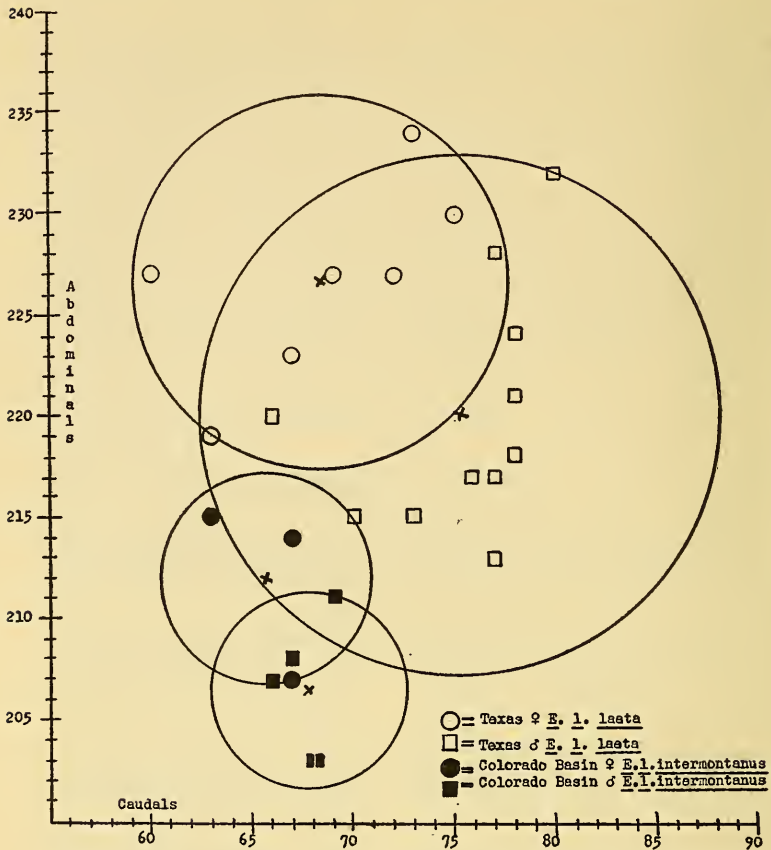


Fig. 1—Scatter graph arranged to show distribution of ventral plates; abdominals plotted against caudals. Circles show for each sex the Texas and Colorado Basin specimens separately.

The dorsal blotches indicated still further divergence, but in a reverse direction. The Texas specimens were generally lower in number. They had a range of 25–45 with average of 35 on the body and 8–20 with average of 15 on the tail. The isolated contingent had a range of 43–55 with average of 48 on the body and 18–23 with average of 20 on the tail.

These variations in blotch numbers produced some distortion in relation of blotch size to the interspaces between them. When measured and averaged, it was found that the greater number of blotches in the Colorado Basin forms had been produced by decreasing the average size of the blotches, without any significant decrease in width of the interspaces. This yielded a significant difference which was indicated by a much higher ratio of interspace to blotch. This is corroborated by scale counts. The

interspaces in both contingents are about  $1\frac{1}{2}$  to 2 scales in length. The blotches of the Texas population are about 3 to 5 scales long with average approximately 4, whereas, the blotches on the Colorado Basin specimens are only about 2 to 4 scales long with average of 3.

These divergences of characters both in degree and direction seemed sufficient to warrant separation taxonomically. This was further tested on a single important character, the ventral plates by a scatter graph shown in figure 1. Specimens were plotted on the graph with abdominals against caudals. In order to compensate for sexual differences, each sex was plotted separately. For each sex in each geographic region, a circle was drawn using the average as center and extreme as the circumference. The females showed no overlapping but the males showed a small amount. The results showed significant divergences in the two geographic areas.

The most divergent characters, i. e., the ventral plates, the dorsal blotches and the ratio of length of interspaces to blotches were studied in more detail, sexes separately. The results are tabulated in table 2 and graphed in figure 2. The averages and ranges of each character for each sex in each of the two geographic localities are shown in the table and the averages are compared in the graph. It should be noted that in general much more divergences occur on the body and less on the tail.

TABLE 2—AVERAGES AND RANGES OF CHARACTERS.  
VENTRAL PLATES.

Specimens	No. of specimens	Ventral Plates					
		Body		Tail		Total	
		Ave.	Range	Ave.	Range	Ave.	Range
Males:							
<i>E. l. laeta</i> .....	11	220	213-232	75.5	66-80	295.5	285-312
<i>E. l. intermontanus</i>	5	207	203-213	67.5	66-69	274.4	271-282
Females:							
<i>E. l. laeta</i> .....	7	228	219-234	68.4	60-75	295	282-307
<i>E. l. intermontanus</i>	3	212	207-215	65.7	63-67	277.7	274-281

DORSAL BLOTCHES.

Specimens	No. of specimens	Dorsal Blotches					
		Body		Tail		Total	
		Ave.	Range	Ave.	Range	Ave.	Range
Males:							
<i>E. l. laeta</i> .....	11	37.5	29-45	16.5	12-20	54	41-65
<i>E. l. intermontanus</i>	5	46.4	42-50	20*	18-23	66.7*	60-73
Females:							
<i>E. l. laeta</i> .....	7	31.9	25-42	12.4	8-18	44.3	37-60
<i>E. l. intermontanus</i>	3	50.3	44-55	20.7	18-22	71	62-77

RATIOS.

Specimens	No. of specimens	Ratio in % of interspaces to blotches					
		Body		Tail		Total	
		Ave.	Range	Ave.	Range	Ave.	Range
Males:							
<i>E. l. laeta</i> .....	11	49	32-77	64.3	32-98	113.5	66-155
<i>E. l. intermontanus</i>	4	53	44-60	83.3*	76-92	134.3*	120-142
Females:							
<i>E. l. laeta</i> .....	7	42	32-61	48.4	24-94	90.4	71-155
<i>E. l. intermontanus</i>	3	66	56-81	85.4	70-114	151	129-194

\* Based on three specimens.

ELAPHE LAETA.

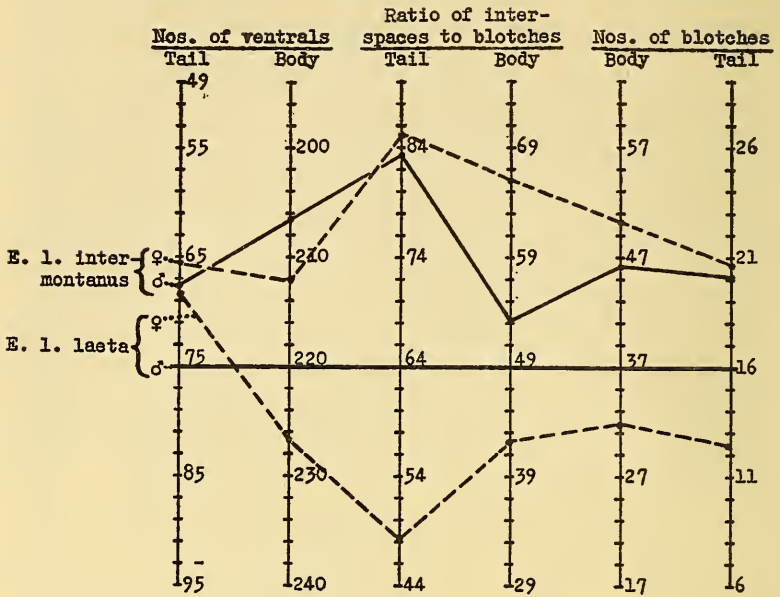


Fig. 2. Summary of selected characters showing differentiation of Colorado Basin Characters from those of Texas, using the means of the Texas males as the standard of comparison.

The averages indicate distinct divergences between the two populations in both sexes for each character, whether considered separately for body and tail or for total. The ranges of characters indicate little or no overlapping in each sex in the two areas as far as the body characters are concerned, but there is considerable overlapping in the characters on the tail and in the total.

A combination of certain characters offers a relatively good basis for separating the two populations. Since the dorsal blotches and the ventral plates diverge in opposite directions, the former being lower and the latter higher in the Texas specimens, a combination of the two presents a useful key character. Subtracting the number of dorsal blotches on the body not including the tail from the number of abdominal plates yields numbers that are less than 166 in the Colorado Basin specimens and more than 172 in those from Texas.

By comparing the specimens tabulated from Nebraska, Kansas, and New Mexico, it becomes evident that most of them are intermediates. The specimens from northern New Mexico, southern Nebraska and one of those from Mankato, Kansas, all seem to show affinities with the Colorado Basin forms and indicate interbreeding influence. The other specimens

from New Mexico and Mankato, Kansas, show more definite affinities with the Texas group. The data given by Baird and Girard in their original description, indicate that the type specimen also belongs with the Texas race.

Since the type is con-specific with the Texas population, it must of necessity be considered as the typical subspecies. In order to distinguish the two subspecies, description of both races based upon available specimens will be given.

The members of these two races may be separated from each other except in the areas of intergradation by the following:

KEY TO THE SUBSPECIES OF *Elaphe laeta*.

- Dorsal blotches 3-5 scales long; ventrals under body and tail more than 282; abdominals minus body dorsal blotches more than 170.  
 Emory's Rat Snake.....*E. l. laeta*
- Dorsal blotches 2-4 scales long; ventrals under body and tail less than 282; abdominals minus body dorsal blotches less than 170.  
 Intermountain Rat Snake.....*E. l. intermontanus*

In the region of intergradation in southern Nebraska and northern Kansas, members might fall in both subspecies according to this key, but it could hardly be maintained that both subspecies occurred in the same interbreeding population. We designate the specimens as intergrades, thus *E. l. laeta* ± *intermontanus* but nearest *laeta* in the population characteristics despite the fact that some individuals may be reversed.

*Elaphe laeta laeta* (B and G)

EMORY'S RAT SNAKE.

*Description*.—Adult specimens often reach 1000-1200 mm. in length. Neck slightly constricted, body usually deeper than wide, flattened ventrally. A series of dorsal blotches traverses the back, usually about 35 in number (25 to 45) on the body and 15 (8 to 20) on the tail. These blotches are about 4 scales in length (3 to 5, occasionally 6 or 7) are of a dark brown color and bordered by darker brown or black. The interspaces about 1½ to 2 scales in length are slightly lighter brown in color. The blotches alternate with smaller lateral rounded blotches on the side which in turn alternate with still smaller blotches (often nearly obsolete) ventrolaterally just above the ventrals.

The ventral ground color is white or creamy and there are two squarish brown blotches on many of the ventral plates. These tend to form 4 longitudinal rows on the body and two on the anterior tail but there are some irregularities produced largely by occasional plates on which the blotches are missing. The throat is generally without blotches.

The scale formula ranges from 25-27-19 through 25-27-21 to 27-29-21. The abdominal plates vary in number from 213 to 234, the caudals from 60 to 80 and the total ventrals from 282 to 312. The upper labials are usually 8 in number but there are occasionally 9. The lower labials range from 12 to 14.

*Range.*—This subspecies is presumed to range east of the Rocky Mountains from southern Nebraska south through Texas to central Mexico and from New Mexico to Arkansas and Missouri.

The new subspecies from the Colorado Basin may be known as

***Elaphe laeta intermontanus*, new subspecies.**

INTERMOUNTAIN RAT SNAKE.

*Types.*—Holotype, adult male, University of Utah Museum of Zoology (UU) No. 271, taken May 6, 1933, at Moab, Utah, by D. M. Parriott and preserved by A. M. Woodbury. Allotype, adult female, Chicago Academy of Science (CAS) No. 4691, taken May, 1938, at Moab, Utah, by D. M. Parriott and presented to Howard K. Gloyd. Paratypes: adult male, UU 270 taken at same time and place as holotype; young female CAS No. 3760 taken June, 1937, at Moab, Utah; adult male and female, Field Museum of Natural History (FMNH) Nos. 38225 and 38226 taken at Lacey, Garfield County, Colorado, August 13, 1941; adult male, FMNH No. 1134 taken at Grand Junction, Mesa County, Colorado; and a young male FMNH No. 26879 taken at Mesa, Mesa County, Colorado, July 18, 1927.

*Type locality.*—Parriott Ranch at a spring at foot of a sandstone ridge about two miles southeast of the Colorado River bridge and about one mile north of Moab, Grand County, Utah.

*Diagnosis.*—A grayer smaller race, usually less than 1000 mm. in length with reduced scalation numbers and increased pattern blotches.

*E. l. intermontanus* has a grayish tinge (in alcohol) to the dorsal background which appears to be absent from the brown background of *laeta*. In the ventral color pattern, plates without spots are numerous enough to be conspicuous in the Texas specimens but are rare in those from the Colorado Basin, which appear more densely spotted.

Fig. 2 analyzes the average divergences of certain characters in each sex between *laeta* and *intermontanus* on the basis of specimens from Texas and the Colorado Basin. *E. l. intermontanus* has fewer ventral plates but more and shorter dorsal blotches. In addition, the average scalation is lower wherever variable: i. e. in scale formula, lower labials, and ventrals.

*Description of holotype.* Total length 875 mm., tail length 160 mm.; body subcylindric deeper than wide, flattened ventrally; neck slightly constricted, tail tapering. The back is crossed by 43 dorsal blotches. Color in alcohol: the dorsal background is a light grayish brown (mauve taupe 7C8<sup>1</sup>). The transverse dorsal blotches are but slightly darker brown (chicle 7C9 or 7C10) but are edged or outlined by a dark brown or blackish ring. These dorsal blotches alternate with lateral large rounded brown spots of similar color and similar dark edges lying along the sides. These spots in turn alternate with smaller spots (one or two) of similar color lying just above the edge of the ventrals, many of which are nearly obsolete.

The dorsal blotch of the neck, instead of being transverse, runs forward and parts in the middle on the back of the head, widens to the parietals

<sup>1</sup> All colors are referred to plates in the color dictionary, Maerz and Paul, McGraw Hill Co., 1930.

and then converges to rejoin on the frontal. A dark or dark bordered stripe runs forward along each side of the head, across the posterior upper labials, temporals and postoculars to the eye, thence over the edges of the posterior part of the prefrontals and tip of the frontal (nearly obsolete) to join in the middle. A stripe of lighter color separates these two dark stripes, crossing some temporals, edge of parietal, supraocular and frontal. A similar light stripe beginning on the upper labials, runs up in front of the eye and over the head involving the preocular, loreal and anterior parts of the prefrontals.

The ventral ground color is white or creamy (9C1 or 2) and is distinctly spotted, usually two squarish spots on a plate, some with a spot at each end, others with two spots near the middle, giving the appearance of four rows, mostly on alternate plates, except on the tail where the plates are divided, a single blotch tends to occur on each plate, and gives the appearance of two rows under the tail, the blotches occurring on nearly every plate.

Scalation: scale formula 25-27-19; abdominal plates 203, caudal plates 2 rows of 68, total ventrals 271; anal divided; head—rostral wider than high, in contact with first upper labials, prenasals and internasals; upper labials 8-8, lower labials 12-13; internasals in contact with pre- and post nasals and prefrontals; loreal trapezoidal, in contact with 2 and 3 upper labials, postnasals, preocular and prefrontals; upper labials 4, 5, and 6 enter eye ring; frontal widest in front where it corners on preoculars and wedges between parietals behind; first lower labials in contact behind mental; first pair of genials contact 1 and 2 labials anteriorly, 3, 4 and 5 laterally, each other centrally, 2nd pair of genials and a pair of small gular scales posteriorly; 2nd pair of genials in contact with lower labials 7 and 8, and separated by 2 pairs of small gular scales.

*Variation of types.* The color pattern is much more distinct in the allotype and all the paratypes except FMNH 1134 which is considerably less distinct. This suggests that the color pattern tends to become obsolete in old specimens. The dorsal blotches range in number on the body from 42 to 50 in males and 44 to 55 in females and on the entire snake from 60 to 73 in males and 62 to 77 in females. In longitudinal length along the snake, blotches are longer than interspaces, the latter varying on the body from 44 to 60% in males and 56 to 81% in females. There is considerable variation in the details of color patterns in various specimens.

The scale formula in six specimens is 25-27-21. The abdominal plates range from 203 to 215 and the caudals from 63 to 69. The upper labials are 8 with one exception of 9. The lower labials range from 11-11 to 12-13. Minor detailed variations occur in the arrangement of gulars around the genials.

The shape of the body cross-section varies somewhat, possibly with age, the younger or smaller specimens tending toward cylindrical or circular ventrally flattened and the older or larger specimens tending to stand up higher, being deeper than wide and with similar ventral flattening.

*Specimens.* In addition to the types examined, a specimen (UCLA 198) from Rito de Los Frijolis, Sandoval County, New Mexico, July 27, 1933, falls in this race and a specimen from Green River near the mouth of Sand

Wash about 2 or 3 miles above the mouth of Minnie Maud Creek, and about 15 miles downriver from Ouray, Unita County, Utah, collected by Wallace F. Wood June 2, 1933, although not examined, will presumably also fall in this race.

*Range.* The Colorado River Basin of Utah and Colorado; and also probably the mountainous region of northern New Mexico, possibly extending southward.

*Habitat.* The four snakes taken from the type locality were occupying a streamside habitat of trees and cultivated fields. The specimen taken on Green River was found in late afternoon crawling about in streamside cottonwood trees on the bank of the river. The one from northern New Mexico was found under a dead log in ponderosa pine and boxelder forest.

*Comment.* Mosauer (Occ. Papers Mus. Zool., Univ. Mich., 1942, 246:15) reports taking a specimen in extreme western Texas at Frijole, at the south end of the Guadalupe Mountains where they extend south from New Mexico. The characters given indicate that it falls within the limits of *intermontanus*, whose range may extend even farther south.

The noticeable reduction in scalation from the Texas specimens to those of Nebraska, extreme western Texas, New Mexico, and the Colorado Basin in Utah and Colorado suggests the idea that the reduction is an isolation phenomenon. That it might be a latitudinal phenomenon, seems hardly tenable in view of the geographic relationships involved.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

---

COMMENTS ON THE *UNDULATA* GROUP OF  
*AMEIVA* (SAURIA).

By L. C. STUART.

---

In a recent paper Dunn<sup>1</sup> has clarified the nomenclature of the lower Central American Ameivas. Of the various species discussed *Ameiva leptophrys* Cope is the only one which falls within the difficult *undulata* complex so common in northern Central America. This group, through the investigations of Smith<sup>2</sup> and Hartweg and Oliver,<sup>3</sup> had begun to sort out into closely related, though quite distinct, populations. Just as the entire problem seemed well in hand, however, I collected in the semi-arid Cahabón Valley of the Alta Verapaz, a series of specimens which throws the situation into worse than its former confusion. Before discussing the problem further I present the following description of this population which is taxonomically distinct:

***Ameiva chaitzami*, sp. nov.**<sup>4</sup>

*Holotype*.—An adult male, University of Michigan, Museum of Zoology No. 90368. Collected April 15, 1940, by L. C. Stuart.

*Type locality*.—Along Cahabón-Lanquín trail about 2 km. north of Finca Canihor (about 38 km. E N E [straight line] of Cobán, Alta Verapaz, Guatemala).

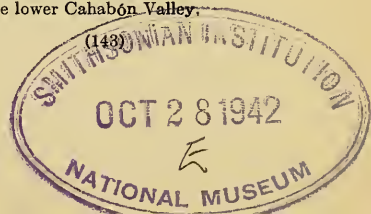
*Diagnosis*.—An *Ameiva* almost identical with *Ameiva undulata stuarti* Smith from which it may readily be distinguished by the fact that the median parietal is divided longitudinally to produce four instead of three parietals.

<sup>1</sup> Dunn, E. R., New and Noteworthy Herpetological Material from Panama, Proc. Acad. Nat. Sci. Phila., 92, 1940: 113-115.

<sup>2</sup> Smith, Hobart M., Descriptions of New Lizards and Snakes from Mexico and Guatemala, Proc. Biol. Soc. Wash., 53, 1940: 55-56.

<sup>3</sup> Hartweg, Norman and Oliver, James, A Contribution to the Herpetology of the Isthmus of Tehuantepec II. The Teiids of the Pacific Slope, Occ. Pap. Mus. Zool., Univ. Mich., 359, 1937: 7-8.

<sup>4</sup> Dedicated to Chaitzam, the mountain lord who dominates the lower Cahabón Valley.



*Description of holotype.*—Rostral moderately narrow, followed by anterior nasals which contact each other mid-dorsally. Frontonasal single; prefrontals contacting postnasals laterally, thus separating frontonasal from loreals. Frontal large, almost hexagonal; 2 frontoparietals and 4 parietals followed by several slightly-enlarged, irregularly-arranged plates which end abruptly at the nape. Supraoculars 4/3, the first completely and the second partially in contact with the supraciliaries; posterior supraoculars separated from the superciliaries by a single row of granules. Posterior portion of third supraocular on one side and entire fourth on the other side separated from frontoparietals by several small scales. Loreal large; 7 supralabials and 8 infralabials, the last three very narrow. Ear large. Eight longitudinal rows of abdominal scutes. Dorsal and lateral caudals keeled, ventral caudals smooth. One row of enlarged radials, 2 of enlarged humerals, 3 of femorals and 2 of tibials. Femoral pores, 16/17. Single median row of enlarged gulars surrounded by subequal granules; enlarged but irregularly arranged scutes on throat collar. Prenasals in 2 longitudinal rows.

*Color in spirits.*—Top of head and mid-dorsal area of body, olive brown. A dorsal lateral stripe of bluish white commencing at the posterior corner of the eye and extending posteriorly to about 1/3 the way back on the tail. This stripe bordered above by a black band whose medial edge is irregular. Below this white stripe is a broad black band beneath which lies a second light stripe commencing at the eye and extending posteriorly above the tympanum and continuing posteriorly onto the tail. This lower stripe is broken into spots above the axilla and is interrupted by the leg insertions. Vento-laterally below the light stripe the body is black with a few irregular vertical bluish white bars. The legs and arms are olive brown above, mottled with black and bluish white. The anterior surfaces of the thighs are black with blue spots. The ventral surfaces are bluish, darkest on abdomen, and the sides of the head are blue mottled with black. The tail is brown above with a broken, mid-dorsal black stripe and laterally is marked with a continuation of the body stripes. Under surface of the tail brownish white.

Body measurements are as follows:

Head to occiput, 20 mm.	Fore limb to tip of digit IV, 23 mm.
Occiput to above anus, 50 mm.	Hind limb to heel, 24 mm.
Tail, 150 mm.	Heel to tip of digit IV, 28 mm.

*Paratypes.*—University of Michigan, Museum of Zoology Nos. 90639–43, collected within a few kilometers of the holotype.

*Range.*—Known only from the type locality but probably distributed throughout the savanna area of the semi-arid lower Cahabón Valley below about 1000 m. from Lanquín (30 km. [straight line] E N E from Cobán) to Taquincó (56 km. [straight line] E from Cobán).

*Remarks.*—The paratypic series is essentially like the holotype in all respects. A female with a head-body length of 66 mm. containing well formed eggs, thus indicating that this is a much smaller species than *stuarti* which it resembles closely. In habits I was unable to distinguish

this species from *A. u. hartwegi*, which was very abundant throughout the Cahabón Valley.

*Relationships.*—Any discussion of the relationships of *chaitzami* must include a survey of the various forms which comprise the *undulata* group. To allocate individuals of this group presents an almost hopeless task, yet when a series of specimens is considered, a collective population is not too difficult to name. Despite the tremendous individual variation and often broad areas of intergradation, definite races are, though possibly little more than incipient, plainly visible when viewed *in toto*.

As yet it is too early to do more than outline briefly the races which occur through Middle America, for there are still tremendous gaps in our data, and our collections are often too sporadically distributed to permit the interpretation of variations or to fix with certainty phylogenetic relationships. Notwithstanding these difficulties I am of the opinion that the *undulata* group presents a rather clear-cut complex of closely related forms, which, when all the material has finally been assembled and studied in detail, should produce a relatively simple taxonomic and geographic picture. In the following, however, I have made no attempt to study the variations critically, and my concept of the races is based for the most part upon familiarity gained through the mere handling of hundreds of specimens rather than upon detailed statistical analysis of the various characters.

The following is a check list of the forms of the *undulata* group which I believe I can recognize:

*Ameiva undulata undulata* (Wiegmann).

*Cnemidophorus undulatus*, Wiegmann, Herpet. Mex. 1834: 27 (type locality, Mexico by inference; restricted to the Tehuantepec, Mexico, race by Smith, *op. cit.*: 56 and not by Hartweg and Oliver as stated by Smith.)

*Range.*—Pacific lowlands of Mexico from Tehuantepec to Colima, inclusively.

*Remarks.*—Specimens from Colima differ slightly from the Tehuantepec material, and I am of the opinion that when material is forthcoming from the intervening regions, a race will be named to include the populations along the Pacific coast west of Tehuantepec. For the present, however, I prefer to include the Colima material under typical *undulata* and extend its range along the Pacific lowlands, Tehuantepec through Colima.

*Ameiva undulata parva* Barbour and Noble.

*Ameiva undulata parva*, Barbour and Noble, Bull. Mus. Comp. Zool., 59, 6, 1915: 476 (type locality, Guatemala).

*Range.*—Along the Pacific slopes from Tehuantepec, Mexico, to Costa Rica.

*Ameiva undulata hartwegi* Smith.

*Ameiva undulata hartwegi*, Smith, Proc. Biol. Soc. Wash., 53, 1940: 55 (type locality, Chiapas, Mexico, across Rio Usumacinta from Piedras Negras Guatemala).

*Range.*—Caribbean lowlands from Campeche, Mexico to Honduras.

*Ameiva undulata stuarti* Smith.

*Ameiva undulata stuarti*, Smith, Proc. Biol. Soc. Wash., 53, 1940: 55 (type locality, Palenque, Chiapas, Mexico).

*Range*.—Lowlands of Caribbean Mexico from Tamaulipas to Campeche.

*Ameiva undulata pulchra* Hallowell.

*Ameiva pulchra*, Hallowell, Proc. Acad. Nat. Sci. Phila., 1860: 483 (type locality, Nicaragua).

*Range*.—Caribbean Honduras southward to Costa Rica.

*Remarks*.—Dunn (*loc. cit.*) does not indicate whether or not *parva* or *pulchra* meets *leptophrys* in Costa Rica nor does he express an opinion as to the status of *amivoides* of Cope (Proc. Acad. Nat. Sci. Phila., 1894: 198; type locality, La Carpintera, Costa Rica). He has informed me (*in litt.*), however, that, though he expects a Caribbean *undulata*, in Costa Rica none has as yet been discovered. He has recently discovered, moreover, two specimens from Pozo Azul de Pirris, Costa Rica, one of which is *leptophrys*, the other *parva*. Lacking other material, however, he hesitates to consider these specimens either as proof of overlapping between the two or as members of an intergrading population. He similarly informs me that *amivoides* may eventually be shown to be distinct from *parva* and be restricted to the central plateau of Costa Rica. It is possible that between *leptophrys* and *pulchra* there may be another race. Similarly *Ameiva festiva miadis* Barbour and Loveridge (Bull. Mus. Comp. Zool., 69, 7, 1929: 141; type locality, Great Corn Island) needs further study before it can be definitely allocated. Through material from southern Nicaragua and western Costa Rica an expression of the relationships between *parva*, *pulchra*, and *leptophrys* may be found. Lacking such material, the following form is accorded specific status entirely because of its greater degree of differentiation (see below).

*Ameiva leptophrys* (Cope).

*Ameiva leptophrys*, Cope, Proc. Amer. Phil. Soc., 31, 1893: 341 (type locality Buenos Ayres, Costa Rica).

*Range*.—"Entire Pacific coast from Darien on into Costa Rica as far as Buenos Ayres. Atlantic coast only in Canal Zone and Porto Bello. Up to 2000 feet at El Valle" (Dunn, *loc. cit.*).

*Ameiva chaitzami* Stuart (see above).

In diagnosing the above forms a number of characters prove useful but few are infallible and, for the most part, they can be applied only to populations rather than to individuals. The nature of the throat scales, whether abruptly enlarged medially or whether arranged in a single longitudinal row, offers an important taxonomic character. In *stuarti* and *chaitzami*, for instance, these scutes are almost consistently arranged in a single longitudinal series, but such an arrangement may occur also in *pulchra* and in the Colima population of *undulata*. A similar arrangement occurs in typical *undulata* but, though difficult to define the differ-

ences between the two, no one familiar with the two forms would ever confuse them.

The single series of preanals were found by Hartweg and Oliver (*loc. cit.*) to prove diagnostic of 92 per cent of the specimens of *undulata*, but this character is much less reliable in the diagnosis of the Colima population. In other forms there is a marked tendency towards a double row of preanals.

Smith (*loc. cit.*) utilized the number of femoral pores and the number of lamellae beneath the fourth toe. That an average difference does occur in these characters can not be denied, but they prove utterly useless in diagnosing the various forms. Only in *leptophrys* which has an extremely high femoral pore count does it seem to be characteristic.

The nature of the granules surrounding the enlarged supraocular plates may eventually prove of considerable usefulness. Hartweg and Oliver (*op. cit.*: 3-7, fig. 2) utilized the character with success in diagnosing several forms of *Cnemidophorus*, and in *parva* and *leptophrys* I have found that there is a marked tendency for the posterior supraocular scale to be more completely separated from the superciliaries and the frontoparietals than in other forms.

Three other characters, however, seem less variable than those listed above, and seem to offer features of some phylogenetic import. The first of these is the consistent lack of lateral contact between the postnasals and the prefrontals in *leptophrys*. In all other forms of the group these two scales contact each other between the loreals and the frontonasals on either side. The longitudinal division of the median parietal to produce four instead of three parietals is unique in *chaitzami*. There is, however, a tendency for the posterior head plates of *leptophrys* to divide and the occurrence of a row of azygous scales between the frontal and parietals is not uncommon in this latter.

Dunn (*loc. cit.*) made studies on the dorsal pattern of the group and concluded that it was of little use as a diagnostic character. My own observations do not bear out his conclusions. In studying pattern several difficulties arise: first, there is ontogenetic change in pattern, and, secondly, there is, in some instances, sexual dimorphism in the adult pattern. The juveniles, both male and female, of all forms possess a light brown mid-dorsal area (often with darker mottlings) generally bordered laterally by a narrow light line. Below this line is a very dark stripe, then another narrow white line (often broken into a series of elongate spots) below which the dark ground color continues to the ventrum. The pattern is definitely striped and not unlike that described above for *chaitzami*, and with minor modifications this type of pattern prevails in the adult males and females of *stuarti* and *leptophrys* as well.

In other forms, however, the juvenile pattern gives way to one of vertical light and dark bars in adult males, while in the females of these forms the two patterns seem to intergrade, the vertical bars being plainly evident but the white ones expanded on the side to show definitely the remnants of the juvenile light lateral stripe.

In attempting to arrange the above characters in an effort to determine phylogenetic relationships, several features attract immediate attention.

First is the similarity in the pattern of adult males in three widely-separated forms, *leptophrys*, *stuarti*, and *chaitzami*. Second is the tendency of the posterior head scales to break up in *leptophrys* and *chaitzami*, and finally, there is a high femoral pore count, and the contacting loreal and fronto-nasal in *leptophrys*. Thus starting with the adult pattern as a basis, three forms are readily separable from the others and they show decreasing amounts of differentiation from south to north, *leptophrys* being widely different from *chaitzami* and this latter only slightly different from *stuarti*. Furthermore the somewhat smaller ranges of these three is suggestive of a relict condition, a suspicion strengthened by the lack of intergrades between *pulchra* or *parva* and *leptophrys* and the fact that *chaitzami* retains its identity though occurring in the same habitat with *hartwegi*. I have examined, however, what I believe to be intergrades between *stuarti* and *hartwegi* from Tabasco.

The remaining forms of the group—all those with the barred pattern in adult males—are poorly differentiated. The transition between them is probably broad (Alta Verapaz, Guatemala to northwestern Honduras in *pulchra* or *hartwegi*) and except in the case of *stuarti* and *hartwegi* they show no tendency to intergrade with the striped types. There is, however, some similarity between *parva* and *leptophrys* in the complete isolation of the third supraocular from the superciliaries and the frontoparietals.

It is evident from the above that we may be dealing with two groups, one (*leptophrys*, *stuarti*, and *chaitzami*) much older, well differentiated, and now possessing smaller ranges, the other made up of little more than incipient races, extremely variable, and actively evolving. Between these two only the *stuarti-hartwegi* intergrades present a connecting link. Further exploration in the south may, however, reveal populations intermediate between *leptophrys* and either *pulchra* or *parva* or both. For the present I am unable to draw any definite conclusions and I offer the above as a mere statement of the problem with some of its more suggestive approaches.

#### KEY TO THE UNDULATA GROUP OF AMEIVA.

- |   |                   |
|---|-------------------|
| A. Posterior nasals separated from prefrontals by frontonasal .....   | <i>leptophrys</i> |
| AA. Posterior nasals in contact with prefrontals .....  | B                 |
| B. Median gulars abruptly enlarged .....  | C                 |
| C. Enlarged medial gulars arranged in a single longitudinal series .....  | D                 |
| D. Four parietal plates .....   | <i>chaitzami</i>  |
| DD. Three parietal plates .....   | <i>stuarti</i>    |
| CC. Enlarged median gulars more or less irregularly arranged .....  | E                 |
| E. Two rows of granules between third supraoculars and superciliaries; third supraoculars generally completely separated from frontoparietals by granules ..... | <i>parva</i>      |
| EE. A single row of granules between third supraoculars and superciliaries; third supra-  |                   |

- oculars in contact with frontoparietals anteriorly.....F
- F. Preanals in a single longitudinal row (Tehuantepec) or a single, large, central preanal followed by a smaller one on either side (Colima); rarely arranged in 2 longitudinal rows.....*undulata*
- FF. Preanals in two longitudinal rows.....*pulchra*
- BB. Median gulars enlarged but grading gradually into smaller surrounding throat scales.....*hartwegi*

ACKNOWLEDGMENTS.

I take this opportunity to acknowledge the stimulating discussions I have had with Hobart Smith and Norman Hartweg and the helpful correspondence with E. R. Dunn on the subject of *Ameiva*. Grants from the Horace H. Rackham School of Graduate Studies and from the Baird Endowment Fund, both of the University of Michigan, which have supported my Guatemalan studies initiated my interest in and enabled me to collect specimens of these lizards.





4. 0673

Library

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON SOME FROGS FROM PERU AND ECUADOR.

BY GEORGE S. MYERS,

Natural History Museum, Stanford University, California.

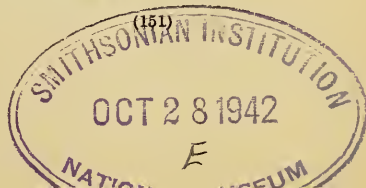
In connection with some notes I have to present on the strange, casque-headed Hylid, *Tetraprion*, it seems desirable to record a few other species from Ecuador and Peru, one of them apparently undescribed. Most of the frogs form part either of a small Ecuadorian collection purchased by the Natural History Museum of Stanford University from Mr. William Clarke-Macintyre of Quito or of a rather extensive series received from my friend Mr. William G. Scherer of the Evangelical Mission at Pevas, Peru. The Pevas frogs were collected by Mr. Scherer's son, Paul Scherer, to whom I take pleasure in dedicating the new species. One of the *Tetraprion* was a gift from my former classmate, Dr. Donald L. Frizzell, of Negritos, Peru.

*Edalorhina perezii* Jiménez de la Espada.

One fine example (no. 5043) from Avila, Rio Napo, Ecuador, at 500 meters, May 1939, Wm. Clarke-Macintyre. This is one of the most unusual and delicately marked of frogs, and records of it are extremely rare.

*Eupemphix schereri*, new species.

*Diagnosis*.—A *Eupemphix* with a median tarsal tubercle, a variable series of lateral dermal glands in front of the groin, the upper surfaces rough with minute rounded spinescent warts of unequal size, a well developed lateral parotoid gland (without distinct superomedian border) behind the tympanum, tympanum dorsally obscured but its anteroventral half distinct and its size two-thirds the diameter of the eye, a projecting snout, slender fingers with expanded rounded tips, first finger longer than the second, sole without tubercles except the two metatarsals and the normal strong subarticular ones on the free parts of the toes; tibiotarsal articulation reaching the eye when leg is brought forward, undersurfaces uniformly smooth, a large black inguinal spot which includes all or nearly



all of the largest (posteriormost) pre-inguinal gland, the large black spots of the undersurfaces confined to the lower belly and hind legs, the posterior part of the belly and underparts of legs with white ground color, the breast and throat becoming progressively darker brown forward, a median light line from the chin to the end of the dark breast color, and anchor-shaped terminal phalanges.

*Holotype*.—Stanford Amphibian Cat. no. 6317, a female taken at Pevas, at the mouth of the Ampiyacu River, Amazonian Peru, in 1940, by Paul Scherer.

*Paratypes*.—Cat. nos. 6316, 6318, 6319, three examples of similar size taken at the same locality by the same collector.

*Measurements of the holotype in mm.*—Snout tip to vent 30. Total length with legs outstretched 75. Eye 3.5. Femur from midline of body 15. Femur 16. Foot from tibiotarsal joint to tip fourth toe 22. Width head at ricti 10.

*Comparisons*.—Unfortunately I have comparative material only of *E. pustulosus* from Panama. From that species *schერი* is abundantly distinct in the total absence both of the longitudinally elongated warts of the dorsum and of the numerous crowded unequal tubercles which cover the sole in *pustulosus*, not to mention the partially free tympanum. The other species bearing a median tarsal tubercle all have longer legs than *schერი*, except *ruthweni*, which has a shorter first finger. *E. schერი* is doubtless close to *petersi*, but appears to differ in the half obscured tympanum, the longer first finger, the presence of smooth flat warts on the dorsum, and perhaps in the color, which is not too well described for *petersi*.

*Hyla reticulata* Jiménez de la Espada.

Two specimens of this rare and bizarre little frog (nos. 6322–6323) from Pevas, Rio Ampiyacu, Amazonian Peru, collected in 1940 by Paul Scherer. In the smaller, most of the dorsum and leg surfaces are whitish with a few rounded, closely appressed maroon spots with white interspaces down the back; the sides of the snout, surfaces of the arms, and some of the sides with maroon spots and narrow white interspaces forming a giraffe-like reticulation. The larger example is not whitish, but brown, and the dorsal band of spots, as well as those on the legs, are also set close in a reticulated pattern. I have never seen quite such a striking color pattern in a frog.

*Tetraprion jordani* Stejneger and Test.

On Feb. 19–20, 1938, I was the guest of Señor Raphael Valdez, chief of the great "Ingenio Valdez," at Milagro, thirty or forty kilometers up the Quito railroad from Guayaquil. After a very pleasant dinner with Señor and Señora Valdez at their new home, we walked down the street to the old residence, which Señor Valdez had graciously turned over to us for the night. Upon opening the screen-door of the porch, a tree-frog hopped from the step across my foot and was promptly caught. Next day I took the frog back to Guayaquil with me, and kept it alive in a wetted sack for a week or more on shipboard. The creature was very alert, with greatly protruding eyes, but nothing in its appearance suggested anything

more than one of the numerous, larger, long-legged, flat-headed, plain brown *Hylas* common in South America.

Upon preservation, however, the creature's head bent sharply forward at the basicranial line, and later, upon examination in the laboratory, the presence of parasphenoid and palatine teeth, together with the hard, bony skull, immediately placed it as the long-lost *Tetraprion jordani*, described in 1891 from a single, poorly preserved example from Guayaquil, and never, to my knowledge, seen since.

It is rather amusing to note that this frog was described the very year Stanford University opened, that it was named for the late David Starr Jordan, first president of Stanford, and that its rediscovery awaited the nearly half-century-later chance meeting of a frog and a Stanford zoologist upon a doorstep during the only night the zoologist spent on Ecuadorian soil.

In 1941, Dr. Donald L. Frizzell, a Stanford classmate of mine who is now an oil geologist at Negritos, in northwestern Peru, sent us a small herpetological collection containing a third specimen of *Tetraprion jordani* caught by himself and Mrs. Harriet Frizzell on Puná Island, in the Guayas estuary. This third example is an adult and shows that the type and my Milagro specimen were both immature and do not exhibit the full cranial development of the species.

The Milagro frog (Cat no. 2272) is 50 mm. in length and shows no appreciable supra-ocular, rostral, or basicranial expansions of the cranial casque. The edges of the snout are rounded, the basicranial transverse ridge is barely evident, and the top of the skull, though concave, has no well developed superior ridges. The rostral notch, evident in the figure of the type, is barely indicated. The Puná Island frog (Cat. no 6407) is 79 mm. from snout to vent. Its casque shows a bizarre development comparable to that of *Tripurion* and *Diaglena*. The flange of the upper lip is produced evenly outward all the way around from rictus to rictus, the flange being level in side view. At the snout-tip there is a deep, narrow, median cleft back to the "normal" point of the snout, the two ends of the lip flange flanking the cleft each being here developed into a small boss. Separated from these adjacent bosses, but running backward from them to each eye, are the two separate, prominent, gently up-sloping, highly developed canthal ridges, the skull between them deeply concave. Below these canthal ridges the lores are also deeply concave. The nostrils, set just behind the bosses and below the anterior origins of the canthal crests, are more than three times as far from the eyes as from the snout tip. The tympana have heavy "eaves" over them formed by the projecting lateral edges of the cranial plate, and the hind border of this plate is upraised into a well developed bony rampart across the basis cranii. On each side of the midline, this rampart is sigmoid in its rear elevation; beginning at the depressed center, it rises, rounds off, and slopes downward concavely to the rear end of the tympanal eaves.

The belly is roughly but evenly granular, the midsection of the dorsum almost completely smooth, and the sides are roughened by the very coarse, wartlike granulation. Upper surfaces of legs almost completely smooth.

The question of the generic arrangement of the casque-headed Hylids is a vexed one. It is generally held but perhaps not formally advocated view that the various "genera" have been separately derived from different species or sections of *Hyla* and that the similar cranial modifications do not necessarily indicate direct relationship. I must dissent from this view. I have compared *jordani* with examples of *Tripriion petasatus* and *Pternohyla fodiens*, as well as with *Diaglena spatulata*,<sup>1</sup> and have rather carefully examined the accounts and figures of *Corythomantis*, *Aparasphenodon*, and *Garbeana*. The cranial casques of certain of these genera bear such a close similarity of pattern (if not of detail) that I find it hard to believe that they are not derivatives of a single stock. This applies particularly to *Diaglena*, *Corythomantis*, *Tripriion*, and *Tetrapriion*, and in my opinion these genera should be grouped together. The fact that certain fresh-water fishes of western Ecuador bear a close faunal relation to Central American forms lends some support to the direct relationship of the Mexican frogs with *Tetrapriion*, while the isolation of some of the forms in southern Brazil is paralleled by the relation of certain fishes of the southern Brazilian streams (*Hollandichthys*) to those of western Ecuador (*Pseudochalceus*). Moreover, *Garbeana* has an intermediate range, in the Amazon basin. *Pternohyla* and *Aparasphenodon* seem rather different, and may not belong to the *Tripriion-Corythomantis* series, but I hesitate to express any definite opinion without seeing the latter genus. *Hyla ceratophrys* from Panama may also belong to the casque-headed group but its position is still obscure.

It will be noted that I retain the monotypic genus *Tetrapriion*. *Tripriion* has been held abundantly distinct from the other casque-headed forms because of the vertical pupil, a character that many herpetologists now feel is often of lesser importance than formerly thought. After comparing *jordani* directly with *petasatus* and *spatulata* I am quite sure that it is even more distinct from the latter than from the former, and although I believe all three to be rather related, I think that the actual relationships are best expressed by recognizing each as a distinct genus. Taylor's recent (1942) description of a new form, *Diaglena reticulata*, from Oaxaca, agreeing with *Diaglena spatulata* in all of the characters I consider to be essentially generic strengthens my view that *Tripriion*, *Diaglena* and *Tetrapriion* should be regarded as of generic rank. To ignore all the other characters and place *Tetrapriion* in *Diaglena* merely because of the pupil shape and palatine teeth (as Nieden and others have done), completely violates my own conception of the relationships, since I consider *Diaglena* to be somewhat closer to *Tripriion* than to *Tetrapriion*, in spite of the pupil and palatine teeth. More real difficulty is likely to appear in working out the relationships of some of the Brazilian forms to *Tetrapriion*, but until I have seen specimens of them I prefer to withhold judgment. From the figures, none of the Brazilian genera seem to have a "split snout" like that of *Tetrapriion*.

My views of the relationships are expressed in the following synopsis:

<sup>1</sup> I must thank Dr. E. H. Taylor for his great kindness in lending me two fine examples of *Diaglena spatulata*.

- 1a. Upraised canthal ridges not confluent anteriorly to form a median ridge; labial flange of cephalic casque strictly rectilinear in side view, not projecting far beyond jaws and its tip deeply but narrowly notched in adults; vomerine, parasphenoid and palatine teeth present; pupil round.....1. *Tetraprion*.
- 1b. Upraised canthal ridges confluent anteriorly to form a short to long median rostral ridge; labial flange of cephalic casque curved in side view, its tip entire and projecting far beyond jaws; vomerine, parasphenoid and sometimes palatine teeth present.
  - 2a. Pupil rounded or squarish; palatine teeth present; labial flange of cephalic casque curved and with a sharp upwardly directed angle before level of eye.....2. *Diaglana*.
  - 2b. Pupil a vertical slit; no palatine teeth; labial flange of cephalic casque curving rather smoothly upward and then backward, without a sharp angle before level of eye....3. *Tripriion*.

Taylor notes that in *Diaglana reticulata* the canthal ridges do not unite to form a prominent, median, rostral ridge as in *D. spatulata*. However, his specific description and figure show that the canthal ridges unite and that a short, low, rostral ridge is present. Some may argue that the characters relating to the cephalic casque are only specific and have no place in a generic key. But an inspection of these three genera will show the considerable differences in the cranial ridge *pattern* in these frogs, differences which I can regard only as generic.

*Dendrobates parvulus* Boulenger.

One typical specimen (no. 6332) from Pevas, Ampiyacu River, Amazonian Peru, collected in 1940 by Paul Scherer.

*Hyloxalus fuliginosus* Jiménez de la Espada.

One example of this rare frog (no. 5076) from Abitagua, Oriente, Ecuador, altitude 1200 meters, August, 1939, Wm. Clarke-Macintyre.

*Elachistocleis ovalis* (Schneider).

One example (no. 3152) from Pevas, Rio Ampiyacu, Amazonian Peru, Sept. 22, 1937, Paul Scherer, agrees entirely with this species in the structure of the pectoral girdle, but differs widely in color. The dorsum and upper leg surfaces are light brown, with a longitudinal median cloudy area the rear borders of which bear a small blackish spot above each groin and run on to form a bar across each femur, tibia and tarsus. The edge of the dorsal light color is very sharply defined, all the way from the snout tip and upper eyelid to the knees, by the deep brown color of the sides, which gradually lightens below till it merges into the brown reticulation of the belly and under surfaces of the legs. Throat dark, lightening towards chest, with a median light hair line.



4. 0673

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW WHITE-FOOTED MOUSE FROM MEXICO.

BY E. A. GOLDMAN.

The accumulation of additional specimens of the *Peromyscus leucopus* group, from Mexico, has indicated the desirability of recognizing as a regional race material hitherto assigned to neighboring forms. The new race inhabits the tropical lowlands of Vera Cruz and adjoining states, mainly in the Humid Lower Tropical Zone, extending along the coast of the Gulf of Mexico from southern Tamaulipas to the Isthmus of Tehuantepec. It may be known by the following description:

***Peromyscus leucopus incensus*, subsp. nov.**

VERA CRUZ WHITE-FOOTED MOUSE.

*Type*.—From Metaltoyuca, Puebla, Mexico (altitude 800 feet). No. 93069, ♀ adult, U. S. National Museum (Biological Surveys collection); collected by E. A. Goldman, January 28, 1898. Original number 12107.

*Distribution*.—Tropical lowlands, bordering the steep eastern slope of the interior plateau, from southern Tamaulipas (Alta Mira) and eastern San Luis Potosi south through eastern Puebla to southern Vera Cruz and northeastern Oaxaca (Guichicovi).

*General characters*.—A tropical subspecies with upper parts suffused with "cinnamon buff" (Ridgway, 1912). Closely allied to *Peromyscus leucopus mesomelas* of the adjoining mountainous interior near Orizaba and Jalapa, Vera Cruz; color of the upper parts much less blackish, more strongly suffused with "cinnamon buff." Similar to *Peromyscus leucopus texanus* of Texas, and *Peromyscus leucopus affinis* of the southern side of the Isthmus of Tehuantepec, but upper parts distinctly darker, less grayish, more suffused with "cinnamon buff" than either. Differs from *Peromyscus leucopus castaneus* of Campeche in larger size, and somewhat darker general coloration, with brighter buff suffusion.

*Color*.—*Type* (winter pelage): Upper parts in general near "cinnamon buff," mixed with black, the buff most distinct along the abrupt line of demarcation between upper and under parts, and the black predominating along median line of dorsum; outer sides of forearms and thighs "dark



grayish brown"; under parts overlaid with dull white; ears blackish; feet whitish; tail scantily haired, light brownish above, dull whitish below. In other specimens the upper parts vary to "cinnamon" in admixture, and the ears may be faintly edged with white. In three of the 15 examples from the type locality very small "pinkish cinnamon" pectoral spots are present.

*Skull.*—About as in *texanus* and *mesomelas*; somewhat smaller and lighter than in *affinis*; skull larger than that of *castaneus*, with more elongated rostrum; premaxillae and nasals more nearly conterminous posteriorly (premaxillae not reaching ends of nasals in *castaneus*).

*Measurements.*—*Type*: Total length, 178 mm.; tail vertebrae, 76; hind foot, 23.5. Average of 10 adult topotypes: Total length, 171.6 (158–185); tail vertebrae, 76.4 (72–81); hind foot, 22.7 (21.5–24.5). *Skull* (type and an adult male topotype, respectively): Occipitonasal length, 26.6, 26.2; condylobasal length, 24.4, 26.3; zygomatic breadth, 14.2, 13.3; interorbital constriction, 4.6, 4.5; length of nasals, 11.1, 10.4; length of incisive foramina, 4.4, 4.7; length of palatal bridge, 4.6, 4.2; maxillary tooth row, 3.5, 3.7.

*Remarks.*—The marked contrast in color between *incensus* and *mesomelas*, which occur near together, is no doubt due to widely differing environmental conditions. The former inhabits the coastal lowlands mainly humid but varying to rather arid in character, while the latter is restricted to the cloud-forested mountains at higher elevations along the eastern flank of the interior plateau.

*Specimens examined.*—Total number, 38, as follows:

Oaxaca: San Juan Guichicovi, 1.

Puebla: Metaltoyuca (type locality), 15.

San Luis Potosi: Valles, 4.

Tamaulipas: Alta Mira, 15 (1 skin without skull).

Vera Cruz: Otatitlan, 2 (1 skin without skull); San Andres Tuxtla, 1.

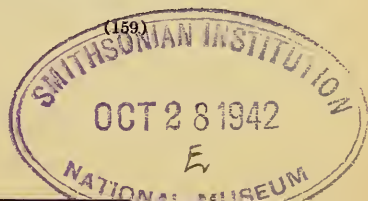


PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTONADDITIONAL NOTES ON MEXICAN SNAKES OF THE  
GENUS *PLIOCERCUS*.

HOBART M. SMITH.

Recent treatments of *Pliocercus*, defining two races of *elapoides* in the southern part of the Yucatán peninsula (Smith, Proc. Biol. Soc. Wash., vol. 54, 1941, pp. 119-124; Schmidt, Zool. Ser. Field Mus. Nat. Hist., vol. 22, 1941, pp. 502-503), have left in doubt to which, if either, of the two races the few records of northern Yucatán *elapoides* should be referred. For this reason two specimens (Mus. Comp. Zool. Nos. 26836, 26843) from Chichen Itza, Yucatán, are of more than casual interest; they appear to be the only specimens of the species from northern Yucatán in American museums. The first is a male, the second a female; respectively they have 11, 13 complete black rings on body, ?, 8 on tail; the infralabials are 9-9 in each. These characters apparently agree with those of neither southern race, as at present defined.

The apparent differences between *semicinctus*, known from British Honduras, and *laticollaris*, recorded from Tenosique, Tabasco (the type locality), and Encarnación and Tres Brazos, Campeche, are two: (1) rings (except nuchal) complete on body as well as on tail in *laticollaris*, on tail only in *semicinctus*; and (2) rings 13 to 18 on body, 10 to 12 on tail in *laticollaris*, fewer in *semicinctus* (9 on body, 6 to 8 on tail). It develops, however, that the type of *laticollaris*, with 16 body and 10 tail rings and saddles, has most of the body rings incomplete ventrally, while the two Campeche specimens have them complete. While these differences in the type series of *laticollaris* were noted at the time the race was named, it was not then conceived that they might have any significance. Since British Honduras specimens, however, are shown to have the same peculiarity of incomplete body bands as the type of *laticollaris*, the character takes on a new implication of significance. Faunistically the possibility of common identity of the type of *laticollaris* and of *semicinctus* is very great, since the type localities of these two are in a single province.



However, there is more than the single character of incomplete body rings and of geographic possibilities in support of the view that a single race extends across the base of the Yucatán peninsula. Five specimens from this area are known: two from British Honduras, recorded by Schmidt (*loc. cit.*), for one of which only incomplete data are available (Brit. Mus.); the type of *laticollaris*, from Tenosique, Tabasco; a specimen from Teapa, Tabasco, in the British Museum, for which are available certain data taken by K. P. Schmidt and very kindly given me several years ago; and a specimen, not available and undescribed, recorded by Dugès (*La Naturelleza*, ser. 2, vol. 2, 1894, p. 376) from Macuspana, Tabasco. Admittedly the data on this series are not all that is to be desired; however, the only two specimens on which the character of the body rings is known have them incomplete ventrally and three out of four specimens have 10–10 infralabials (the exception, type of *laticollaris*, has 9–9). The number of infralabials is of considerable significance in *elapoides*, and the possession of 10 by so many as three of these 4 indicates as population difference from *elapoides elapoides*, normally with 9–9, and from the four northern Yucatán and Campeche specimens, all with 9–9.

In view of the fact that the Chichen Itza specimens can not be allocated with *semicinctus* or *laticollaris* as previously defined, and do not provide characters which may indicate a third race is involved, a re-analysis, completely irrespective of names proposed in the past, is necessary. From this it appears that on the Atlantic drainage three forms of *elapoides* may be defined.

1. *elapoides elapoides*, with 9–9 infralabials or less (10 on one side of 3 in 25 specimens); black rings in triads (the outer rings of each triad very distinct and as long or longer than yellow rings); primary black rings on body complete (except nuchal collar), 9 to 10 in males (6), 9 to 15 in females (20); primary black rings on tail 5 to 8 in males (5), 5 to 8 in females (10); ventrals 128 to 131 in males (6), 133 to 144 in females (19); caudals 88 to 108 in males (4), 85 to 100 in females (9); range central and southern Veracruz (Atoyac,<sup>1</sup> Córdoba, Cuautlapan, Jalapa, Mirador, Orizaba, Potrero Viejo), extreme north-eastern Puebla (Hueytamalco, near Tezuitlán), and central eastern Oaxaca (La Raya, San Cristobal).

2. *elapoides laticollaris*, with 10–10 infralabials (one specimen in four with 9–9); outer rings of triads very narrow or obsolete; primary black rings on body incomplete ventrally, 9 to 11 in males (2), 9 to 16 in females (2); ventrals 124 to 128 in males (2), 127 to 130 in females (2); caudals 114 in a male, 97 to 105 in females (2); range Tabasco (Macuspana, Teapa, Tenosique) through parts of northern Guatemala to British Honduras (Double Falls, west of Stann Creek).

3. A hitherto unnamed race:

<sup>1</sup> It is believed that Boulenger's record (*Cat. Snakes*, vol. 3, 1896, p. 636) of *elapoides* from Atoyac, Guerrero (Godman), refers to the town by the same name in Veracruz, since several other records given by Boulenger for the same locality and of the same collector are for species otherwise unknown from the Pacific Coast north of the Isthmus of Tehuantepec, but well known in the area about Atoyac, Veracruz. Boulenger's "Jalisco" record (*Cat. Snakes*, vol. 2, 1894, pp. 182–183), the only other indication of the possible occurrence of *elapoides* on the west coast north of Tehuantepec, is yet to be explained.

***Pliocercus elapoides schmidti*, subsp. nov.**

*Type*.—Mus. Comp. Zool. No. 26843, female, from Chichen Itza, Yucatán. *Paratypes*.—Mus. Comp. Zool. No. 26836, topotype; EHT-HMS No. 11642, Tres Brazos, Campeche, and No. 11643, Encarnación, Campeche.

*Diagnosis*.—Normally 9-9 infralabials (no exceptions, four specimens); outer rings of black triads very narrow or obsolete; primary black rings on body complete (except nuchal ring), 11 to 13 in males (2), 13 to 18 in females (2); primary black rings on tail unknown in males, 8 to 12 in females (2); ventrals 127 to 128 in males (2), 128 to 134 in females (2); caudals unknown in males, 97 to 99 in females.

*Description*.—Head scales normal; portion of rostral visible from above nearly as long as internasals; latter a little more than half again as broad as long, a little less than half as long as prefrontals; frontal pentagonal, the anterior edge forming a slight angle, sides very slightly convergent posteriorly, posterior edges forming a right angle; frontal almost exactly as long as its distance from snout and from posterior median edge of parietals; nasal completely divided, posterior section a little longer and higher than anterior; loreal as large as anterior section of nasal, a little higher than long; a large upper preocular, and a very small lower one separating third labial from orbit; two postoculars, lower two-thirds size of upper; temporals 1-1-2, anterior the longest; 8-8 supralabials, the last two nearly subequal in size and larger than any others; 9-9 infralabials, five in contact with anterior chinshields, the first in contact medially with its mate, sixth largest; chinshields elongate, anterior a little longer than posterior; latter in contact with each other anteriorly, but rather strongly divergent posteriorly.

Dorsal scales smooth everywhere, pitless, in 17-17-17 rows; ventrals 128; anal divided; caudals divided, 99; total length 472 mm., tail 196 mm.; female.

A black head cap extending posteriorly to the posterior edges of the postoculars and frontal, and including the anterior tips of the parietals, laterally to about the middle of the first to fifth infralabials; a few irregular light areas on tip of snout; a black nuchal collar extending anteriorly to include the extreme posterior tips of the parietals, tertiary temporals and 8th supralabials, and covering five scale lengths on the nape; this collar extending laterally to the tips of the ventrals; between head cap and nuchal collar a light temporal band (yellow in life ?) involving two thirds the length of the temporal scales. Posterior to nuchal collar, a series of 12 complete black rings on body, each involving 2 or 3 ventral scales, the narrower ones slightly wider dorsally; on tail 8 similar but slightly longer rings; black rings bordered on either side by a narrow ring, unmarked by black pigment, covering a little more than one scale length; scales in red areas between yellow rings usually with black tips, although numerous scales lack them; red rings not black-marked ventrally; ventral surface of entire head, body and tail lacking dark marks, save the complete primary black rings on body and tail.

*Variation*.—The topotypic paratype, a male, has 127 ventrals, tail incomplete; four (instead of five) infralabials touching anterior chin

shields on one side; snout-vent measurement 88 mm., tail (incomplete) 181 mm., black rings on body 11, on tail perhaps seven (six present, but tail incomplete); all dorsal scales in red areas black-tipped; yellow temporal collar involving posterior tip of frontal; otherwise as in type.

The male paratype from Tres Brazos has 128 ventrals; tail broken; 13 black rings on body. The female paratype from Encarnación has 134 ventrals, 97 caudals, 18 black annuli on body, 12 on tail.

*Comparisons.*—*P. e. elapoides* is well differentiated from other Atlantic coast races; the closest resemblances are between *schmidti* and *laticollaris*. As at present understood, the latter two differ from each other in number of infralabials (usually 9–9 in *schmidti*, 10–10 in *laticollaris*), in the completeness of the primary black rings on body (complete in *schmidti*, broken in *laticollaris*), and perhaps in the average number of rings on body (more numerous in *schmidti*, 11 to 13 in males, 13 to 18 in females; less numerous in *laticollaris*, 9 to 11 in males, 9 to 16 in females) and tail (more numerous in *schmidti*, 8 to 12 in females, unknown in males; less numerous in *laticollaris*, 6 to 10 in females, 8 in a male).

*Remarks.*—The type of *laticollaris* is not wholly characteristic of the population to which its name is here restricted, nor of course is it much like *schmidti*. It appears to be intermediate between the two races. However, since the character of the body rings (probably the most important character of all) in the type is much more like that of the southern race, and since the number of body and tail rings fits better into the variation pattern of the same race, I have chosen to apply the name to the southern subspecies; the number of infralabials in the type, which agrees with the number present in the northern peninsular race, appears to me a somewhat more variable character than those of pattern.

His personal encouragement, unsolicited courtesies, and outstanding contributions to a knowledge of the herpetology of the Yucatán Peninsula make particularly welcome this opportunity to associate the name of Karl P. Schmidt with the Yucatecan race of *Pliocercus elapoides*.

In checking the foregoing conclusions with Mr. K. P. Schmidt, whose opinion concerning *semicinctus* concurs with mine, it was discovered that Field Museum also possesses specimens of a new form of *Pliocercus* from Yucatán. These, oddly enough, do not prove conspecific with *e. schmidti*, but represent an entirely different species which Mr. Schmidt has very kindly suggested I describe. It is a pleasure to name the species in honor of the collector of the first specimen, Mr. E. Wyllys Andrews, who has contributed much to the knowledge of the fauna of the Yucatán peninsula.

#### *Pliocercus andrewsi*, sp. nov.

*Holotype.*—Field Mus. Nat. Hist. No. 36323, female, from Libre Unión, Yucatán, collected November 15, 1939, by E. Wyllys Andrews. *Paratype.*—F.M.N.H. No. 36322, female, from Yohdzonot, Yucatán, collected October 25, 1939, by E. W. Andrews.

*Diagnosis.*—A *Pliocercus* related to *elapoides*, having yellow, black and red rings about the body, the latter alternating with the black, and the yellow rings narrow and separating the black and red rings from each other; ventrals 128 to 131; differing from *elapoides* in having very broad

black rings extending over 8 to 11 scale lengths dorsally and over 6 to 10 ventrals; black rings on body 6 or 7.

*Description of holotype.*—Head flattened, somewhat broader than neck; length of portion of rostral visible from above a little less than length of internasals; latter a half wider than long (1.3 mm.) about a fourth the size of, and a little less than half as long (3 mm.) as prefrontals; frontal pentagonal, anterior edge convex, posterior sides forming an angle a little greater than a right angle, lateral sides slightly convergent posteriorly; frontal a little shorter than its distance from tip of snout (4.7 mm.), subequal to length of median suture between parietals, about two-thirds maximum length of parietals (6.4 mm.); nasal completely divided into subequal halves, nostril largely in anterior portion and in contact with upper edge, which is indented; loreal nearly square, nearly two-thirds size of an internasal; two preoculars, lower half as large as loreal and wedged between labials; two postoculars, upper two or three times as large as lower; temporals 1–1–2, anterior elongate and narrow; 8–8 supralabials, 7th largest, 1st smallest, 4th and 5th entering eye; 8–9 infralabials, the penultimate quite elongate, 4 or 5 in contact with anterior chinshields, two (4th and 5th, or 5th and 6th) in contact with posterior; latter a little larger than anterior chinshields, divergent posteriorly; two rows of small scales between chinshields and first enlarged ventral.

Dorsal scales smooth, pitless, in 17–17–17 rows; ventrals 128; anal divided; tail broken near base; snout to vent length 368 mm., tail (incomplete) 49 mm.; female.

Anterior portion of head, including all of frontal, extreme anterior tips of parietals, the postoculars, and the upper portion of the 5th supralabial black; no light areas on anterior part of dorsal or lateral surfaces of head, except on lower part of rostral and the extreme lower edges of labials (none of these light areas visible from above); a broad yellow collar across temporal region, involving all except extreme anterior and posterior tips of parietals, and expanding laterally to include all of the posterior supralabials and the lower half of the fifth; a black nuchal collar, covering 9 scale lengths middorsally, but becoming narrower laterally and extending only to the edges of the ventrals; anterior edge of nuchal collar nearly straight, slightly convex; 5 other black rings on body, varying in length from 9 to 11 scale lengths dorsally, and from 6 to 10 ventrally; these separated from each other by spaces one and one-third to two times as long as the black rings, each space occupied by two narrow yellow rings and a large red ring; yellow rings covering about one and one-half scale lengths, the red ones about 11 to 18; yellow rings unspotted, red rings with numerous, irregular, small black spots, one at the tip of each dorsal scale and a very small one at the ends of some ventrals; ventral surface of head yellow, immaculate save for a pair of small black spots, each involving mainly the anterior tips of the first infralabials; tail marked like body, much of tip missing, the stump with a red, two yellow, and a black ring, disposed and marked as on body.

*Variation.*—The single paratype has 131 ventrals, tail incomplete; infralabials 9–10, on one side the penultimate typically elongate, split on the other; the lower preocular is very minute on one side; otherwise the scutel-

lation is much like that of the type. Yellow temporal band involving extreme posterior tip of frontal and the postoculars; black rings on body 7 (including nuchal collar); no chin markings; otherwise much as type.

*Remarks.*—This remarkable species is well differentiated from other *Pliocercus* species. It is most like *elapoides*, but all races of this species have narrow black rings occupying 2 to 4 scale lengths, while in *andrewsi* they are much longer. Moreover, *l. schmidti* occurs in the same territory occupied by *andrewsi*.

The species and subspecies of *Pliocercus* now known from Mexico, more than doubled since my summary was written in 1941, may be compared in the following key.

KEY TO MEXICAN *Pliocercus*.

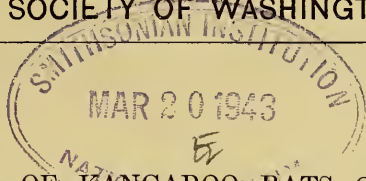
1. Rings on body alternating red and black, all subequal in length (black rings a little the longer).....2  
 Yellow rings, as well as red and black, present on body; black rings or saddles in triads or, if single, the spaces between them at least a half greater than their own length.....3
2. Black rings numerous, on body 25 to 27, on tail about 17; primary caudal black rings separated from each other by spaces equal to their own length; in addition, secondary, incomplete black rings (saddles) present in middle of red spaces on tail.....*aequalis*<sup>2</sup>  
 Black rings less numerous, 14 on body; black tail rings twice as long as interspaces, which lack secondary black rings or saddles (Tuxpan, Veracruz).....*bicolor*
3. Black rings very long, covering 6 to 10 ventrals and 8 to 11 dorsals (Yohdzonot and Libre Unión, Yucatán).....*andrewsi*  
 Black rings short, covering 2 to 4 scale lengths.....*elapoides*. 4
4. Black rings single on body or, if triad, the outer rings considerably narrower than the yellow rings..... 5  
 Black rings triad on body and tail, the outer rings of each triad very distinct and as long as or longer than yellow rings; primary black rings complete (except nuchal), on body 9 to 10 in males, 9 to 15 in females; primary black rings on tail 5 to 8; infralabials usually 9, sometimes 8, rarely 10; ventrals 128 to 131 in males, 133 to 144 in females (central and southern Veracruz, north-eastern Puebla, central eastern Oaxaca).....*e. elapoides*
5. Most primary rings on body incomplete ventrally, 9 to 16; infralabials usually 10; ventrals 124 to 128 in males, 127 to 130 in females (Tabasco through northern Guatemala to British Honduras).....*e. laticollaris*  
 All primary black rings, except nuchal collar, complete.....6
6. Black rings on body 11 to 13 in males, 13 to 18 in females; black rings on tail 8 to 12; usually 9 infralabials; ventrals 127 to 128 in males, 128 to 134 in females (Chichen Itzá, Yucatán).....*e. schmidti*  
 Black rings on body 5 to 10, on tail 4 to 6; usually 10 infralabials; ventrals 123 to 128 in males, 132 to 137 in females (Pacific slopes of southern Chiapas and Guatemala).....*e. diastemus*

<sup>2</sup> Recorded by Bocourt (Miss. Sci. Mex., Rept., livr. 10, 1886, pp. 637-638, pl. 41, fig. 7) from "Mexico." It may occur on Atlantic slopes in the foothills of Chiapas and Tabasco.

4.0673

page 1

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



NEW SUBSPECIES OF KANGAROO RATS OF THE  
*DIPODOMYS ORDII* GROUP FROM MONTANA  
AND WYOMING.

BY DONALD F. HOFFMEISTER,  
*Museum of Vertebrate Zoology, University of California.*

Kangaroo rats of the *Dipodomys ordii* group, currently placed in the single species *D. ordii*, range geographically from the plains south of the Columbia and Snake rivers in Oregon and Washington and from eastern Montana southward through the Great Basin, intermountain valleys of the Rockies, and the western part of the Great Plains into the state of Jalisco, Mexico. Within the geographic limits of this widest-ranging species of kangaroo rat there is considerable variation; this variation is indicated by the large number of subspecific names (more than twenty) proposed for the geographic variants now grouped as of the one species. Examination of specimens from the austral parts of eastern Montana and from the Red Desert of Wyoming indicates the existence of two additional geographical races, here newly named.

I am indebted to Dr. Hartley H. T. Jackson of the Federal Fish and Wildlife Service for the loan of specimens of *Dipodomys ordii luteolus* from the type locality and to Dr. Robert Hiatt for the loan of specimens from southeastern Montana. Unless otherwise indicated, all specimens are in the Museum of Vertebrate Zoology.

***Dipodomys ordii terrosus*, new subspecies.**

*Type*.—Male, adult, skin with skull, no. 93477, Mus. Vert. Zool.; Yellowstone River, 5 miles west of Forsyth, 2750 feet, Rosebud County, Montana; obtained June 2, 1940, by J. R. Alcorn, original no. 1528.

*Range*.—Eastern and southern Montana.

*Diagnosis*.—Size: large (see measurements); body long and heavy; hind feet long. Color: dark; upper parts near (*h*) Ochraceous-Tawny (capi-

talized color terms after Ridgway, Color Standards and Color Nomenclature, Washington, D. C., 1912) mixed with black; black arietiform facial markings distinct; patch of hair on outer side of forelimbs tipped with ochraceous-buff, becoming plumbeous basally; white hip-stripe not continuous from underparts of body to base of tail, or, if continuous, greatly constricted in width; dorsal tail-stripe dark brownish to blackish. Skull: large; zygomatic process of maxilla broad; auditory bullae greatly inflated; upper incisors long; rostrum broad.

*Comparisons.*—From *Dipodomys ordii luteolus*, known to me by specimens from the type locality (Casper, Wyoming) and from Kennedy and one mile northwest of Gavin, Nebraska, *terrosus* differs as follows: body longer and heavier, hind feet longer, upper parts markedly darker resulting from more black and red, hip-stripes less prominent, skull larger in every measurement taken except interorbital breadth, and averaging larger in this measurement, auditory bullae more inflated, zygomatic process of maxilla broader, and upper incisors longer.

From *D. o. richardsonii*, known by specimens from El Paso and Bent counties, Colorado, *terrosus* differs: size larger, upper parts more heavily mixed with black, dark ventral tail-stripe extending farther distally, and skull averaging larger in all measurements except greatest breadth which is the same.

From topotypes of *D. o. montanus* and other specimens from south-central Colorado, *terrosus* differs: size larger, upper parts more reddish, skull averaging larger in all measurements, auditory bullae more inflated, incisors longer, and posterior apex of interparietal rounded rather than pointed.

From *D. o. columbianus* from Bingham County, Idaho, and from topotypes of *D. o. utahensis*, *terrosus* differs in larger size and more reddish coloration; in every cranial measurement taken, *terrosus* is larger by at least 2 per cent.

From *D. o. evexus* from Salida, Chaffee County, Colorado, *terrosus* differs, as far as can be judged from Goldman's description (Journ. Washington Acad. Sci., vol. 23, p. 464, 1933), in longer body and hind feet; darker coloration of upper parts; some hairs of forelimbs pigmented rather than white; ventral tail-stripe brownish for more than proximal two-thirds of length of tail; larger skull, for example occipitonasal length 39.2 mm. (38.3–39.9) in 7 adults of *terrosus* as contrasted with 37.3 in the type of *evexus* and all other corresponding measurements larger than those given for the type of *evexus*.

From *D. o. nevilis*, from 5 miles west of Naturita, Montrose County, Colorado, *terrosus* differs, judging from Goldman's description (*op. cit.*, p. 470), in shorter hind feet, slightly darker upper parts, and a longer skull which is broader across the maxillary arches but narrower across the bullae.

Comparison with the race *priscus* is made below in the account of that form.

*Measurements.*—Three adult males (type and two topotypes in that order): Total length, 266 mm., 282, 274; length of tail, 143, 157, 149;



length of hind foot, 43, 44, 43; weight (in grams), 71.8, 78.5, 75.5; basal length of skull, 28.4, 28.7, 28.9; length of nasals, 15.5, 14.7, 14.5; greatest breadth, 25.8, 25.4, 25.3; maxillary breadth, 22.8, 22.0, 22.1; interorbital breadth, 13.2, 13.6, 13.0. Cranial measurements are taken in the same way as illustrated by Hall and Dale (Occas. Papers Mus. Zool. Louisiana State Univ., no. 4, p. 50, 1939).

*Remarks.*—*D. o. terrosus* is a large-sized, dark-colored, peripheral race which inhabits the more austral parts of Montana east of the crest of the Rocky Mountains. These kangaroo rats live in the *Artemisia* and short-grass prairie at the edge of the juniper belt. Locally these rats are common, as evidenced by their burrow openings, tail and foot marks, and runs. J. A. Allen in "Notes on the natural history of portions of Dakota and Montana territories, . . ." (Proc. Boston Soc. Nat. Hist., vol. 17, p. 42, 1875) writes under the heading of *Dipodomys ordii*: "The most abundant mammal met with in the valley of the Yellowstone; much less common on the Great Porcupine Creek and in the valley of the Musselshell. It seems to prefer the driest situations, burrowing beneath the cacti and in bunches of sage brush everywhere." In suitable habitat, the species ranges northward to within 125 miles of the Canadian Border.

As may be noted from the above comparisons, *terrosus* differs least from, and thus is most similar to, the races *richardsonii* and *nexilis*, the nearest known records of occurrence of which are in eastern and west-central Colorado, respectively. It is separated geographically from these races by the range of the paler-colored *luteolus* and *priscus* of Wyoming. The two specimens from Powderville show approach to *luteolus* in shorter body, slightly lighter upper parts, and smaller skull. These specimens are not fully adult and adult specimens from this area may prove to be typical *terrosus*.

*Specimens examined.*—Total number, 13, from the following localities in Montana: *Garfield County*: Sand Creek, lat. 47° 15', long. 106° 55', [near] Jordan, 2. *Musselshell County*: Harvey Ranch, Melstone, 2. *Rosebud County*: Yellowstone River, 5 mi. W. Forsyth, 2750 ft., 6. *Yellowstone County*: Billings, 1. *Powder River County*: Powderville, 2 (coll. Montana State College, Museum of Zoology).

#### *Dipodomys ordii priscus*, new subspecies.

*Type.*—Female, adult, skin with skull, no. 89119, Mus. Vert. Zool.; Kinney Ranch, 21 miles south of Bittercreek, 7100 feet, Sweetwater County, Wyoming; obtained September 16, 1939, by Donald T. Tappe, original no. 766.

*Range.*—Known only from the type locality, but probably occurs throughout much of the Red Desert of southwestern Wyoming and northwestern Colorado.

*Diagnosis.*—Size: large (see measurements); body long but weight medium. Color: pale; upper parts Light to Pale Ochraceous-Buff mixed with blackish; forelimbs white; white supraorbital patch large; dorsal tail stripe light grayish brown. Skull: large; auditory bullae greatly inflated; interorbital region broad.

*Comparison.*—From *D. o. terrosus*, *priscus* differs in smaller size, except that the length of the tail averages about the same, strikingly paler coloration of the upper parts resulting from less black and red which is of a markedly lighter tone, forelimbs without ochraceous-buffy patch of hair, lighter dorsal tail-stripe, smaller skull in all parts measured except interorbital breadth, less inflated auditory bullae, narrower and relatively longer rostrum, and narrower zygomatic process of maxilla.

From *D. o. luteolus*, *priscus* differs in longer body, slightly paler upper parts, larger skull (on the average), more inflated auditory bullae, and longer rostrum.

From *D. o. richardsonii*, and from *nezilis* as described by Goldman (*op. cit.*, p. 470), *priscus* differs in the same way as from *terrosus*.

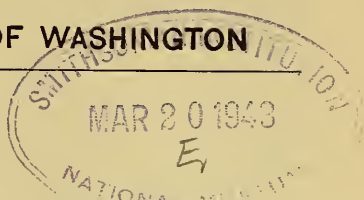
From *D. o. evexus*, relying on Goldman's description (*op. cit.*, p. 468), *priscus* differs in longer body, slightly paler upper parts, and a larger skull. *D. o. priscus* differs in this same way from topotypes of *montanus*, *utahensis*, and *columbianus*, but to an even greater degree.

*Measurements.*—Average and extreme measurements of 4 adult females: total length, 269 mm. (264–274); length of tail, 150 (145–152); length of hind foot, 41.8 (41–43); weight (in grams), 64.8 (61.2–67.2); basal length of skull, 27.5 (27.0–27.8); length of nasals, 14.7 (14.1–15.0); greatest breadth, 24.9 (24.6–25.2); maxillary breadth, 21.3 (20.9–21.9); interorbital breadth, 13.3 (13.2–13.4). Measurements of two young adult males (wear on the fourth upper premolar has not quite obliterated the anterointernal notch): Total length, 251, 269; length of tail, 146, 147; length of hind foot, 42, 41; weight (in grams), 55.6, 62.3; basal length of skull, 26.7, 27.5; length of nasals, 13.7, 14.7; greatest breadth, 24.0, 24.0; maxillary breadth, 19.9, 20.5; interorbital breadth, 12.9, 13.5.

*Remarks.*—*D. o. priscus* is a large, pale race closely resembling *luteolus* and *evexus*. It is more or less isolated from *luteolus* by the Green, Ferris, Seminole, and Medicine Bow mountains in central Wyoming and from *evexus* by the higher parts of the Rocky Mountains, including the Continental Divide. Other specimens of *D. ordii* have been recorded from the Red Desert region of Wyoming and Colorado (Cary, N. Amer. Fauna, nos. 33 and 42), but it is not known whether these are referable to the race *priscus*. Cary, in commenting on this species of kangaroo rat from the Red Desert area of northwestern Colorado (N. Amer. Fauna, no. 33, pp. 140–141, 1911) says: "It occurs . . . over parts of the sandy sage plains. . . [One] large colony occupied a sandy strip of country abounding in blow-outs, and the burrows were either in the banks of these or beneath bushes of *Atriplex confertifolia* or *Grayia spinosa*."

*Specimens examined.*—Total number, 14, all from the type locality.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



THE SPECIES *EURYSTOMUS ORIENTALIS*.

BY S. DILLON RIPLEY.<sup>1</sup>

"Dollar birds" are a striking and familiar component of the bird life of southeast Asia. Usually seen singly or in pairs, these bright blue rollers with their broad scarlet bills have a habit of perching high on the top of isolated trees in jungle clearings. At other times they may be seen hurtling over the forest, performing the aerial evolutions which have earned them one of their common names.

Actually little is known of the habits of these birds. Their nests have seldom been found, and their somewhat erratic migrations have taxed the understanding of most ornithologists who have studied them.

Aside from their unusual behavior, this is a difficult species taxonomically. There are few if any striking color or morphological differences between the various forms. Since Stresemann's revision (*Novit. Zool.*, xx, 1913, p. 297), most workers have been inclined to pass over specimens of *orientalis* in their collections after a rather cursory identification.

Recently, during a speciation study of the bird fauna of the west Sumatran Islands, I have had to identify specimens of *orientalis* in the splendid Abbott collection at the United States National Museum. Careful study of these and other specimens in the Museum, as well as birds in the collection of the American Museum of Natural History in New York, inclines me to the belief that the facts in this case are rather different from those outlined by Stresemann (l. c.). However, I do believe also that in this case, the static study of museum specimens will never solve the very fluid problem of this wandering and erratic species. The fundamental biological problem of *Eurystomus orientalis* can only be properly interpreted by field studies and banding operations—work which it may be hoped will lie within the future scope of our great museums.

I am very grateful to Mr. H. G. Deignan for valuable comments on the

<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution.

zoogeography of North Thailand. Dr. Ernst Mayr has generously allowed me to look at specimens in the American Museum of Natural History, and Mr. James L. Peters has been most helpful on nomenclatorial matters.

In the following discussion, all measurements are in millimetres, the wing pressed flat against the ruler. The measurement listed as "bill height" refers to the distance from the ridge of the culmen to a point just posterior to the mandibular ramus. The wing-tip index is secured by measuring the difference between the longest and shortest primaries and dividing this by the wing length.

*orientalis* versus *calonyx*.

In his excellent review of this species (l. c., p. 298), Stresemann lists specimens under *orientalis orientalis* as occurring in the Greater Sunda islands and the Philippines. Under *orientalis calonyx*, he gives a range covering India, the Malay Peninsula, Thailand, Indo-China, and north in China to Manchuria. This distribution breaks down somewhat when he lists nearly a hundred specimens called *orientalis*  $\cong$  *calonyx* from virtually every available locality.

As a result of this confusion of range, and due to the lack of any very well-defined characters by which the races may be separated, some recent writers on this area (Stuart Baker, Fauna of British India, Birds, *iv*, 1927, p. 228; Delacour et Jabouille, Les Oiseaux de l'Indochine Francais, *ii*, 1931, p. 298) have tended to feel that *calonyx* is insupportable. After examining one hundred sixty-one specimens of *orientalis*  $\cong$  *calonyx*, I am inclined to feel that there is a well-defined northern breeding race of this species, characterized not only by the color of the primaries and tail, but also by a consistent difference in the wing-tail ratio and the wing tip index.

Unfortunately, as Mr. Peters has pointed out to me (in litt.), the name *calonyx* is inapplicable to this race. Originally spelled *calornyx*, it was a nomen nudum at its first appearance (Hodgson, Gray's Zool. Misc., 1844, p. 82). Later it was validated as *calonyx* by Sharpe (1890), but prior to this it had been cited in the synonymy of *E. orientalis* by G. R. Gray (1848). Thus *calonyx* cannot be used, and this northern race requires a new name.

*Eurystomus orientalis abundus*, nom. nov.

Type: ad ♂ (U. S. N. M. No. 276483) collected May 20, 1923, by Arthur deC. Sowerby at Nanking, China.

Diagnosis: from *orientalis* this race differs by having a pronounced dark blue wash on the primaries and secondaries. Characteristically in freshly-molted male specimens this blue wash extends along the outer webs of the primaries nearly to the ends of the feathers and is well marked on the inner webs also. Although this race averages only very slightly larger in size (wing average 192.7 compared to 188.3 for *orientalis* from the Malay Peninsula), there is a very marked difference in the wing tail ratio of *abundus*, 47-51% (49.6), as compared with that of *orientalis*

50–56% (53.1). There is also a constant difference in the wing-tip index of the two races—that of *abundus* being 35–38% (36.9), while in *orientalis* this index runs from 31–37% (33.8).

Measurements of type: wing 195, tail 95.5, wing-tail ratio 49%, wing-tip index 37%, bill height 13.

Range: India in northern Cachar, Nepal, upper Assam, and from north China to the lower Amur and east to Manchuria; in migration to India, the Malay Peninsula, Sumatra (December), Simalur (December), Indo-China, southern China, and Japan (Tsu Shima I., June).

From the figures quoted above it may be seen that *abundus* has a relatively shorter tail in proportion to its wing length than *o. orientalis*, and also a relatively more graduated wing indicating greater migratory habits. This is the bird which may be found from October to March wandering erratically in the southern half of its range.

In northern Thailand there is a breeding population of these birds. In habits and size they seem to agree with *abundus*, while in color they are more closely identified with *orientalis orientalis*. For this population I propose the name

***Eurystomus orientalis deignani*, subsp. nov.**

Type: ad ♂ (U. S. N. M. No. 350027) collected April 22, 1936, by H. G. Deignan at Mu'ang Ngawp, N. Siam.

Diagnosis: from *orientalis* this race differs by having a shorter tail, wing-tail ratio 49–51% (50.1) as against 50–56% (53.1) for *orientalis*, and a more sharply graduated wing, wing-tip index 36–40% (36.7) as against 31–37% (33.8). The bill also is somewhat less deep, more thin and fine as in *abundus*. In color these birds resemble *orientalis* closely, differing only in the rather more blackish crown which presents more of a contrast with the color of the rest of the back.

From *abundus* these birds differ by lacking the pronounced dark blue wash on the outer webs of the primaries and secondaries and by having more of the brownish olive wash on the breast and sides of the neck. In *abundus* this area tends to be nearly concolorous with the abdomen and vent.

Measurements of type: wing 189, tail 94, wing-tail ratio 50% wing-tip index 36%, bill height 13.5.

Range: North Thailand east to Hin Lap, south to Raheng, in migration to Java, Sumatra, Nias, Borneo, and probably the Malay Peninsula.

Speculation on the origin of bird forms is not likely to be profitable, but in this case it is perhaps worth pointing out that the Himalayan upthrust left northern Thailand in a rather isolated position. Presumably then the basic *Eurystomus* stock arrived from the south where it already existed as typical *orientalis*. When speciation finally occurred, it took place along the morphological lines found in the highly migratory *abundus*. Specimens before me from the northern range of this bird are in breeding condition in March. A young male collected in July

resembles birds in similar plumage from southern Thailand but has a somewhat more blackish forehead. Birds from the southern winter range were collected in February (Borneo), March (Nias), and November (Java). I feel that it is this population which has caused the confusion about the status of *orientalis* and its races in the Malay area. As H. C. Robinson notes (Birds of the Malay Peninsula I, 1927, p. 92), "This form (*abundus*) is said to be distinguished by having more deep blue on the secondaries and tail feathers, and birds answering to the description certainly occur in the winter months, but intermediate specimens occur, and many ornithologists doubt the existence of the two forms." Presumably these intermediate specimens can be referred to *deignani*.

This race is named for Mr. H. G. Deignan of the United States National Museum, who has collected and studied the birds of Thailand so exhaustively.

*Eurystomus orientalis orientalis* (Linnaeus).

For a description of this form see Robinson (l. c., p. 91) or Sharpe (Cat. Birds Brit. Mus., XVII, 1892, p. 33).

Range: southern Himalayas, Bengal south to Madras, Assam, Burma, central and southern Thailand, Indo-China, Riu Kiu Is. (Yayeyama) south to the Malay States, Sumatra and its western islands, Borneo, Java, the Philippines (all months of the year), and in winter to Great Sanghir, northern Celebes, and Halmahera.

The records for the last mentioned islands are as follows: Great Sanghir (January). Celebes (December to March), Halmahera (September to December). I have yet to find any breeding records for these islands. Presumably, therefore, these birds are wanderers from the Philippines. The Halmahera specimens are three of those mentioned by Stressemann (l. c., 1913, p. 302) as *Eurystomus orientalis* subsp. They agree perfectly with the National Museum's large series from the Philippines. Their measurements are as follows: wing (two males, one sex undetermined) 180, 182, 193.5; tail 95, 95, 97; wing-tail ratio 49, 52, 53%; wing-tip index 35, 36, 37%; bill height 15, 16.

A single male specimen from Yayeyama in the Riu Kiu group (U. S. N. M. No. 335296) taken in February belongs to *orientalis* rather than *abundus*. It measures: wing 186.5, tail 103, wing-tail ratio 55%, wing-tip index 35.9%, bill height 13.5.

I have only seen one bird from Madras. This is a male in the Koelz collection (A. M. N. H. uncatalogued) collected in May. This bird measures: wing 186, tail 98, wing-tail ratio 52%, wing-tip index 38%, bill height 16.5. Except for the fact that the crown is rather blackish, it does not support Sharpe's original description of *laetior* (l. c., 1892, p. 36). In this specimen, however, the blue streaking on the throat is rather pronounced, extending down well onto the abdomen. Lacking further material, I feel it is impossible to settle the status of *laetior* at the present time.

A series of comparative measurements of the preceding three forms follows:

	WING	TAIL	WING TAIL RATIO
abundus ♂ . . . .	185.5–198(192.7)	91.5–97.5(94.7)	48–51(49.6)%
abundus ♀ . . . .	193–196 (194.1)	89.5–93.5(93.8)	47–50(48.7)
deignani ♂ . . . .	189–193(191.3)	94–99 (97)	50–51(50.3)
deignani ♀ . . . .	193, 194, 207	94, 95, 103	49, 50
orientalis ♂ . . . .	174.5–193 (186.9)	93.5–106.6(100.1)	51–56(53.9)
orientalis ♀ . . . .	172.5–200(186.5)	92–111(99.5)	50–55(53.8)

	WING TIP INDEX	BILL HEIGHT
abundus ♂ . . . .	36–38(36.6)%	12–15(13.6)
abundus ♀ . . . .	35–38(36.7)	12–14.5(13.2)
deignani ♂ . . . .	36–40 (37)	13.5–15.5(14.6)
deignani ♀ . . . .	36–37(36.5)	14, 14.5.
orientalis ♂ . . . .	31–36(33.7)	13.5–17.5(15.8)
orientalis ♀ . . . .	31–37(34)	14.5–17.5(15.8)

*Eurystomus orientalis gigas* Stresemann.

A single specimen from South Andaman (U. S. N. M. No. 178577) collected in January agrees with Stresemann's original description. It measures: wing 189.5, tail 106, wing-tail ratio 56%, wing-tip index 33, bill height 15.

Range: Rutland and South Andaman Is.

*Eurystomus orientalis oberholseri* Junge.

A female collected by Abbott in October agrees with Junge's description. It measures: wing 187.5, tail 103, wing-tail ratio 54% wing-tip index 30%, bill height 15.5.

Range: Simalur I., west of Sumatra.

*Eurystomus orientalis azureus* Gray.

This is an unusual form, differing from all other members of the species in being uniformly purplish blue all over, except for the typical pale bluish-white wing bar on the primaries. The crown is somewhat more blackish colored than the rest of the body. There are the usual bright blue streaklets on the throat found in all adult members of the species. The bill is longer and deeper than in any of the other forms.

Measurements: (one male, three sex undetermined) wing 204–212 (209), tail 111–117 (114), wing-tail ratio 54–55% (54.1), wing-tip index 31–33% (31.7), bill height, 18, 20.

Range: Batjan (Batchian) I., Moluccas.

*Eurystomus orientalis waigiouensis* Elliot.

This form is somewhat similar to *o. orientalis* but larger and brighter. The scapulars and wing coverts are rather more bluish, less infused with green. On the lower parts also, this form is brighter and somewhat deeper in color, approaching Sevrès blue. The wings and tail are much

more extensively washed with purplish blue. The bill has a dark brown tip.

Measurements: ♂, wing 199–210 (204), tail 101–111 (107.4), wing-tail ratio 50–54% (52.4), wing-tip index 32–34% (33.7), bill height 15–17 (16.4); ♀, wing 205.5, 207, tail 107, 108.5, wing-tail ratio 51, 52%, wing-tip index 33, 34%, bill height 18.

Range: Misool, Batanta, Waigeu, all New Guinea, Japan, Dampier (Karkar), Rook (Umboi), Witu, Trobriand, D'Entrecasteaux and Louisiade Islands.

This is a relatively non-migratory form which has spread out to most of the neighboring New Guinea islands. Immature birds were collected on Dampier Island in February and March. A male with slightly enlarged gonads is recorded from Port Moresby in January. There seem to be no distinct size or color differences between east and west New Guinea birds.

*Eurystomus orientalis crassirostris* Slater

For remarks on the taxonomic status and color characters of this form see Mayr (Amer. Mus. Novit. No. 709, 1934, p. 6). In mature specimens there is a strong contrast between the blackish crown and the light bluish green back which sets this race apart from all the others. Young birds (April to July) are darker, more uniform brownish green on the back not showing this strong color contrast. In this race the bill is clear orange red not tipped with brown.

Measurements: ♂, wing 198–203 (200.9), tail 113–118 (115.8), wing-tail ratio 56–58% (57), wing-tip index 28–33% (31.9), bill height 17–19 (17.7); ♀, wing 198–208 (203.6), tail 111–121 (116.2), wing-tail ratio 56–58% (57), wing-tip index 31–35% (33).

Range: New Britain, New Hanover, and St. Matthias Islands, probably on New Ireland. An immature specimen was taken on St. Matthias in July, and a male with enlarged gonads is recorded from New Britain in October. Hartert (Novit. Zool. XXXIII, 1926, p. 177) records this race from Witu and Unia Ids. but I feel that Witu birds belong to *waigiensis*. I have seen no specimens from Unia.

*Eurystomus orientalis solomensis* Sharpe

Like the preceding two forms, this is a brighter bird than *o. orientalis*, as well as being larger. Occasional specimens, however, as a male from New Georgia (A. M. N. H. No. 643454) are almost indistinguishable in color, except for the bill, which is always clear orange-red. The tail in this race is longer than in any other member of the species.

Measurements: ♂, wing 190–204 (196.6), tail 124–137.5 (130.1), wing-tail ratio 63–67% (65.7), wing-tip index 28–33% (31), bill height 16–18 (17.4); ♀, wing 183–199 (194), tail 124–131 (128), wing-tail ratio 63–69% (66.2), wing-tip index 29–31% (30.1), bill height 17.5.

Range: Feni and probably Nissan, and Solomon Islands. This species has not been recorded from Rennell.



The following races belong to a sub-group within the species *Eurystomas orientalis* characterized by rather pale washed out plumage—Above these birds are rather dusty brownish on the crown and shoulders instead of blackish. The lower back scapulars and tail coverts are smoky greenish blue. The lower surface is paler, more cerulean than in the preceding forms.

*Eurystomas orientalis connectens* Stresemann.

This form is intermediate between the darker forms of *orientalis* and the paler *pacificus* of Australia. Like that race, it presents a rather washed out appearance.

Measurements: ♂, wing 188–201 (195.6), tail 93–100 (96.8), wing-tail ratio 47–50% (49), wing-tip index 33–38% (36), bill height 13.5–16 (14.5); ♀, wing 193.5–202 (198.5), tail 94.5–102 (98.3), wing-tail ratio 48–52% (50), wing-tip index 35–37% (36), bill height 13.5–15 (14.2).

Range: Celebes, Peling and Tukang Besi Island, and the lesser Sunda Islands from Lombok to the Tanimbar group, wandering to east Borneo.

It is unfortunate that Stresemann picked Moa, so near Australia, for the type locality of this race. Moa birds are nearer in color to *pacificus* than are those from further west. Indeed there is a continuous cline from Celebes to Moa. A Makassar bird (A. M. N. H. No. 298952) is very dark, particularly on the crown, sides of the head, and breast. Birds from Jampea, Lombok, and Sumba also are dark; but as specimens are examined all along the line of the lesser Sundas, it becomes evident that there is no single break or gap in the chain of specimens.

In his Birds of Celebes, Stresemann (Journ. für Ornith., 88, pt. 3, 1940, p. 422) lists *Eurystomas o. orientalis* as occurring in the northern part of the island and *connectens* in the southern part. The National Museum has specimens of *connectens* from Parigi and Gimpoë in the north central part of the island and also an immature female from Batoe Hangoes Baroe taken in June. The latter locality is near Manado at the extreme northern tip of the island. On the other hand, the three specimens of *o. orientalis* from Likoepong and Toli Toli in the Manado Peninsula of the island were all taken in December and January. I note also that the specimens of this latter race listed by Stresemann are from Rurukan Kumarsot and Paleleh, localities in which Heinrich was collecting from October through March (l. c., pt. 1, p. 14). Thus these birds could all have been wanderers from the Philippines, with which population they agree exactly in size and color.

Somewhat the same situation applies to the specimens of *connectens* taken by Raven in Borneo. Two males taken in June and August on the Mahakpam river and at Tandjong Seglu on the east central peninsula which projects towards the north coast of Celebes, are new records for Borneo; but due to the season when they were collected, they are presumably post breeding birds. From specimens of typical *connectens* from Celebes these birds do not seem to differ. The wings of both specimens are slightly longer (200.5, 201) than in the Celebes birds

(190-199.5, ave. 196.8), but this is well within the range of the subspecies as a whole.

Young were taken on Dammar in December and on Timor in January (Stein coll.).

*Eurystomus orientalis pacificus* (Latham)

This race differs from *connectens* by being paler, the upper surface presenting a more washed out appearance, the lower parts being more cerulean.

Measurements: ♂, wing 190-200.5 (196.5), tail 89.5-101 (95), wing-tail ratio 46-50% (48.2), wing-tip index 34-39% (37.8), bill height 13-15 (14.1); ♀, wing 192.5-198.5 (195.6), tail 92-96 (93.9), wing-tail ratio 47-49% (48), wing-tip index 36-37% (36.4), bill height 13-15 (13.9).

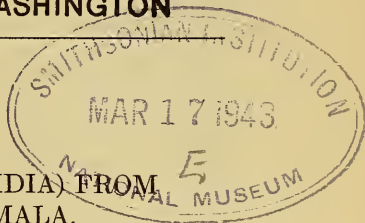
Range: Australia migrating north from April to November to the Kei islands, Ceram, New Guinea and adjacent islands. Wandering individuals have even been taken in New Zealand.

It is noteworthy that the figures for the wing-tail ratio and the wing-tip index for this migratory race compare very favorably with those for the two northern races, *abundus* and *deignani*.

Mathews named a race *bravi* from west Australia (Novit. Zool., xviii, 1912, p. 285) based on the character of being paler below than east Australian birds. I have compared specimens from east and west Australia without being able to observe this as a constant character.

Conclusion: *Eurystomus orientalis* is a widely scattered species with eleven races. Seven of these show a tendency to erratic post-nuptial wandering which has taken the form of definite migration in the three most northern and most southern forms, *abundus*, *deignani* and *pacificus*.

The four races from the Moluccas to the Solomons, *azureus*, *waigiouensis*, *crassirostris*, and *solomonensis*, apparently show little tendency to wander, perhaps due to the combination of their geographical isolation and the climatic stability of their environment. Those races having the most migratory habits have a corresponding adjustment in the wing-tail ratio and the wing-tip index.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTONA NEW *TROPIDODIPSAS* (OPHIDIA) FROM  
ALTA VERAPAZ, GUATEMALA.

By L. C. STUART.

While collecting in the cloud forests of Alta Verapaz, Guatemala in 1938, I secured from bromeliads two specimens of *Tropidodipsas* which do not seem referable to any of the many descriptions of species of this difficult genus. As an wholly inadequate expression of my appreciation for the numerous courtesies he extended to me during my sojourns in Guatemala, I dedicate this undescribed species to Doctor A. V. Kidder, Chairman of the Division of Historical Research, Carnegie Institution of Washington. It may be known as

***Tropidodipsas kidderi*, sp. nov.**

Holotype.—An adult male, University of Michigan Museum of Zoology No. 91065, collected April 23, 1938, by L. C. Stuart.

Type locality.—Cloud forest above Finca Samac (6 km. [straight line] west of Cobán, Alta Verapaz, Guatemala). Altitude, about 1,500 m.

Diagnosis.—A long-headed, compressed-bodied *Tropidodipsas* with 17 moderately keeled dorsal scale rows, apparently related to *T. fischeri* Boulenger from which it is distinguished by its totally different pattern.

Description.—Head scutellation normal. Rostral broader than long, clearly visible from above; 2 short internasals; 2 prefrontals, twice as long as the internasals; frontal longer than broad, equal to its distance from the end of the snout, and the parietals also equalling their distance from the end of the snout. Nostril between 2 nasals; a long, narrow loreal barely entering the eye; a single preocular separated from the labials by a narrow extension of the loreal; 2 postoculars; temporals 1 + 2. There are 7 supralabials, the fourth and fifth entering the eye; 7 infralabials of which only the first 4 are in contact with the anterior chin shields; posterior chin shields well developed but only one-half as long as the anterior ones. Dorsal scales in 17 rows throughout the length of the body, 13 of which are feebly to moderately keeled (mid-dorsally). Body strongly compressed. Abdominal scutes, 185; sub-

MAR 10 1943

caudals, 76; anal single. About 12 maxillary teeth decreasing in size posteriorly. Total length, 480 mm.; body length, 357 mm.; tail length, 123 mm.

In spirits the ground color of both the *dorsum* and *ventrum* is light chocolate brown. Behind the parietals is a white crossband, one scale wide, which extends laterally onto the sides of the head, expanding forward to cover the posterior labials and ventrally extending forward to the posterior chin shields thus leaving the anterior part of the jaw brown, while the posterior portions to the level of the first abdominal scute are white. On the body are 23 light cross bands, complete ventrally, and all except 7 complete dorsally. These bands are 1 scale wide mid-dorsally and 2 scales wide at their junction with the abdominal scutes, thus producing triangular shaped markings with the apices at the mid-dorsal point. There are 12 similar bands on the tail.

Paratype.—A female collected near the holotype, University of Michigan Museum of Zoology, No. 91064. It is like the holotype in most particulars but departs in possessing no preoculars, 182 abdominals, and 62 subcaudals. Its ground color is somewhat darker, and it possessed but 20 light crossbands (all complete) on the body and 8 on the tail. These bands are somewhat more broadly triangular than in the holotype and are lightly dusted with brown.

Habitat and range.—I found the above two specimens in bromeliads growing next to each other in the cloud forest typical of higher elevations in Alta Verapaz. Considering the date, it is not unlikely that the two were about to mate. In view of their compressed body form and bromeliad habits it seems likely that the species is arboreal and possibly is restricted to the cloud forest of Alta Verapaz. From the stomachs of both I removed fragments of slugs.

Remarks.—There are in northern Central America and Mexico two groups of the genus *Tropidodipsas* with 17 rows of dorsal scales. One of these is characterized by possessing a short, broad head (about as broad as long), a frontal which is broader than long, a round or very slightly compressed body, a poorly differentiated pair of posterior chin shields, 5 infralabials in contact with the anterior chin shields, and a pattern of light crossbands on a dark background. These crossbands are of almost equal width dorsally and ventro-laterally. This species is *T. sartorii* Cope which Hobart Smith informs me may be broken down into several races. It is largely a lowland group.

The other form has a long head (twice as long as broad), a frontal whose length exceeds its width, a strongly compressed body, a well-differentiated pair of posterior chin shields, only 4 infralabials in contact with the anterior chin shields and a pattern of triangular-shaped light crossbands on a dark background. To this group belong *T. fischeri* of the Guatemalan plateau and Chiapas and *T. kidderi* of Alta Verapaz, thus indicating that the group is predominantly an upland type.

Another species *T. fasciata* Günther which is poorly understood seems to occupy a position about half way between the former two groups. This latter—I have examined 2 specimens from Yucatan in the collec-

tions of the Field Museum of Natural History, Nos. 36194-5—has a long head in juveniles but relatively short in adults, though less so than in *T. sartorii*; the frontal is as long as broad, its body moderately compressed, well-differentiated posterior chin shields, 5 infralabials in contact with the anterior chin shields (except in one of the types in which but 4 make this contact), and a typical *sartorii* pattern. Though morphologically *T. fasciata* serves as a connecting link, its geographic position is still too poorly known to decide with certainty whether such is the case. It is known from only northern Yucatan and Tehuantepec (Mocquard, Miss. Sci. Mex., 1908:872).

Into this whole scheme, *T. kidderi* appears to be little more than an eastern offshoot of *T. fischeri* from which it differs primarily by its simplified pattern. Alta Verapaz has numerous reptilian forms which are similarly nothing more than populations which have differentiated from more widespread stem species to the west. Among the more conspicuous of these may be listed *Oedipus helmrichi*, *Anolis cobanensis*, and *Rhadinaea hempsteadae*.

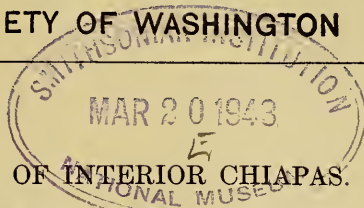
Acknowledgments.—I take this opportunity to acknowledge grants received from the Horace H. Rackham School of Graduate Studies and from the Baird Endowment Fund, both of the University of Michigan, which have supported my Guatemalan investigations. To the authorities of the Field Museum of Natural History I wish to express my thanks for the loan of material contained in their collections. Mr. Hobart Smith of the University of Rochester has generously offered me many stimulating suggestions concerning the genus *Tropidodipsas* and has given me access to considerable unpublished data.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

## THE CHACHALACA OF INTERIOR CHIAPAS.

BY PIERCE BRODKORB.



The only chachalaca specimens known from interior Chiapas consist of a small series collected in 1941 in the upper part of the Grand Valley. Part of this series went to the Conover collection and has been referred to *Ortalis vetula intermedia* Peters, the race of the lower part of the Yucatan peninsula (cf. Hellmayr and Conover, Zool. Ser. Field Mus. Nat. Hist., 13, 1, pt. 1, No. 1, 1942, p. 171). While these birds resemble *intermedia* more closely than they do any other form, they differ in certain respects, besides occupying an area which seems to be entirely cut off from the territory of *intermedia* by the ranges of more dissimilar subspecies.

The ranges of the various forms of *Ortalis* in southern Mexico and northern Central America are delimited in large part by physiography and humidity. Two forms, *O. vetula poliocephala* (Wagler) and *O. v. leucogastra* (Gould), are confined to the Pacific side, the former in the arid northern part, the latter in the more humid southern portion. The southernmost record for *poliocephala* is Tonala, Chiapas, which has 1,100 mm. annual rainfall. The most northern stations for *leucogastra* are in the District of Soconusco in Chiapas, which has over 2,000 mm. of rain. Both of these forms are often considered as specifically distinct from the Atlantic coast races of *vetula*.

The latter assemblage occupies the entire coastal plain and foothills from the Rio Grande to Honduras (possibly Nicaragua). The breaks between the ranges of the various subspecies of the Atlantic side also correspond very closely to the 1,000 and 2,000 mm. isohyete lines. *O. v. mcalli* Baird, a pale race, inhabits an area with an average rainfall of well under 1,000 mm. per year. The southernmost locality for *mcalli* is Tampico, which has 1,200 mm. of rain.

From Tampico southward the rainfall becomes progressively heavier, reaching 5,400 mm. in northern Chiapas. This area is inhabited by a richly colored race, *O. v. vetula* (Wagler).

*O. v. plumbeiceps* (Gray) occupies the Caribbean lowlands of Guatemala and Honduras. The rainfall here is perhaps on the average even heavier

than in the area inhabited by *vetula*, and *plumbiceps* differs from that race only in slightly richer coloration. The region between the known ranges of *vetula* and *plumbiceps* has not been visited by bird collectors. From what is known of the country and from the fact that specimens from Verapaz approach the characters of the more northern race, it may be inferred that the two forms intergrade in that area.

Utila Island off the coast of Honduras is the home of *O. v. deschauenseei* Bond, a form which is paler than the mainland race. There are unfortunately no rainfall records for this station.

On the base of the Yucatan peninsula, to the north of the ranges of *vetula* and *plumbiceps*, the rainfall decreases. This is the area inhabited by *O. v. intermedia*, whose southern limit follows very closely the 2,000 mm. isohyetose line and whose northern limit occurs near the 1,000 mm. line. This race is paler than either *vetula* or *plumbiceps*.

In the still more arid tip of the peninsula lives the even paler race, *O. v. pallidiventris* Ridgway. The annual rainfall of this area averages well below 1,000 mm.

The Grand Valley of Chiapas lies in a rain shadow, and the precipitation here is under 1,000 mm. per year. I attribute the resemblance of the chachalacas of this area to those of the base of the Yucatan peninsula to parallelism, induced by similar climatic conditions, since the two areas are separated by a broad humid belt. For the form of interior Chiapas, I propose the name

***Ortalis vetula vallicola*, subsp. nov.**

Type.—Univ. Mich. Mus. Zool. No. 110109; male adult; Malpaso, Chiapas; June 22, 1941; Carlos Ordoñez, collector.

Characters. Most similar to *Ortalis vetula intermedia*, but larger; breast somewhat paler and grayer; flanks, crissum, and thighs on average more brownish olive, less rufescent.

Resembles *O. v. vetula* in size but is paler throughout, including the tips of the rectrices.

Measurements.

SEX	RACE	WING	TAIL
12 ♂	<i>intermedia</i>	184–209 (193.3)	207–235 (221.4)
3 ♂	<i>vallicola</i>	207–214 (210.3)	234–252 (245.3)
7 ♀	<i>intermedia</i>	179–193 (185.4)	208–227 (219.9)
2 ♀	<i>vallicola</i>	192–199 (195.5)	216–239 (227.5)

Material examined. *O. vetula vallicola*: Chiapas (Chicomuselo, 3; Malpaso, 3). *O. vetula intermedia*: Peten (Uxactun, 8), Campeche (Apazote, 2; Matamoros, 4); Tabasco (Montecristo, 1; La Palma, 1; near Reforma, 1; Balancán, 2; Tenosique, 1).

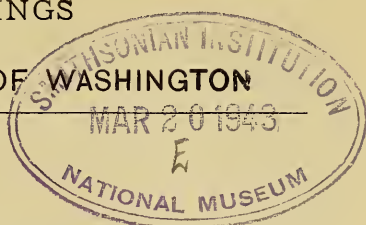
This study was aided by a grant from the Faculty Research Fund of the Horace H. Rackham School of Graduate Studies of the University of Michigan. Thanks for the generous use of material in their collections are due Mr. H. B. Conover, and the authorities of Field Museum of Natural History, the Fish and Wildlife Service, and the U. S. National Museum.



574, 0673

710

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



A NEW SUBSPECIES OF *TROGON CITREOLUS*.

BY PIERCE BRODKORB.

*Trogon citreolus* Gould is divisible into a northern and a southern subspecies, differentiated on size and the extent of white tipping of the rectrices. Gould's name was based on two birds of unknown origin. Cory<sup>1</sup> restricted the type locality to Colima. Van Rossem (Ms.) examined Gould's types and found them to resemble birds from Sinaloa. Their measurements are as follows: wing, ♂ 132, ♀ 129; culmen, ♂ 18.5, ♀ 19; white tip of inner web of outer rectrix, measured along shaft, ♂ 42, ♀ 27 mm.

*Trogon lucidus* is a manuscript name of Lichtenstein's first quoted by Cabanis and Heine<sup>2</sup> in the synonymy of *Aganus* [*Trogon*] *citreolus*. It is therefore to be treated exactly as a nomen nudum quoted in synonymy, i. e., as a new name for *citreolus*. The fact that the only specimens examined by Cabanis and Heine were from Tequistlán and Tehuantepec and are at least in part not of the same race as Gould's types has no bearing on the nomenclature of the case.

*Trogon capistratum* Lesson, which Ridgway quoted with a query under the synonymy of *citreolus*, is now conceded to be a synonym of *Trogon melanocephalus*.

For the southern race I propose

***Trogon citreolus sumichrasti*, subsp. nov.**

Type.—Univ. Mich. Mus. Zool. No. 102334; ♂ adult; Arriaga, Chiapas altitude 56 meters; May 24, 1939; P. Brodkorb, orig. no. 14674.

Characters.—Differs from *Trogon citreolus citreolus* by being larger and by having larger white tips to the lateral rectrices.

Wing (7♂), 141-150 (147.0); culmen, 21-23 (21.9); white tip of inner web of outer rectrices, 44.5-57.5 (50.4). Wing (5♀), 141-144 (143.0); culmen, 20.5-21.5 (20.9); white tip, 33.5-52 (38.1).

*Trogon citreolus citreolus* has the following measurements: wing (9♂),

<sup>1</sup> Zool. Ser. Field Mus. Nat. Hist. 13, pt. 2, No. 2, 1919, p. 328.

<sup>2</sup> Mus. Hein., 4, Heft 1, 1863, p. 197, note.

133-141 (137.6); culmen, 18.5-21.5 (20.1); white tip, 35.5-42 (40.9). Wing (7 ♀), 134-138 (135.7); culmen, 19-20 (19.4); white tip, 25.5-33.5 (29.3).

Range.—Pacific coastal plain of Mexico, from central Oaxaca (Santa Cruz Bay) to central Chiapas (Pijijiapan).

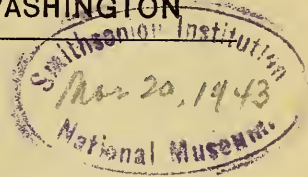
Remarks.—Birds from Acapulco, Guerrero, and from Santa Cruz Bay, Oaxaca, are intermediate, those from Acapulco being nearer *citreolus* and those from the latter place nearer *sumichrasti*. Three males from Acapulco have the wing 132-138; culmen, 20.5; white tip, 43-50.5. A male from Santa Cruz Bay measures 140, 20.5, and 52.5, respectively. Two females from Acapulco measure 133-139, 17.5-20.5, and 26-31. Two females from Santa Cruz Bay measure 140-142, 20.5-21, and 35.5-43.

I am greatly indebted to A. J. van Rossem and James L. Peters for various courtesies. Thanks for the use of material are due the authorities of Field Museum of Natural History and the U. S. National Museum, including the Fish and Wildlife Survey collection. Acknowledgment is also made to the Board of Governors of the Horace H. Rackham School of Graduate Studies of the University of Michigan for a grant from the Faculty Research Fund.

Material examined.—*Trogon citreolus citreolus*: Sinaloa (Mazatlán, 4; Escuinapa, 1), Nayarit (Santiago, 1; San Blas, 1), Michoacan (La Salada, 1), Colima (Colima, 4; Río de la Armeria, 1; Sierra Madre, 1), Guerrero (Acapulco, 5).

*Trogon citreolus sumichrasti*: Oaxaca (Santa Cruz Bay, 3; Tehuantepec, 1; Huilotepec, 2; Chihuitán, 2; Santa Efigenia, 1), Chiapas (Arriaga, 1; Tonalá, 2; Pijijiapan, 3).

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON



DESCRIPTIONS OF NEW SPECIES AND SUBSPECIES  
OF MEXICAN SNAKES OF THE GENUS RHADINAEA.

BY HOBART M. SMITH.<sup>1</sup>

The recent review of Mexican *Rhadinaea* by Bailey<sup>2</sup> has greatly simplified the study of this interesting group of snakes. Collections recently acquired for the U. S. National Museum and the E. H. Taylor-H. M. Smith collection have notably augmented the meager series previously available of most species. The present study is based upon these collections and, as predicted by Bailey, has revealed a number of forms as yet unnamed.

I am indebted to Dr. E. H. Taylor for his very generous loan of specimens, for advice with the various problems that have arisen, and for the photographs here reproduced. The drawings were executed by my wife. The study was completed, and a portion of the material was collected, during tenure of the Walter Rathbone Bacon Traveling Scholarship.

*Rhadinaea hesperia hesperia* Bailey.

*Diagnosis.*—Ventrals 155 to 166 (in specimens I have seen; Bailey gives a range of 151 to 179 in whole species); caudals 109 to 136; temporal and dorsolateral light stripes separate; latter anteriorly on sixth and adjacent halves of fifth and seventh rows; usually a secondary dark stripe on seventh scale row (pigment abruptly terminating at that point, if stripe is absent), occasionally a similar stripe on eighth row; evidence of light border to vertebral dark stripe present; light stripes (dorsolateral) present on tail; sides below lateral dark stripe usually evenly pigmented; dorsolateral light stripes curving laterally at nape, not angular; temporal stripe not reaching lower secondary temporal.

*Material examined.*—Five specimens: U. S. N. M. 15429, "Guanajuato"; U. S. N. M. 20166, Cuernavaca, Morelos; EHT-HMS 5441-2, Hda. El Sabino, near Uruapan, Michoacán; EHT-HMS 23547, five miles north of Chilpancingo, Guerrero.

<sup>1</sup> Published by permission of the Secretary of the Smithsonian Institution.

<sup>2</sup> The Mexican snakes of the Genus *Rhadinaea*. Occ. Papers Mus. Zool. Univ. Mich., no. 412, 1940, pp. 1-19, pls. 1-2.

*Remarks.*—The material available fortunately represents most of the extremes of distribution so far as known. The El Sabino specimens show a trend toward *hesperioides*, in possessing secondary stripes on the lateral scale rows. All others are more or less uniform, having the sides of the body nearly evenly pigmented, the inner border of the dorsolateral light stripe on the seventh scale row, lateral dark stripe passing through the middle of the fifth scale row, distinct light stripes on the tail, and other more minor peculiarities which differentiate them from *hesperioides* and *baileyi*. Ecologically, the area represented by these specimens is more or less a unit, with the exception of the Chilpancingo area. Specimens from this area may eventually prove distinct from others of the subspecies.

***Rhadinaea hesperia hesperioides*, subsp. nov.**

(Fig. 1.)

*Holotype.*—U. S. National Museum 67373, male, from Magdalena, Jalisco, collected by C. C. Elliott, June 23, 1924. *Paratypes.*—U. S. N. M. 46456, Plomosas, Sinaloa; U. S. N. M. 15430, labelled "Guanajuato," but in all probability from the vicinity of Guadalajara (from Dugès).

*Diagnosis.*—Like *hesperia*, except lateral stripe on fourth and fifth scale rows; inner border of dorsolateral light stripe anteriorly on sixth scale row; a light stripe on adjacent halves of second and third scale rows, most distinct anteriorly; a dark line, extending the full length of body, on second scale row.

*Description of holotype.*—Rostral much broader than high, portion visible from above about half length of internasals; latter three-fifths length of prefrontals; frontal much longer (3.7 mm.) than its distance from tip of snout (2.4 mm.), subequal to length of parietals on median line; nasal completely divided; a ridge bordering naris below; prefrontals extending onto sides of head; a large loreal; a large preocular and a small subpreocular; two large postoculars; temporals 1+2; supralabials eight, fourth and fifth entering eye, seventh somewhat the largest; ten infralabials, five in contact with anterior chinshields, which are separated from mental; chinshields subequal in size.

Dorsals in 17 rows throughout, smooth; ventrals 154; caudals 131; analdivided.

Lateral dark stripe on lower portion of fifth scale row; upper (inner) portion of fourth scale row also dark, the two stripes partially fused and appearing much as one to the naked eye; a dim, dotted dark stripe along inner portion of third scale row; a light stripe, most distinct anteriorly, on adjacent halves of second and third scale rows; a distinct, continuous dark stripe on second scale row; a less distinct dark stripe on first scale row; ends of ventrals stippled.

Inner edge of dorsolateral light stripe well defined anteriorly, on inner portion of sixth scale row; dim secondary dark lines on seventh and eighth rows; a fairly distinct light band adjoining vertebral stripe, occupying adjacent edges of vertebral and paravertebral scale rows; a continuous dark stripe, the most distinct on body, following vertebral scale row; tail with fairly well-defined dorsolateral light bands.

Light temporal stripe separated by two scale lengths from dorsolateral light stripes; temporal stripe reaching to naris; a dark line through upper portion of supralabials; a longitudinal series of black dots crossing somewhat below middle of supralabials; a few dark flecks on mental and anterior infralabials.

*Variation.*—In the Plomosas and Guadalajara specimens, respectively, the ventrals are 158 and 150, caudals 110 (♀) and tail broken. There are nine supralabials in the latter, and no subpreocular on one side in the former. The pattern is almost identically that of the type, except that the stripes on rows one, three, seven and eight are not or scarcely evident.

*Remarks.*—This subspecies has apparently the same scutellation as *hesperia*, from which it differs only in pattern. The present subspecies can easily be recognized, however, by the confinement anteriorly of the dorsolateral stripes to the fifth and sixth rows (involves all of sixth as well as half of each adjacent row in *hesperia*), and by the presence of a distinct light stripe (most distinct anteriorly) on adjacent halves of the second and third rows, bordered below by a distinct, continuous dark stripe.

The present form is considered a subspecies because of a development of secondary lines on the lateral scale rows in specimens of *hesperia* from El Sabino, which is geographically near *hesperioides*.

***Rhadinaea hesperia baileyi*, subsp. nov.**

(Fig. 2.)

*Holotype.*—EHT-HMS 5444 male, El Treinte, Guerrero, collected by E. H. Taylor.

*Diagnosis.*—Like *hesperia*, except lateral stripe on lower edge of fifth scale row; inner border of dorsolateral light stripe anteriorly on sixth scale row. No lateral light or dark stripes, even anteriorly, on first to fourth scale rows; a nearly transverse light bar at nape, connected with dorsolateral stripes at an angle; light temporal stripe extending diagonally backward, terminating on lower secondary temporal; no distinct light stripes on tail.

*Description of holotype.*—Rostral much broader than high, portion visible from above about half length of median internasal suture; internasals two-thirds length of prefrontals; length of frontal (3.2 mm.) somewhat less than its distance from tip of snout (2.9 mm.), shorter than parietals on median line (3.5 mm.); nasal very large, posterior section larger than anterior, completely divided, a ridge below naris; a large, square loreal; a large preocular and a small presubocular; two postoculars; temporals 1+1, 1+2; eight supralabials, fourth and fifth entering eye, sixth and seventh subequal in size; ten infralabials, five in contact with anterior chinshields, which are separated from mental; posterior chinshields somewhat longer than anterior.

Dorsals in 17 rows throughout, smooth; ventrals 153; anal divided; caudals 120.

A narrow lateral black stripe on lower part of fifth scale row; outer scale rows and ends of ventrals rather evenly pigmented; pigment on upper

part of fifth row forming coarse reticulae, but not uniting with the black lateral stripe, which skips the inner edges of the scales of the fourth row which interlace with the outer edges of the scales of the fifth row; no evidence anteriorly of light or dark stripes on rows one to four; inner edge of dorsolateral light stripe well defined anteriorly, placed on inner edge of sixth scale row; inner edge of dorsolateral light line indeterminate posterior to neck, no light lines evident or indicated on tail; a diagonally placed light bar on nape, extending from a point one scale length behind angle of mouth to anterior edge of dorsolateral light lines, with which the bar scarcely connects, at a sharp angle; a continuous black streak on middle of vertebral scale row; adjacent rows evenly pigmented, gradually merging with dorsolateral light stripes; temporal stripes not extending directly posterior, but diagonally to the lower secondary temporal, where they terminate; anterior to orbit temporal stripe extends to nasal plate; a dark line through upper edges of supralabials, posteriorly passing through lower part of eighth supralabial; labial border unmarked; a few, very small scattered flecks on chin.

*Remarks.*—This peculiar specimen holds in common some characters of *hesperioides*, others of *hesperia*, and certain peculiarities of its own. Due to the fact that the specimen comes from an area distinct ecologically from those occupied by either *hesperia* or *hesperioides*, I believe its peculiar characters are not anomalous nor variations of those of the other two forms.

From *hesperia* the present form is easily distinguished by restriction anteriorly of the dorsolateral stripes to the fifth and sixth scale rows; it also is notable in lacking secondary stripes, present in *hesperia* at least on the seventh scale row; there are no light stripes on the tail; the lateral dark stripe is placed on the lower part of the fifth scale row, and is interrupted by scales of the fourth (passes through middle of fifth in *hesperia*). From *hesperioides* it differs in absence of a dark stripe along the second scale row, absence of a light stripe along adjacent halves of the second and third scale rows, restriction of lateral stripe to fifth row, and in the peculiar character of the transverse light bar on the nape.

#### ***Rhadinaea forbesi*, sp. nov.**

(Fig. 3.)

*Holotype.*—U. S. National Museum No. 110365, male, collected at Tequeyutepec, seven miles west of Jalapa, Veracruz, March 23, 1940.

*Paratypes.*—U. S. N. M. No. 110364, topotype; U. S. N. M. 29124, without locality; and EHT-HMS (HMS field No. 13211), topotype.

*Diagnosis.*—Temporal stripe diagonal, extending to corner of mouth, or to upper edge of last supralabial; sides of body dark, including tips of ventrals; a black stripe on fourth scale row, involving edges of adjacent rows erratically; a broken white line (dotted) on fifth row; a dark stripe on median row, narrow or involving edges of adjacent rows; usually two preoculars (a presubocular); ventrals 140 to 150; caudals 63 to 64 (males).

*Description of holotype.*—Eight supralabials, fourth and fifth entering orbit on one side, third also on other; on the latter side, one preocular

(lower fused with third labial), two on other side; two postoculars, upper much the larger; temporals 1+2+3, anterior in contact with both postoculars; nine infralabials, the first in contact with its mate; six labials in contact with chinshields, five with anterior, two with the posterior.

Scales in 17 rows; ventrals 143; caudals 64; supra-anal ridges distinct.

Outer edges of ventrals to inner edge of third row black, the dorsal scales with numerous tiny lighter flecks; a dark line following fourth row, encroaching on third and fifth; bases and median area of scales in fifth row white, forming a dotted line; median and edges of adjacent rows black; median black stripe replaced by a white stripe on three scales posterior to parietals; area between fifth and median rows dark, becoming darker medially. Tips of subcaudals and ventrals black; a small black spot in the center of each anterior upper and lower labial, also on mental.

A dark-edged white line from upper edge of orbit to edge of eighth supra-labial, confluent with white of ventral surface; top of head brown; labials, except upper edges, black; lateral black stripes passing through eyes and confluent with each other around end of snout, a narrow black stripe passing through rostral.

Hemipenis<sup>3</sup> extending to seventh caudal (not everted); sulcus divided at fifth; distal third calyces; about eighteen medium-sized hooks; no large spines or hooks; tip capitate.

Maxilla with 17 subequal teeth, followed by a short diastema and three enlarged teeth.

*Variation.*—All three paratypes have two preoculars (presuboculars). The infralabials are 10–10 in one. The coloration is essentially similar in all. The two most notable variations in color pattern are in width of the median dark stripe, and in the posterior extension of the temporal stripe. In two specimens (the paratyptic topotypes) the median stripe is very narrow and runs along the middle of the median row, while in the type and other paratype it occupies the edges of the paravertebral as well as the median row. In one of the latter (No. 29124) it is lighter in the middle of the vertebral row. In one paratype the light temporal stripe extends to the ventral color, while in the other two it terminates at the posterior edge of the eighth labial. In both of the latter it practically fuses with the dorsolateral light stripe.

In No. 13211, the ventrals are 140, caudals 63, male; in 110364, ventrals 150, caudals 57+, female; in 29124, ventrals 143, caudals 60+, male.

*Remarks.*—The three Tequeyutepec specimens were found under stones and logs after a heavy rain during the dry season.

This species differs from any other known from Mexico in the diagonal position of the temporal stripe, and in features of the color pattern. Its ventral counts are the lowest of Mexican species, except *decorata*.

The species is named for Mr. Dyfrig McH. Forbes, who aided in the discovery of these three specimens, and who was responsible for a great share of our success in collecting in Veracruz and adjacent states.

---

<sup>3</sup> Descriptions of hemipenis and maxilla from No. 29124.

**Rhadinaea crassa**, sp. nov.

(Figs. 4, 5.)

*Holotype*.—EHT-HMS 5526, male, collected at Durango, Hidalgo, by E. H. Taylor. *Paratypes*. EHT-HMS 5443, La Placita, south of Jacala, Hidalgo; U. S. Nat. Mus. 110366, Barranca de los Horcones, ten kilometers south of Durango, Hidalgo (badly crushed road specimen); EHT-HMS 23548, Ciudad del Maiz, San Luis Potosi.

*Diagnosis*.—Ventrals 166 to 173; caudals 98 to 106; eight supralabials; temporal stripe fused with dorsolateral; a narrow dark stripe along middle of fourth, edges of fourth and fifth, or on lower half of fourth scale row; sides below lateral stripe uniformly pigmented; a small dark spot at ends of each ventral; a dark, secondary streak along inner edge of sixth scale row; a continuous dark line on middle of vertebral scale row; a light area, indistinct posteriorly, anteriorly bounded by a dark streak along outer edge of eighth scale row, bordering vertebral stripe on each side; a light middorsal streak on nape, black bordered.

*Description of holotype*.—Rostral much broader than high, portion visible from above a little less than half length of internasals; latter a little more than half length of prefrontals, which extend somewhat onto sides of head; length of frontal (3 mm.) greater than its distance from tip of snout (2.7 mm.), subequal to length of median parietal suture; a large nasal completely divided; a square loreal; one preocular; no presubocular; eight supralabials, eighth slightly the largest, fourth and fifth entering eye, third separated from eye by contact of preocular and fourth supralabial; temporals 1+2; infralabials ten, five in contact with anterior chinshields, which are separated from mental; posterior chinshields subequal to anterior in length.

Dorsals in 17 rows throughout, smooth; ventrals 168; anal divided; caudals 106.

Maxillary teeth 17+2 (in paratypes 5443 and 23548).

Lateral dark stripe narrow, involving adjacent edges of fourth and fifth scale rows; sides below this and ends of subcaudals uniformly stippled; a dark spot at ends of ventrals; a light stripe on adjacent portions of fifth and sixth scale rows, occupying most of these rows, its inner border fairly well defined throughout length of body, very distinct anteriorly; a continuous dark stripe on middle of vertebral scale row, bordered on either side by a light streak, which is distinct anteriorly, less distinct posteriorly, and which involves most of the paravertebral scale row; remainder of dorsal area light brown. Dorsolateral light lines continuous with temporal stripes, which diverge somewhat in temporal region and extend through upper part of rostral, where one connects with the other; upper edges of supralabials dark, remainder white, save a few irregular dark spots arranged more or less in a line passing through the middle of the labials; a light median nuchal stripe, dark-edged; a few irregular, dark flecks and spots on mental and infralabials.

Tail with ends of caudals dark; a narrow lateral stripe; area between ends of caudals and lateral dark stripe light brown; a dorsolateral light



stripe, inner edge moderately well defined, but not sharp; dorsal area light brown, edges slightly darker; a middorsal black line, somewhat reticulate.

*Variation.*—The ventrals and caudals of Nos. 5443, 23548 and 110366 are, respectively: 173, 98 (♀); 166, 93 (♀); 173, ? (♀). A presubocular which separates the third infralabial from orbit occurs in two (indeterminate in 110366).

In No. 5443, the lateral stripe involves the lower half of the fourth, and the upper edge of the third scale rows; inner edge of dorsolateral stripe, and disposition of other dorsal stripes, same as in type; ends of ventrals dark, as in type.

In No. 23548 the stripes are disposed exactly as in the type; the ends of the ventrals are spotted; the tail, however, lacks a middorsal black stripe on distal portion.

In No. 110366, the dorsolateral dark stripes pass through the middle of the fourth scale row; the dorsal stripes appear to be the same as in the type; the ends of the ventrals are spotted.

*Remarks.*—This species bears a resemblance to *gaigeae*, to which it is closely related. It differs from *gaigeae* in presence of dark spots at the tips of the ventrals, light lines bordering vertebral dark stripe, and perhaps in number of maxillary teeth (17+2 in two *crassa*; 14+2 in two *gaigeae* *vide* Bailey).

The specimens available of *crassa* may represent the extremes in variation of that species. The specimen from La Placita resembles *quinquelineata* in position of the lateral dark stripe (but differs in numerous other details of pattern), while the specimen from Barranca de los Horcones agrees with *gaigeae* in position of the lateral stripe. Both *crassa* and *quinquelineata* have a short, white middorsal nuchal stripe; *gaigeae* may have.

#### EXPLANATION OF FIGURES ON PLATE III.

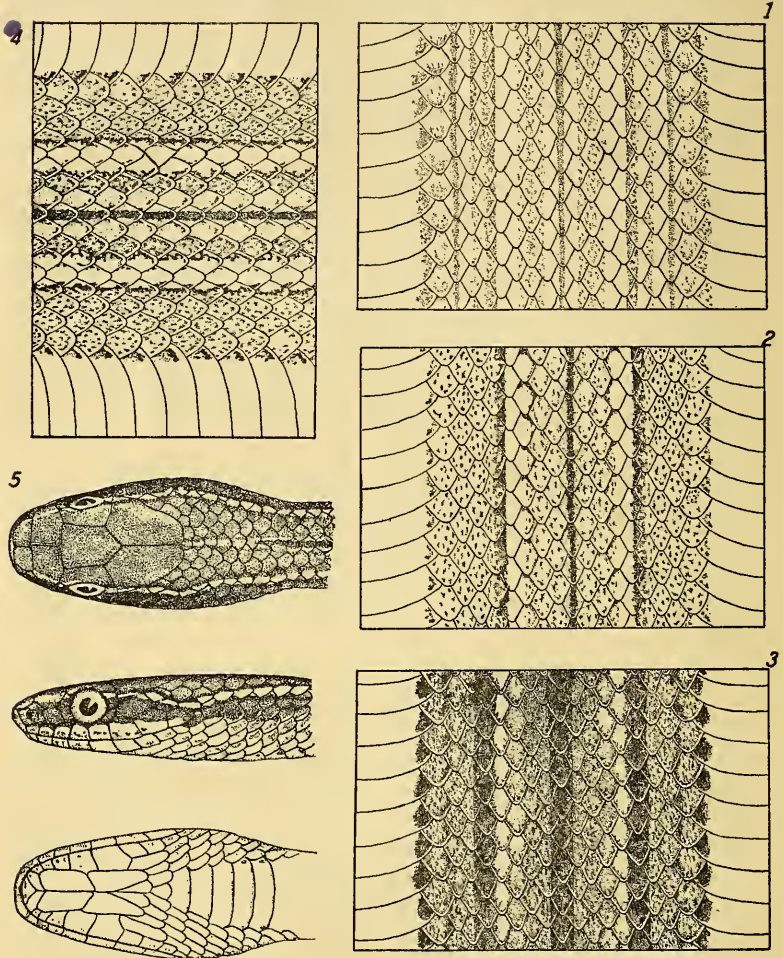
Fig. 1. Pattern of *Rhadinaea hesperia hesperioides*, from holotype, U. S. N. M. 67373, Magdalena, Jalisco. Anterior part of body.

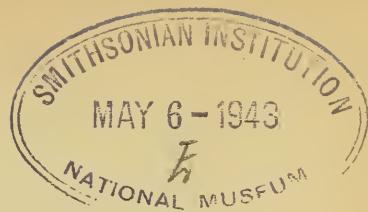
Fig. 2. Pattern of *Rhadinaea hesperia baileyi*, from holotype, EHT-HMS 5444, El Treinte, Guerrero. Anterior part of body (15th to 24th ventrals).

Fig. 3. Pattern of *Rhadinaea forbesi*, from holotype, U. S. N. M. 110365, Tequyutepec, Veracruz. Anterior part of body.

Fig. 4. Pattern of *Rhadinaea crassa*, from holotype, EHT-HMS 5526, Durango, Hidalgo. Anterior part of body.

Fig. 5. Cephalic scutellation and pattern of *Rhadinaea crassa*, from holotype.





# INDEX.

New names are printed in heavy type.

A			
abraea, Hemitrichia.....	29	Apium.....	110
absonus, Thomomys bottae.....	76, 77	arabicus, Ophilioacarus.....	125
abundus, Eurystomus orientalis.....	170	arbutifolius, Oxylobus.....	114
	171, 172, 173, 176	Archibaccharis asperifolia.....	118
Acaridae.....	124	caloneura.....	117
Acarina.....	122	campii.....	115
Acarus farinae.....	122	sescenticeps.....	118
scabiei.....	122	aridus, Colinus virginianus.....	67, 69
siro.....	124	arizonicus, Neocarus.....	128
aequalis, Pliocercus.....	164	Arkansobius.....	21, 22
affinis, Micrurus affinis.....	65	armata, Scolopendra.....	18
Peromyscus leucopus.....	157, 158	Artemisia.....	167
afghana, Stauroids.....	74	Arthropleptides.....	54
Aganum citreolus.....	183	asperifolia, Archibaccharis.....	118
agassizi, Gopherus.....	90	asellus, Macrotoleagus.....	25
Ageratum.....	114	Asterocarpus.....	110
albayana, Hemitrichia brachy- tricha.....	32	Asterostemma.....	111
albicaudatus, Thomomys bottae.....	76	Astrocarpus.....	110
albida, Euphorbia pulcherrima.....	84	Astrostemma.....	111
albuguttatus, Salarias.....	4	Astylosternus.....	54
Aldrich, John W. New Bob- white from Northeastern Mexico.....	67	Atlapetes apertus.....	108
alleni, Macrotoleagus alleni.....	25	brunnei-nucha.....	108
altamirae, Macrotoleagus.....	25	inornatus.....	108
Altitana.....	53	atriceps, Saltator.....	106, 107
amazonicus, Anonocarpus.....	99, 101	Saltator atriceps.....	106, 107
Batocarpus.....	99, 100, 101	Atrichoconcha.....	28, 38, 39
amazonum, Thlypopsis sordida.....	85	bakeri.....	39
Ameiva chaitzami.....	143	flavida.....	39
	145, 146, 147, 148	gummata.....	39
festiva miadis.....	146	laccata.....	39
letophrys.....	143, 146, 147, 148	luteofasciata.....	39
pulchra.....	146	oblita.....	39
undulata amivoides.....	146	panayensis.....	39
hartwegi.....	145, 148, 149	semisculpta.....	39
parva.....	145, 146, 147, 148	Atriplex confertifolia.....	168
pulchra.....	146, 148, 149	azureus, Eurystomus orientalis.....	173, 176
stuarti.....	143, 146, 147, 148		
undulata.....	145	B	
undulata.....	146, 147, 149	badajosana, Hemitrichia con- similis.....	31
americanus, Tyroglyphus.....	123, 124	baileyi, Rhadinaea hesperia.....	186, 187, 191
amivoides, Ameiva undulata.....	146	bakeri, Atrichoconcha.....	39
Ammodramus savannarum.....		bakeri, Hemitrichia.....	42
ammolegus.....	15	balerana, Hemitrichia setigera.....	34
perpallidus.....	15, 16	Bartsch, Paul. A Synopsis of the Philippine Land Mollusks of the Genus Hemitrichia.....	27
ammolegus, Ammodramus sa- vannarum.....	15	batanensis, Hemitrichia brachy- tricha.....	32
anamallaiensis, Nannobatrach- us.....	49, 52, 53	batangasana, Hemitrichia seti- gera.....	35
andrewsi, Pliocercus.....	162, 164	Batocarpus amazonicus.....	99, 100, 101
aneitensis Salarias.....	6	orinocensis.....	99, 100
angulifer, Sphaeriodesmus.....	57	beali, Oceanodroma.....	9, 10
Anolis cobanensis.....	179	leucorhoa.....	10
Anonocarpus.....	100	beddomii, Nannobatrachus.....	50, 52, 53
amazonicus.....	99, 101	Rana.....	55, 73
antimonana, Hemitrichia semi- sculpta.....	40	beldingi, Oceanodroma.....	9
Aparasphendon.....	154	Bell, W. B. Quest of the Alaska seal skin.....	viii
aparriana, Hemitrichia.....	29, 35	bennettii, Lepus californicus.....	25
apertus, Atlapetes.....	108	bicolor, Pliocercus.....	164
Apies.....	110	bilineatus, Salarias.....	5
		bilitonensis, Salarias.....	4



- Dicroglossus grunniens*..... 54  
*kuhlii*..... 54  
*leytensis*..... 54  
*limnocharis*..... 54  
*macrodon*..... 54  
*microdisca*..... 54  
*microtympanum*..... 54  
*modesta*..... 54  
*occipitalis*..... 54  
*tigerina*..... 54  
*verrucosa*..... 54  
*diminutiva, Micrixalus*..... 73, 74  
*Dipodomys*..... 87  
*microps bonnevilliei*..... 90  
*celsus*..... 89, 90  
*centralis*..... 90  
*leucotis*..... 90  
*occidentalis*..... 90  
*woodburyi*..... 89, 90  
*ordii celeripes*..... 91  
*columbianus*..... 91, 166, 168  
*cupidineus*..... 91  
*evexus*..... 166, 168  
*luteolus*..... 165, 166, 167, 168  
*montanus*..... 166, 168  
*nexilis*..... 166, 167, 168  
*panguitchensis*..... 90, 91  
*priscus*..... 166, 167, 168  
*richardsonii*..... 166, 167, 168  
*terrosus*..... 165, 166, 167, 168  
*utahensis*..... 166, 168  
*Discodeles*..... 73  
*dixiensis, Tamiasciurus*..... 87, 88, 89  
*doriae, Dicroglossus*..... 54  
*douglasii, Thomomys douglasii*..... 95  
*Dove, W. E. Dogfly control*..... vii  
*Durvillea*..... 111  
*dussumieri, Salaris*..... 3, 5  
*Dutilly, Father A. Arctic flora*..... vii
- E
- Ebertia*..... 122  
*echinopus, Rhizoglyphus*..... 123, 124  
*Edalorhina perezii*..... 151  
*edentulus, Salaris*..... 3, 5  
*Elachistocleis ovalis*..... 155  
*Elaphe laeta intermontanus*..... 136  
*laeta laeta*..... 137, 138, 139, 140, 142  
*135, 137, 138, 139, 140*  
*elapoides, Pliocercus*..... 159, 160, 162, 164  
*elapoides*..... 160, 162, 164  
*Elaps fitzingeri*..... 64  
*Elattobius*..... 22  
*elkoensis, Thomomys townsendii*..... 75, 76  
*Elodea*..... 111  
*Elodes*..... 111  
*emarginatus, Myotis emarginatus*..... 104  
*Epidendron*..... 110  
*Epidendrum*..... 110  
*eremicus, Lepus californicus*..... 25  
*Erigeron mihianus*..... 114, 115  
*oaxacanus*..... 115  
*erioloma, Perezia*..... 118  
*Eschweilera*..... 111  
*Eschweilera*..... 111  
*Ethulia*..... 114  
*Eucaridae*..... 125  
*Eucarus*..... 125  
*Eupemphix petersi*..... 152  
*pustulosus*..... 152  
*ruthveni*..... 152  
*schereri*..... 151, 152  
*Euphorbia poinsettia*..... 84  
*pulcherrima*..... 84  
*albida*..... 84  
*plenissima*..... 84
- Eurystomus orientalis*..... 169  
*abundus*..... 170, 171, 172, 173, 176  
*azureus*..... 173, 176  
*bravi*..... 170  
*calornyx*..... 170  
*connectens*..... 175, 176  
*crassirostris*..... 174, 175, 176  
*deignani*..... 171, 172, 173, 176  
*gigas*..... 173  
*laetior*..... 172  
*oberholseri*..... 173  
*orientalis*..... 170  
*171, 172, 173, 174, 175*  
*pacificus*..... 175, 176  
*solomonensis*..... 174, 176  
*waigiuensis*..... 173, 174, 176  
*evexus, Dipodomys ordii*..... 166, 168  
*Ewing, H. E., and Herbert H. Nesbit. Some Notes on the Taxonomy of Grain Mites. (Acarina: Acaridae, formerly Tyroglyphidae)*..... 121
- F
- farinae, Acarus*..... 122  
*Tyroglyphus*..... 124  
*fasciata, Tropicodipsas*..... 178  
*fasciatus, Salaris*..... 4  
*festinus, Macroto lagus*..... 25  
*fischeri, Tropicodipsas*..... 177, 178, 179  
*fitzingeri, Elaps*..... 64  
*Micrurus*..... 63, 64  
*fitzingeri*..... 63, 65  
*flavida, Atrichocochla*..... 39  
*flavicularis, Macroto lagus*..... 25  
*fodiens, Pterohyla*..... 154  
*forbesi, Rhadinaea*..... 188, 191  
*Forslesia*..... 109  
*clokeyi*..... 112  
*nevadensis*..... 112  
*planitierum*..... 112  
*pungens*..... 111, 112  
*spinescens*..... 112  
*texensis*..... 112  
*Fosberg, F. R. The Genus Batocarpus Karst (Moraceae)*..... 99  
*Fowler, J. A. An Exhibit of the salamanders of the District of Columbia and vicinity*..... ix  
*— Note on the effects of the October flood on the distribution of reptiles and other animals*..... ix  
*fowleri, Salaris*..... 7  
*fremonti, Tamiasciurus fremonti frenatus, Salaris*..... 88, 89  
*6*  
*Friedmann, Herbert. A New Panager from Venezuela*..... 85  
*fuliginosus, Hyloxalus*..... 155  
*fuscus, Ixalus*..... 72, 73, 74  
*45, 47*  
*Micrixalus*..... 72, 73, 74  
*Pipilo*..... 45, 47  
*fuscus*..... 45, 46, 47, 48  
*Salaris*..... 3  
*fusiforme, Panicum*..... 93
- G
- gaigeae, Rhadinaea*..... 191  
*gaillardi, Macroto lagus gailardi*..... 25  
*galamensis, Dicroglossus*..... 54  
*Garbeana*..... 154  
*Gerardiina*..... 111  
*Gerrardiina*..... 111  
*gigas, Eurystomus orientalis*..... 173

glacialis, <i>Thomomys talpoides</i> .....	97, 98	gummata—	
globosa, <i>Hemitrichia hidalgoi</i> ....	36, 37	purpurascens.....	38
Glossopetalon.....	109	semisculpta.....	39, 40
clokeyi.....	112	antimonana.....	40
nevadensis.....	112	cataduanensis.....	40
planitierum.....	112	polagana.....	40
pungens.....	111, 112	semisculpta.....	40
spinescens.....	109, 112	webbi.....	40
stipuliferum.....	110, 112	woodi.....	40
texensis.....	112	setigera.....	28, 29, 33, 35
Glossopetalum.....	109	balcrana.....	34
Goldman, E. A. Three Rodents		batangasana.....	35
from Southern Utah.....	75	casigurana.....	34
Notes on the Coatis of		makabengana.....	34
the Mexican Mainland.....	79	malupana.....	35
A New White-footed		moeliendorffi.....	35
Mouse from Mexico.....	157	palanana.....	34
Gopherus agassizi.....	90	polilloensis.....	35
Goupius.....	109	quadrasi.....	33, 34
Gramineae.....	111	tauitana.....	34
grayi, <i>Dicroglossus</i> .....	54	setosula.....	29
Grayia spinosa.....	168	striatula.....	29
graysoni, <i>Colinus virginianus</i> ...	69	tagalensis.....	29, 36, 37, 38
grunniens, <i>Dicroglossus</i> .....	54	casigurana.....	37
Guerrobius.....	20	mearnsi.....	37, 38
humberti.....	20	principensis.....	38
pontifex.....	20	tagalensis.....	37, 38
gummata, <i>Atrichocoacha</i> .....	39	velutina.....	28
<i>Hemitrichia</i> .....	39, 41	velutinella.....	29
gummata.....	41	xanthotrichia.....	27, 28, 29
guttatus, <i>Salarias</i> .....	6	hempsteadae, <i>Rhadinaea</i> .....	179
H			
Hardy, Ross. Three New Ro-		Henderson, W. C. Comparison	
dents from southern Utah.....	87	between the Biological Sur-	
hartwegi, <i>Ameiva undulata</i> .....	145, 148, 149	vey of Dr. Merriam's time	
helmrichi, <i>Oedipus</i> .....	179	and the present.....	viii
<i>Hemitrichia</i> .....	27, 28	Herre, Albert W. C. T. Notes	
abraea.....	29	on Fishes in the Zoological	
aparriana.....	29, 35	Museum of Stanford Uni-	
bakeri.....	42	versity. IX. A New Species	
boettgeri.....	29	of <i>Salarias</i> , With a Key to the	
brachytricha.....	29, 31, 32	Philippine Species.....	1
albayana.....	32	herrei, <i>Micrixalus</i> .....	71, 74
batanensis.....	32	hesperia, <i>Rhadinae hesperia</i> ...	185, 186, 187
brachytricha.....	32	hesperioides, <i>Rhadinae hes-</i>	
clnnamomea.....	28	peria.....	186, 187, 191
consimilis.....	28, 30, 31	Hevea.....	100
badajosana.....	31	hexophthalmus, <i>Ophilioacarus</i> ...	125, 128
consimilis.....	31	hexophthalmus,	
sibuyanensis.....	31	Paracarus.....	126
gummata.....	39, 41	hidalgovi, <i>Hemitrichia</i> .....	29, 36, 37, 38
gummata.....	41	hidalgovi.....	36, 37
obscura.....	41	hirsutus, <i>Peridontodesmus</i> .....	58
hidalgovi.....	29, 36, 37, 38	Hoffmeister, Donald F. New	
globosa.....	36, 37	Subspecies of Kangaroo Rats	
hidalgovi.....	36, 37	of the <i>Dipodomys ordii</i> Group	
matuliana.....	36, 37	from Montana and Wyoming..	165
stenostoma.....	36, 37	Hollandichthys.....	154
kobelti.....	29, 32, 33	hoogstraali, <i>Peridontodesmus</i> ...	58
kobelti.....	33	Howell, Arthur H. A New Red	
romblonensis.....	33	Squirrel From North Dakota	13
luteofasciata.....	28, 38, 43	humberti, <i>Guerrobius</i> .....	20
conoidalis.....	43, 44	hyacinthi, <i>Rhizoglyphus</i> .....	123, 124
libmanana.....	43	Siteroptes.....	124
luteofasciata.....	43, 44	Hyla ceratophrys.....	154
maculaboensis.....	43, 44	reticulata.....	152
paracaleana.....	43, 44	Hylarana.....	54, 55
oblita.....	41	Hyloxalus fuliginosus.....	155
oblita.....	41	I	
tayabasana.....	41, 42	incensus, <i>Peromyscus leucopus</i> ...	157, 158
pandana.....	29, 36	inornatus, <i>Atlapetes</i> .....	108
panyensis.....	42	insularis, <i>Lepus</i> .....	25
platyzona.....	29	intermedia, <i>Ortalis vetula</i> .....	181, 182
pruinosa.....	28, 30, 31	intermedius, <i>Pipilo fuscus</i> .....	45, 46, 47
depressa.....	30	intermontanus, <i>Elaphe laeta</i> .....	136, 137
pruinosa.....	30	138, 139, 140, 142	
zambalesana.....	30	interruptus, <i>Salarias</i> .....	7
		Iria.....	110, 111







- P
- pacificus*, *Eurystomus orientalis* 175, 176  
*palanana*, *Hemitrichia setigera* 34  
*palitans*, *Macroptolagus allenii* 25  
*pallescens*, *Tamiasciurus hudsonicus* 13  
*pallida*, *Nasua narica* 80  
*pallidiventris*, *Ortalis vetula* 182  
 Palmer, T. S. Dr. Merriam's life as a scientist. viii  
     — Vernon Bailey, an appreciation ix  
*panayensis*, *Atrichocncha* 39  
*panayensis*, *Hemitrichia* 42  
*pandana*, *Hemitrichia* 29, 36  
*panguitchensis*, *Dipodomys ordii* 90, 91  
*Panicum fusiforme* 93  
     *pinetorum* 93  
*panucensis*, *Ortyx graysoni* 67  
*paracaleana*, *Hemitrichia luteofasciata* 43, 44  
*Paracarus hexophthalmus* 126  
*Parachistes* 58  
*Paraiulus phloibius* 60  
     *schaachti* 60  
*parva*, *Ameiva undulata* 145, 146, 147, 148  
*parvulus*, *Dendrobates* 155  
*Paspalum texanum* 94  
     *wrightii* 94  
*paupropodus*, *Simoleptus* 19, 20  
*pedrigalus*, *Vulcanbius* 20  
*Peltophorus* 111  
*Peponia* 110, 111  
*Peponium* 110, 111  
*perezi*, *Edalorhina* 151  
*Perezia erioloma* 118  
     *umbratilis* 119  
*Peridotodesmus hirsutus* 58  
     *hoogstraali* 58  
     *woodianus* 58  
*Peromyscus leucopus affinis* 157, 158  
     *castaneus* 157, 158  
     *incensus* 157, 158  
     *mesomelas* 157, 158  
     *texanus* 157, 158  
*perpallidus*, *Ammodramus savannarum* 15, 16  
*Pipilo* 45, 46, 47  
     *petasatus*, *Triprion* 154  
     *petax*, *Myotis* 104  
         *petax* 103  
     *petersi*, *Eupemphix* 152  
     *Phania trinervia* 114  
     *phloibius*, *Paraiulus* 60  
     *Phyllobates nubicola* 72  
     *pinetorum*, *Panicum* 93  
     *Piper* 100  
     *Pipilo fuscus* 45, 47  
         *fuscus* 45, 46, 47, 48  
         *intermedius* 45, 46, 47  
         *jamesi* 45  
         *mesoleucus* 45, 46, 47, 48  
         *potosinus* 46, 47, 48  
         *tenebrosus* 48  
         *texanus* 47  
         *toroi* 46, 47  
         *perpallidus* 45, 46, 47  
*planitierum*, *Forsellesia* 112  
     *Glossopetalon* 112  
*platensis*, *Ophilioacarus* 125  
*Platydesmus cerrobius* 57  
*Platyplectrurus madurensis* 55  
*platyzona*, *Hemitrichia* 29  
*plenissima*, *Euphorbia pulcherrima* 84  
*Pleuripetalum* 111  
*Pleuripetalum* 111  
*Pliocercus aequalis* 164  
*Pliocercus andrewsi* 162, 164  
     *bicolor* 164  
     *elapoides* 159, 160, 162, 164  
         *diastemus* 164  
         *elapoides* 160, 162, 164  
         *laticollaris* 159, 160, 162, 164  
         *schmidti* 161, 162, 164  
         *semicinctus* 159, 160, 162  
*plumbiceps*, *Ortalis vetula* 181, 182  
*poinsettia*, *Euphorbia* 84  
*poinsettiae*, *Sphaceloma* 83  
*polagana*, *Hemitrichia semisculpta* 40  
*polilloensis*, *Hemitrichia setigera* 35  
*poliocephala*, *Ortalis vetula* 181  
*pontifex*, *Guerrobius* 20  
*potosinus*, *Pipilo fuscus* 46, 47, 48  
*Povelsenia* 122, 124  
*preblei*, *Tamiasciurus hudsonicus* 13  
 Presnall, C. C. Indian Salmon fishing in the Pacific Northwest. vii  
*principensis*, *Hemitrichia tagalensis* 38  
*priscus*, *Dipodomys ordii* 166, 167, 168  
*pruinosa*, *Hemitrichia pruinosa* 28, 30, 31  
     *pruinosa* 30  
*Pseudochalceus* 154  
*Pternobyla fodiens* 154  
*pugetensis*, *Thomomys talpoides* 96, 97, 98  
*pulcherrima*, *Euphorbia* 84  
*pulchra*, *Ameiva undulata* 146, 148, 149  
     *Ameiva undulata* 146, 148, 149  
*pungens*, *Forsellesia* 111, 112  
     *Glossopetalon* 111, 112  
*purpurascens*, *Hemitrichia pustulosus*, *Eupemphix* 38  
*pustulosus*, *Eupemphix* 152  
 Pyle, N. J. Commercial production of biological and pharmaceutical products. vii  
*Pyxicephalus* 54  

Q

*quadrasii*, *Hemitrichia setigera* 33, 34  
*quinquelineata*, *Rhadinaea* 191  

R

*Rana* 52, 53, 54  
     *beddomii* 55, 73  
     *temporalis* 52, 55  
     *verrucosa* 52, 54  
*raptor*, *Saltator atriceps* 107  
*reticulata*, *Diaglena* 154, 155  
     *Hyla* 152  
*Rhadinaea crassa* 190, 191  
     *decorata* 189  
     *forbesi* 188, 191  
     *gaigeae* 191  
     *hesperia baileyi* 186, 187, 191  
     *hesperia* 185, 186, 187  
     *hesperoides* 186, 187, 191  
     *hempsteadae* 179  
     *quinquelineata* 191  
*Rhizoglyphus echinopus* 123, 124  
     *hyacinthi* 123, 124  
*richardsoni*, *Lepus richardsonii*, *Dipodomys ordii* 166, 167, 168  
*richmondi*, *Nasua narica* 81, 82  
 Ricker, P. L. Our botanist's paradise. x  
 Ripley, S. Dillon. The Species *Eurystomus orientalis* 169  
     *robustus*, *Sphaeriodesmus* 57  
*romblonensis*, *Hemitrichia kobelti* 33  
*Rubia* 110, 111

Rubus.....	110, 111	sibuyanensis, Hemitrichia	
Ruehle, George D. See under		consimilis.....	31
Jenkins, Anna E.....	83	Siluboura nigra.....	55
ruthveni, Eupemphix.....	152	Silybura.....	55
S			
Sahagunia.....	99	siligorensis, Myotis emarginatus	104
Sakophallus.....	59	silvaticus, Micrixalus.....	74
simplex.....	59	similis, Thomomys townsendii..	75, 76
Salarias.....	1, 2, 3	Simoleptus cruzanus.....	19
alboguttatus.....	4	michoacanus.....	19, 20
aneitensis.....	6	pauropodus.....	19, 20
bilitonensis.....	4	simplex, Sakophallus.....	59
bilineatus.....	5	siro, Acarus.....	122, 124
caudolineatus.....	4, 6	Siteroptes.....	123
ceramensis.....	4	hyacinthi.....	124
colei.....	4	Skytanthus.....	111
deani.....	7	Smith, Hobart M. Additional	
dussumieri.....	3, 5	Notes on Mexican Snakes of	
edentulus.....	3, 5	the Genus Pliocercus.....	159
fasciatus.....	4	Descriptions of New	
fowleri.....	7	Species and Subspecies of	
frenatus.....	6	Mexican Snakes of the Genus	
fuscus.....	3	Rhadinæa.....	185
guttatus.....	6	See under Brown,	
interruptus.....	7	Bryce C.....	63
lineatus.....	4, 6	socorroensis, Oceanodroma.....	9, 10, 11
marmoratus.....	6	leucorhoa.....	10, 11
martini.....	2, 5	solomensis, Eurystomus	
nitidus.....	4	orientalis.....	174, 176
oorti.....	5	sordida, Thlypopsis.....	85
periophthalmus visayanus.....	4, 6	sordida.....	85, 86
zamboangæ.....	3	spatulata, Diaglena.....	154, 155
Saltator atriceps.....	105	Sphaeloma poinsettiae.....	83
atriceps.....	106, 107	Sphaeriodesmus angulifer.....	57
raptor.....	107	Sphaeriodesmus michoacanus.....	57
suffusus.....	106, 107	robustus.....	57
sarasinorum, Micrixalus.....	74	spinescens, Forsellesia.....	112
Sarcoptes.....	122	Glossopetalon.....	109, 112
sartorii, Tropidodipsas.....	178, 179	spinosa, Grayia.....	168
saxicola, Micrixalus.....	74	Stauroids.....	53, 54
scabiei, Acarus.....	122	afghana.....	74
schaechti, Paraiulus.....	60	larutensis.....	74
Scheffer, Victor B. See under		natator.....	74
Dalquest, Walter W.....	95	stenostoma, Hemitrichia	
schmidti, Pliocercus elapoides	161, 162, 164	hidalgoi.....	36, 37
schmeri, Eupemphix.....	151, 152	stipuliferum, Glossopetalon.....	110, 112
Scolopendra armata.....	18	St. John, Harold. Nomencla-	
chlora.....	17	torial Changes in Glossope-	
mima.....	18	talon (Celastraceæ).....	109
pomacea michoacana.....	18	striatula, Hemitrichia.....	29
viridis.....	17, 18	Stuart, L. C. Comments on the	
Scotobleps.....	54	Undulata Group of Ameiva	
segmentatus, Ophilioacarus.....	125, 126, 129	(Sauria).....	143
Scutigera chichivaca.....	23	A New Tropidodipsas	
coleoptrata.....	23	(Ophidia) from Alta Verapaz,	
tancitarona.....	22	Guatemala.....	177
Scytanthus.....	111	stuarti, Ameiva undulata 143, 146,	147, 148
semicinctus, Pliocercus		suffusus, Saltator atriceps.....	106, 107
elapoides.....	159, 160, 162	sumichrasti, Trogon citreolus.....	183, 184
semisculpta, Atrichoconcha.....	39	Swallen, Jason, R. Two New	
Hemitrichia.....	39, 40	Grasses from Florida and	
semisculpta.....	40	Texas.....	93
sescenticeps, Archibaccharis.....	118	Symphostemon.....	111
setigera, Hemitrichia.....	28, 29, 33, 35	Symphystemon.....	111
setosula, Hemitrichia.....	29	T	
Shamel, H. Harold. The Sub-		tacomensis, Thomomys douglasii	95
generic Position of the Lepus		talpoides.....	96, 97, 98
californicus group of Hares.....	25	tagalensis, Hemitrichia.....	29, 36, 37, 38
A New Myotic from		tagalensis.....	37, 38
Manchuria.....	103	tamanulipensis, Nasua narica.....	80, 81
Shantz, H. L. Trends in wild-		Tamiasciurus fremonti dixiensis	87, 88, 89
life populations on the Nation-		fremonti.....	88, 89
al Forests.....	viii	mogollonensis.....	88
sheldoni, Lepus californicus.....	25	hudsonicus dakotensis.....	13, 14
Shillinger, J. E. Account of the		loquax.....	13
7th North American Wildlife		pallascens.....	13
Conference.....	viii	preblei.....	13







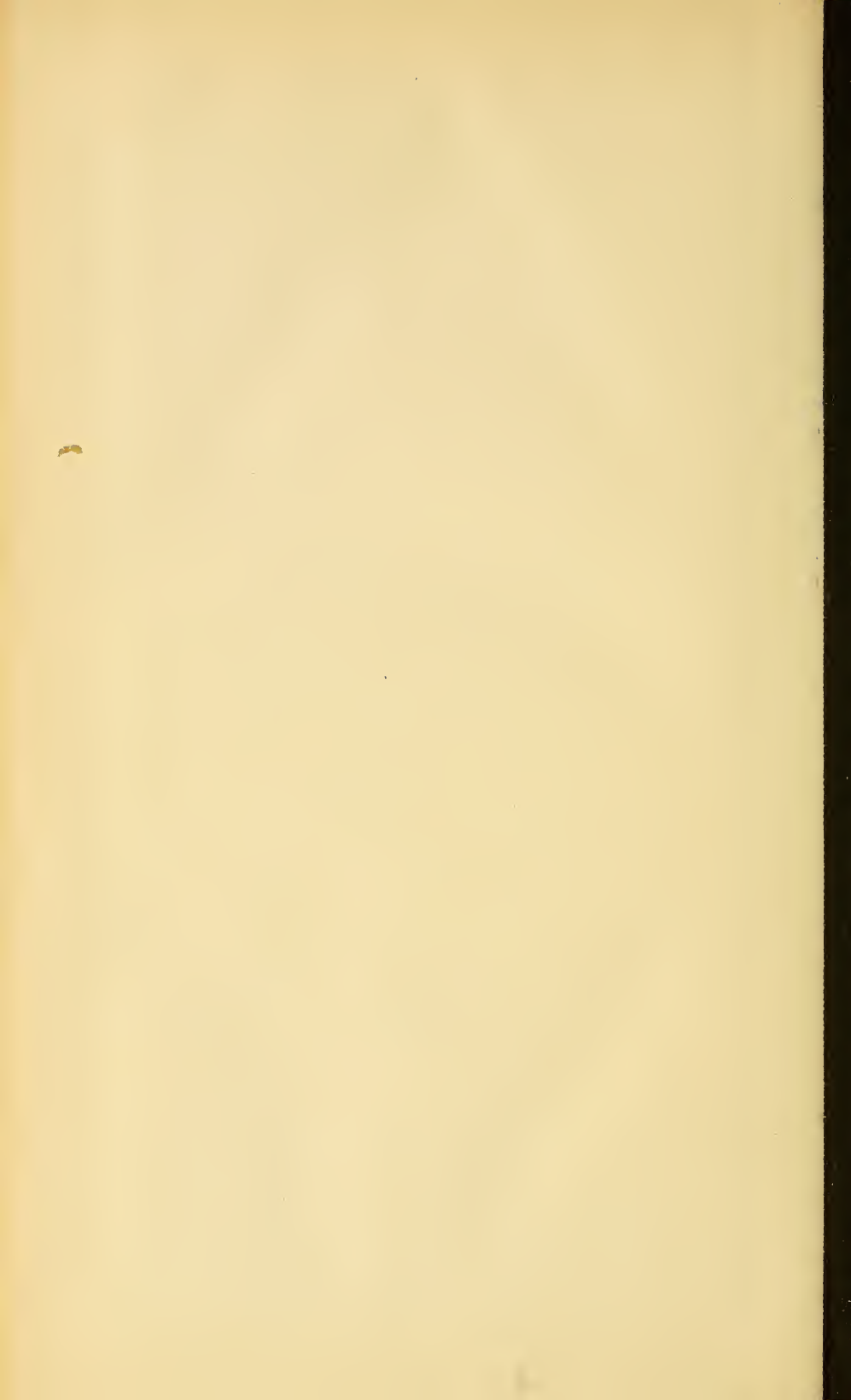


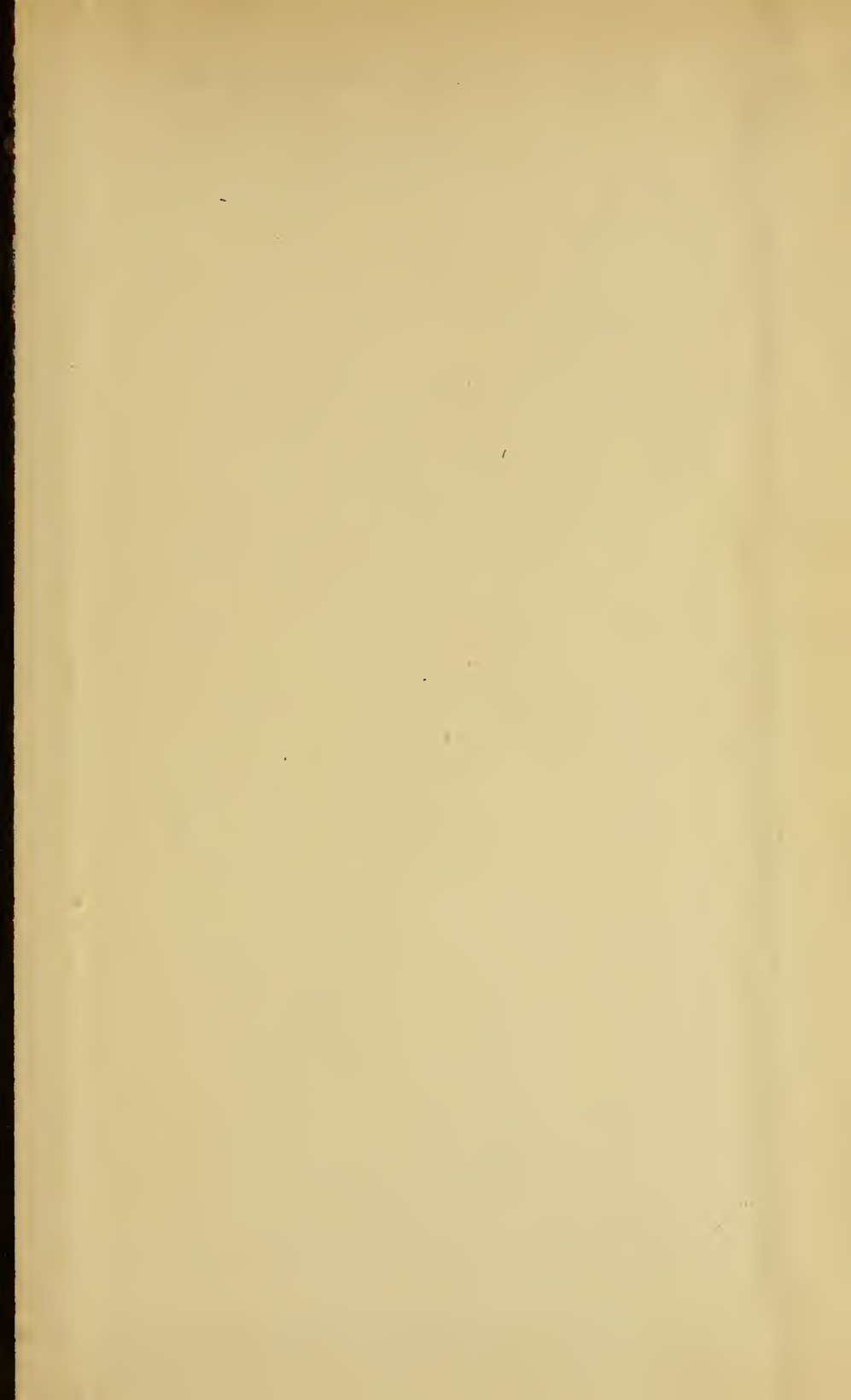












SMITHSONIAN INSTITUTION LIBRARIES



3 9088 01205 1850