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# PROCEEDINGS

OF THE

# Biological Society of Washington




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VOLUME 49  
1936

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WASHINGTON  
PRINTED FOR THE SOCIETY

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### PUBLICATION NOTE

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

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 III. Following Plate II. Head plates of *Sceloporus cochranæ*.
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The Committee on Publications declares that each paper of this volume was distributed on the date indicated on its initial page. The table of contents, minutes of meetings, and index for 1936 (pp. v-xi; 167-174) were issued on February 23, 1937. The title page and lists of officers and committees for 1936-1937 (pp. i-iv) were issued on July 3, 1936.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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PROCEEDINGS.

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The Society meets from October to May, on alternate Saturdays, at 8 P. M. All meetings during 1936 were held in the new lecture hall of the Cosmos Club.

**January 11, 1936—827th Meeting.**

President Chambliss in the chair; 100 persons present.

*Informal communications:* H. Darling, Notes on biogeochemistry; M. B. Waite, Note on damage to corn and chickens by vermin; J. S. Wade, Exhibition of Hendrick's Life of Andrew Carnegie.

*Formal communications:* F. A. McClure, A. S. Hitchcock: an appreciation; David Lumsden, Orchids and their fertilization.

**January 25, 1936—828th Meeting.**

President Chambliss in the chair; 125 persons present.

New members elected: R. S. Bray, F. E. Firth, Mrs. John R. Leach, Vera Millsop.

*Formal communications:* J. P. E. Morrison, Mollusks of the District of Columbia and vicinity; C. A. Harwell, Recorded songs of western birds.

**February 8, 1936—829th Meeting.**

President Chambliss in the chair; 65 persons present.

New members elected; T. A. Fennell, Wilman Spawn, W. F. Stanley.

*Informal communication:* M. B. Waite, Note on the effects of low temperature and dormancy on the growth of plants.

*Formal communications:* Joseph Dixon, Observations on various forms of wild life in the West; A. E. Borell, Reactions of animal life to the filling of Boulder Lake.

**February 22, 1936—830th Meeting.**

President Chambliss in the chair; 75 persons present.

*Informal communications:* J. S. Wade, Exhibition of recent books; F. Thone, Exhibition of recent books; H. Darling, Travel observations.

*Formal communications:* W. W. Diehl, Lichens of the District of Columbia and vicinity; Irving Fox, Spiders of the District of Columbia and vicinity.

**March 7, 1936—831st Meeting.**

President Chambliss in the chair; 220 persons present.

*Informal communications:* F. Thone, Exhibition of recent books; C. E. Chambliss, Note on the gathering of gulls in the Washington Basin to feed on dead fish.

*Formal communications:* Vernon Bailey, Wichita Wild Life Refuge in Oklahoma, an outdoor laboratory of wild life study and game management; Carveth Wells, Animals of the Panama Canal Zone.

**March 21, 1936—832d Meeting.**

President Chambliss in the chair; 190 persons present.

New member elected: L. H. Kraskin.

*Informal communications:* H. C. Oberholser, Note on the gathering of gulls in the Washington Basin; G. S. Myers, Note on the identity of the dead fish in the Washington Basin; Titus Ulke, Note on a large snapping turtle.

*Formal communications:* Alexander Wetmore, Land birds of the District of Columbia and vicinity; R. B. Horsfall, Experience of an artist-naturalist.

**April 4, 1936—833d Meeting.**

President Chambliss in the chair; 100 persons present.

New member elected: Rita Buddeke.

*Informal communications:* E. P. Walker, Notice of the First International Snake Exposition; F. C. Lincoln, Additional records of banded birds; M. B. Waite, Effects of the severe winter on plant life; E. P. Walker, Effect of the feeding by cardinals on Forsythia on its subsequent flowering; J. S. Wade, Exhibition of new books.

*Formal communications:* L. K. Couch, The Aplodontia of the



West Coast; E. C. Leonard, Mosses of the District of Columbia and vicinity; L. K. Couch, Mammals of the arid regions of Oregon and Washington.

**April 18, 1936—834th Meeting.**

President Chambliss in the chair; 85 persons present.

New members elected: J. L. Gressitt, D. C. Riley.

*Informal communications:* Vernon Bailey, Exhibition of a hog-nosed snake; F. Thone, Exhibition of new books; E. P. Walker, Exhibition of a model squirrel house.

*Formal communications:* E. G. Holt, The wild life program of the Soil Conservation Service; Vernon Bailey, Traps for taking birds and mammals alive and uninjured; W. T. Bower, A notable accomplishment in wild life administration on the Pribilof Islands, Alaska.

**May 2, 1936—835th Meeting.**

President Chambliss in the chair; 75 persons present.

New members elected: E. G. Holt, Mrs. Gertrude D. Howard, Ruth M. Melroy, Lois Olson, M. Helen Stohlman, Leola Washburn, Mrs. Mabel S. Weidemann.

*Informal communications:* T. S. Palmer, Announcement of the ratification by the United States Senate of the treaty with Mexico protecting migratory birds; and Announcement of the signing of the enabling act completing action on the bill to protect whales; D. E. McHenry, Outline of the summer program of the local park service; J. S. Wade, Exhibition of recent books; J. A. Stevenson, Note on the pirating of a book on mushrooms.

*Formal communications:* E. A. Chapin, Beetles of the District of Columbia and vicinity; P. E. Garber, Flying creatures; D. E. McHenry, The tufted-eared squirrels of the Grand Canyon National Park.

**May 16, 1936—836th Meeting.**

**FIFTY-SEVENTH ANNUAL MEETING.**

President Chambliss in the chair; 22 persons present.

New members elected: A. M. Clymonds, G. L. Crawford, R. H. Davis, S. D. Durrant, D. E. McHenry, R. DuB. Rappleye, A. F. Ruff, D. R. Wickes.

The reports of the Recording Secretary, Corresponding Secretary, and Treasurer were read. Reports were presented

for the Trustees of Permanent Funds and the Committee on Communications.

The following officers and member of council were elected: *President*, H. C. Fuller; *Vice Presidents*, C. W. Stiles, T. H. Kearney, W. B. Bell, E. P. Walker; *Recording Secretary*, S. F. Blake; *Corresponding Secretary*, J. S. Wade; *Treasurer*, F. C. Lincoln; *Members of the Council*, A. A. Doolittle, I. N. Hoffman, J. E. Shillinger, A. L. Nelson, J. E. Benedict, Jr.

**October 17, 1936—837th Meeting.**

President Fuller in the chair; 35 persons present.

*Formal communications*: F. Thone, New books of biological interest; H. Boschma, Notes on parasitic Crustacea.

**October 31, 1936—838th Meeting.**

President Fuller in the chair; 70 persons present.

New members elected: D. A. Rice, Alma W. Rutledge, W. R. Van Dersal.

*Informal communications*: T. S. Palmer, Report on the 54th Annual Meeting of the American Ornithologists' Union; J. S. Wade, Exhibition of recent books.

*Formal communications*: E. D. McAlister, Recent studies of photosynthesis; F. Thone, Exhibition of biological micro-movies, photographed by John B. Hawley, Fort Worth, Texas.

**November 14, 1936—839th Meeting.**

President Fuller in the chair; 55 persons present.

*Informal communications*: Titus Ulke, Note of an exhibition of intelligence by an orang-outang; E. P. Walker, Discussion of the proposed book and pamphlet exchange.

*Formal communications*: W. J. Humphreys, Bio-meteorology; R. A. Young, The bamboos, what we know of them and their uses.

**November 28, 1936—840th Meeting.**

President Fuller in the chair; 55 persons present.

*Informal communications*: F. Thone, Exhibition of recent books; V. Bailey, Occurrence of the little red-backed mouse near the District of Columbia; E. P. Walker, The book and pamphlet exchange.

*Formal communications*: C. H. Rouse, The introduction of

musk ox into Alaska; W. B. McDougall, Ecological problems of the proposed Big Bend National Park, Texas.

**December 12, 1936—841st Meeting.**

President Fuller in the chair; 46 persons present.

New members elected: William Bernstein, Stanley Gortenhau, Joe Wilcox.

*Informal communications:* V. Bailey, Exhibition of a live gray fox; M. B. Waite, Exhibition of specimens of *Baccharis halimifolia*.

*Formal communications:* G. C. Ruhle, Some problems of game administration in Glacier National Park; F. W. Poos, Insects in relation to plant diseases.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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DESCRIPTIONS OF NEW INTERGENERIC HYBRIDS  
BETWEEN CERTAIN CYPRINID FISHES OF  
NORTHWESTERN UNITED STATES.

BY LEONARD P. SCHULTZ AND MILNER B. SCHAEFER.<sup>1</sup>

School of Fisheries, University of Washington.

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During the last eight years the senior author and numerous students in the school of fisheries, University of Washington, have collected fishes extensively throughout the Northwest. In many of these collections have appeared specimens which do not conform to published descriptions of any known species. They are either new species or hybrids.

To demonstrate with absolute certainty that these specimens are hybrids, would require experimental crossing of the two supposed parents. This we have not done, but our abundance of circumstantial evidence, statistically treated, indicates another clear case of hybridization in nature. Natural hybridization between different species and between different genera of fish probably is more common than usually believed. Hubbs and Schultz (1931 : 1-6), and Hubbs and Hubbs (1932 : 427-437), and others have observed natural hybridization.

Each hybrid is treated separately below.

I. *Apocope oscula carringtoni* Cope x *Richardsonius balteatus hydrophlox*  
(Cope).

The supposed hybrids, 19 in number, have been taken at the following localities in the State of Washington: Palouse River at Hooper, collected by L. P. Schultz and Leo Erkila, June 14, 1932; Palouse River at Palouse, collected by Schultz and Marvin Bowers on August 28, 1932; small tributary of the Palouse River 2 miles above Colfax, collected by Schultz and Erkila, June 18, 1932; South Fork Palouse River 2 miles above Pullman, collected by Schultz and Erkila June 15, 1932, and again on August 28, 1932, by Schultz and Bowers.

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<sup>1</sup>The authors wish to thank Dr. C. L. Hubbs for the loan of some of the hybrids used in the preparation of this paper.

A study of the fish fauna of the Palouse River system above the falls, which are just below Hooper, indicates that the following species occur: *Apocope oscula carringtoni*; *Richardsonius balteatus hydrophlox*; *Rhinichthys cataractae*; *Cyprinus carpio*; *Catostomus macrocheilus*; *Catostomus syncheilus*; *Pantosteus jordani*; *Esox vermiculatus*; *Aphites salmoides*; *Eupomotis gibbosus*; *Cottus rhotheus*; and the supposed hybrid.

The reasons for suspecting that *Apocope* and *Richardsonius* are the parents of our supposed hybrids are: (1) In each locality where the hybrids were taken, large numbers of *Apocope* and *Richardsonius* were collected. (2) A survey of the Palouse River system fish fauna indicates that *Apocope* and *Richardsonius* are the only two species which could possibly be the parents of this supposed hybrid. *Rhinichthys* is very scarce and inhabits the upper parts of the colder and more turbulent waters and besides the hybrid does not resemble *Rhinichthys*. (3) *Apocope* and *Richardsonius* were taken from the same riffle in a spawning condition and in their breeding colors in late June of 1932, suggesting that these species spawn in the same part of the stream. (4) The supposed hybrid resembles both *Apocope* and *Richardsonius* in their general color and their general shape. (5) Our measurements and counts when treated statistically indicate that the supposed hybrid is either intermediate between the two supposed parent species or is not distinguishable from one or both of them in every detail studied.

Although numerous counts, measurements,<sup>2</sup> and morphological characters were studied, the following did not give significant differences for the separation of *Apocope oscula carringtoni* from *Richardsonius balteatus hydrophlox* when treated statistically: Length from snout to origin of dorsal fin; length from snout to insertion of ventral fin; longest dorsal fin ray; longest anal fin ray; longest pectoral fin ray; longest ventral fin ray; length of caudal fin; length of the head; greatest depth of body; number of dorsal fin rays; number of pectoral fin rays; number of transverse rows of scales crossing the lateral line; number of scales above and below the lateral line.

Each character studied which was thought to indicate a valid difference between the parent species is treated in detail below.

1. The number of anal fin rays. Only the principal anal rays were counted, the two or three rudiments in front were omitted and the last two rays, usually branching from the single base were counted as one. *Apocope oscula carringtoni* had 7 anal rays in 119 specimens; there was no variation. *Richardsonius balteatus hydrophlox* had from 10 to 14 rays (mean  $11.59 \pm .029$ ) in 249 specimens. The supposed hybrids had 8 or 9 anal rays in 19 specimens (mean  $8.53 \pm 0.080$ ).

2. The number of pelvic fin rays. The last two pelvic fin rays, often branching from a single base, were counted as one ray. In 236 cases there were 7 to 9 (mean  $7.93 \pm .012$ ) pelvic fin rays in *Apocope oscula carringtoni* and in 500 counts of *Richardsonius balteatus hydrophlox*, 8 to 10 (mean  $8.78 \pm .013$ ) rays. The supposed hybrids had 8 to 10 (mean  $8.83 \pm 0.050$ ) in 36 pelvic fin ray counts.

<sup>2</sup>The counts and measurements were made by the junior author in most cases.

3. Pharyngeal teeth. The pharyngeal teeth were as follows: (The number not in parenthesis refers to the number of teeth and the number in parenthesis to the number of specimens possessing that number of pharyngeal teeth.) *Apocope oscula carringtoni*: Left side—4 : 0 (1); 4 : 1 (23); 4 : 2 (41). Right side—4 : 0 (2); 4 : 1 (22); 4 : 2 (39). *Richardsonius balteatus hydrophlox*: Left side—4 : 1 (10); 4 : 2 (29); 5 : 1 (18); 5 : 2 (51). Right side—4 : 1 (28); 4 : 2 (72); 5 : 1 (4); 5 : 2 (3). Hybrids: Left side—4 : 1 (1); 4 : 2 (4); 5 : 2 (2). Right side—4 : 1 (1); 4 : 2 (4); 5 : 2 (2). The above data indicate that in 108 specimen of *Richardsonius balteatus hydrophlox*, 64 per cent had five teeth in the main row on the left side while not a single *Apocope oscula carringtoni* had 5 teeth on either the left or right sides. *Apocope* occasionally had no teeth in the lesser row while in all examples of *Richardsonius* there were one or two teeth. The hybrids are intermediate, having either 4 or 5 teeth in the main row, and one or two in the inner row on both sides.

4. The general color pattern. *Apocope oscula carringtoni*: The body is variously covered on sides, belly and the back by numerous patches of brownish colored specks, each speck covers the exposed portions of one or two scales. The lateral band extends forward on the snout. It is pale over the region above the pectoral fin, but becomes rather dense posteriorly where it is as wide as the eye. Near the base of the caudal fin rays, the lateral band ends abruptly. A characteristic non-pigmented area occurs between the posterior margin of the lateral band and the caudal fin spot, which is very distinct on all specimens. Above and below the caudal fin spot, on the proximal third of the caudal fin rays are rows of blackish pigment which show up in a characteristic manner. The two pigmented areas, one on the upper lobe and one on the lower caudal lobe, are much less densely pigmented than the caudal fin spot. Along the base of the dorsal fin rays is a dark area which sharply contrasts with the light or whitish spot on the very base of the last one or two dorsal rays. In the hybrid this latter character is evident though fainter.

*Richardsonius balteatus hydrophlox*: A few widely scattered and rather small speckled areas may occur on the sides of the body but none occur on the back or on the belly as found on *Apocope*. The blackish lateral band is divided into a narrow upper and a wider lower portion by a slightly oblique light streak which is about as wide as the pupil. The upper dark band is widest over the pectoral fin and fades out posteriorly in the region below the posterior margin of the dorsal fin. The weakly pigmented lower band is about 2/3 the diameter of the eye anteriorly, but posteriorly it becomes very blackish from the region over the pelvic fin to the base of the caudal fin rays where it ends abruptly. Along the axis of the body is a narrow thin blackish line, which cuts across the light lateral streak anteriorly and across the blackish lower band posteriorly. This line begins above the region of the pectoral fin. The pigmentation of the operculum appears to be a more or less continuation of the wide lateral band. Around the lower margin of the eye is a narrow sparsely pigmented area. The lateral band extends forward to the snout. The suborbital is unpigmented. On adults the belly is pinkish to orange, especially brilliant on the males

during the breeding season. The caudal fin spot is very faint, almost obsolete in the adults and young. Along the base of the anal fin rays is a series of black pigment spots, very faint in the hybrids.

*Hybrids:* The color in alcohol or formalin is brownish, with chocolate brown specks or freckles on sides and on the back, much as in *Apocope*, but fewer. The specks are more or less arranged in small patches and cover nearly the entire exposed portion of one or two scales. The specks are more closely packed dorsally; those on the sides are much scattered, as in *Apocope*, which it resembles very much in regard to this character. The blackish lateral band begins in the region over the pectoral fins, narrow at first but becoming as wide as  $\frac{1}{2}$  the diameter of the eye below the dorsal fin and extending posteriorly to the base of the caudal fin rays where it ends in a wide expansion terminating at the posterior edge of the hypural plate. Anteriorly this lateral blackish band is cut across by a slightly oblique light streak, exactly as in *Richardsonius* but fainter. This light streak widens anteriorly, almost obliterating the lower lateral band. The dark narrow line, so obvious in *Richardsonius*, which extends along the axis of the body is in the same position on the hybrids but much fainter. The pink or orange belly of *Richardsonius* was not observed on the hybrids. This was to be expected since none of the hybrids appeared to be mature. A band of fine dots is present on the operculum and continues forward on the snout. The fleshy margin below the eye is somewhat pigmented too. The maxillaries and chin are pigmented as in both of the supposed parent species. The caudal spot is faint. It occurs just beyond the posterior edge of the fleshy caudal base of the caudal fin, near the base of the middle rays. This spot is intermediate in density between *Apocope* and *Richardsonius*. The proximal third of the caudal fin rays above and below the caudal fin spot are slightly pigmented, a character so obvious in *Apocope*. Along the base of the anal fin rays is a series of very faint pigment spots, which are very distinct in the young of *Richardsonius*. The color of the peritoneum is light dusky, nearly white ventrally, but becoming darker dorsally. It is finely speckled. In *Apocope* the peritoneum is dark brown to blackish while in *Richardsonius* it is silvery with brownish speckles not crowded.

In general, the color of the hybrid may be compared to two pictures having been recorded on the same film, with the picture of *Richardsonius* slightly dominating.

5. The presence or absence of a barbel. An examination of each specimen was made by means of a binocular microscope to determine the presence or absence of a barbel at the posterior tip of the maxillary. In *Apocope oscula carringtoni* a barbel was present in 141 specimens and absent on 20. In *Richardsonius balteatus hydrophlox* it was absent on all specimens. A barbel was present on the left side of only one of the supposed hybrids, and absent on all others.

6. Depth of the caudal peduncle. The least depth of the caudal peduncle was expressed in hundredths of the standard length as in the case of all other measurements. In 119 specimens of *Apocope oscula carringtoni* the range was from 10.0 to 14.9 (mean  $12.33 \pm .048$ ) and in 252 specimens of *Richardsonius balteatus hydrophlox* from 8.0 to 10.4 (mean  $9.37 \pm .018$ ).



15 specimens of the supposed hybrid have a range from 9.5 to 11.4 (mean  $10.42 \pm .078$ ).

7. Length of the caudal peduncle. The length of the caudal peduncle is the distance from the base of the last anal fin ray to the posterior tip of the hypural plate. In 119 specimens of *Apocope oscula carringtoni* the range was from 19.0 to 27.9 (mean  $24.61 \pm .076$ ), and in 251 specimens of *Richardsonius balteatus hydrophlox* the range was from 17.0 to 23.9 (mean  $20.26 \pm .051$ ). In 15 specimens of the supposed hybrid the range was from 20.9 to 27.6 (mean  $23.70 \pm .310$ ).

8. Diameter of the eye. The eye was measured along the greatest diameter. In 113 specimens of *Apocope oscula carringtoni* the range was from 5.0 to 8.4 (mean  $6.55 \pm .035$ ) and in 233 specimens of *Richardsonius balteatus hydrophlox* the range was from 6.5 to 10.4 (mean  $8.64 \pm .043$ ). The range for 15 of the supposed hybrids was from 7.3 to 9.7 (mean  $8.48 \pm 0.164$ ).

9. Length of mouth. The length of the mouth was measured from the tip of the snout to the posterior edge of the maxillary. In 120 specimens of *Apocope oscula carringtoni* the range was from 5.0 to 7.9 (mean  $6.70 \pm .027$ ) and in 252 specimens of *Richardsonius balteatus hydrophlox* from 7.5 to 11.4 (mean  $9.48 \pm .028$ ). The range for the 15 supposed hybrids was from 7.25 to 9.7 (mean  $8.68 \pm 0.135$ ).

10. Length of snout. The length of the snout is the distance from the tip of the snout to the anterior margin of the eye. In 120 specimens of *Apocope oscula carringtoni* the range was from 6.5 to 9.4 (mean  $7.95 \pm .033$ ) and in 251 of the *Richardsonius balteatus hydrophlox* from 6.0 to 8.4 (mean  $7.10 \pm .019$ ). The range for 15 of the supposed hybrids was from 6.4 to 9.1 (mean  $7.58 \pm 0.134$ ).

The counts and measurements of these morphological characters of *Apocope* and *Richardsonius* overlap in certain cases. However, if all of these characters are considered together and the average differences between *Apocope* and *Richardsonius* are added together to form a *character index*, no overlapping occurs. This may be done in the following manner and expressed as an index similar to that used by Hubbs and Whitlock (1929 : 470) and Schultz and Welander (1934 : 5-6). Our *character index* is based on the following principle. If the mean of a given character in *Apocope* is significantly greater than the mean for the same character in *Richardsonius* the value is positive and is added to the other (positive) characters, but when the mean for a character in *Apocope* is significantly smaller than the mean in *Richardsonius* the value is considered negative and is subtracted from the other (positive) characters. This results in the addition of the numerous small average differences between the various characters for each specimen.

This concept was applied to our data and may be expressed more concisely for our case by the following formula:

$$\text{Character Index} = \text{Length of caudal peduncle} + \text{least depth of caudal peduncle} + \text{length of snout} - \text{diameter of eye} - \text{length of mouth} - \text{the number of anal rays.}$$

In the above *character index* we used only those characters which were found to give statistically significant differences between the supposed parent species when studied alone. This formula was applied to each individual specimen. The *character index* of 111 specimens of *Apocope oscula carringtoni* ranges from 19.0 to 32.9 (mean  $25.64 \pm .168$ ) and of 249 specimens of *Richardsonius balteatus hydrophlox* from 2.0 to 13.9 (mean  $7.26 \pm .105$ ). The 15 hybrids are almost intermediate between the parent-species for they range from 12.9 to 18.9 (mean  $15.90 \pm 0.300$ ).

The following method was used to determine the probability against the supposed hybrid falling within the variation of the supposed parent species for each character. The ratio of a given deviation from the mean of a frequency distribution to the probable error in a single observation represents the probability of the occurrence of a deviation as great or greater than the given deviation. Thus, for example (Table I) hybrid 15, length of the mouth, it was found that the deviation from the mean of *Apocope* was 6 times the probable error of a single observation. This represents odds of 19,300 to 1 against the chance occurrence of this deviation within this frequency (length of mouth). The table of odds used by us was that presented by Hodgman (1933 : 180). From that table<sup>3</sup> we extract the following so that the reader may judge for himself the possible significance of our findings. Ratio of deviation to P. E. and odds against to one, 5.0 and 1,341; 6.0 and 19,300; 7.0 and  $4.27 \times 10^5$ ; 8.0 and  $1.47 \times 10^7$ ; 9.0 and  $7.30 \times 10^8$ ; respectively.

It may be seen from Table I that individual specimens of the hybrid may always be distinguished from both parent species by the number of anal rays and may usually be distinguished by the character index. An examination of Table II indicates further that the hybrid may be distinguished statistically from *A. o. carringtoni* on the basis of the depth of the caudal peduncle, the diameter of the eye, and the length of the mouth; that the hybrid may be distinguished from *R. b. hydrophlox* in the same manner on the depth of the caudal peduncle, the length of the caudal peduncle, the length of the mouth, and length of the snout.

We conclude, therefore, that the specimens which are intermediate between *Apocope* and *Richardsonius* are natural hybrids. We base our conclusions on the facts that these hybrids are intermediate in regard to: number of anal rays; number of ventral fin rays; number and arrangement of the pharyngeal teeth; general color pattern; the presence or absence of a barbel at the corner of the mouth; depth of caudal peduncle; and length of mouth. They are indistinguishable from *Apocope* in regard to length of the caudal peduncle and length of snout, and can not be separated from *Richardsonius* on the basis of the diameter of the eye.

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<sup>3</sup>This table may be used to judge the significance of the differences, expressed in terms of their probable errors presented in Table II.

TABLE 1. THE RATIOS OF THE DEVIATION OF EACH HYBRID, *Apocope oscula carringtoni* x *Richardsonius baltteatus hydrophlox*, FROM THE MEANS OF THE PARENTS TO THE P. E.'S OF A SINGLE OBSERVATION FOR THE PARENT SPECIES.

	Parent species— <i>Richardsonius baltteatus hydrophlox</i> .																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Number of the hybrid	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>Characters</i>																			
Number of anal rays..	7.8	5.6	5.6	5.6	5.6	5.6	5.6	7.8	5.6	5.6	7.8	7.8	7.8	7.8	5.6	7.8	7.8	5.6	7.8
Least depth of caudal peduncle.....	*	*	*	5.3	5.3	*	*	*	*	*	*	*	6.0	*	*	*	*	*	*
Length of caudal peduncle.....	*	*	*	*	*	*	5.9	9.1	*	*	7.0	6.3	*	*	*	*	*	*	*
Diameter of eye.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Length of mouth.....	5.1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Length of snout.....	*	*	*	*	*	*	6.7	*	*	*	*	*	*	*	*	*	*	*	*
Character index.....	6.6	*	5.6	5.3	*	*	5.8	6.4	*	*	6.4	6.1	5.3	5.3	5.1	*	*	*	*

Parent species—*Apocope oscula carringtoni*.

	Parent species— <i>Apocope oscula carringtoni</i> .																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Number of the hybrid	1	2	3	4	5	6	7	8	9 <td>10</td> <td>11</td> <td>12</td> <td>13</td> <td>14</td> <td>15</td> <td>16</td> <td>17</td> <td>18</td> <td>19</td>	10	11	12	13	14	15	16	17	18	19
<i>Characters</i>																			
Number of anal rays..	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞	∞
Least depth of caudal peduncle.....	*	*	*	*	*	*	*	*	*	*	*	*	5.15	*	*	*	*	*	*
Length of caudal peduncle.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Diameter of eye.....	*	*	*	*	*	*	6.9	*	8.5	8.5	7.4	*	7.4	*	*	*	*	*	*
Length of mouth.....	5.7	6.3	*	5.0	8.0	10.0	5.7	5.3	10.0	6.0	9.3	8.7	*	6.0	*	*	*	*	*
Length of snout.....	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Character index.....	6.0	5.4	5.7	7.1	7.1	5.2	*	6.8	8.1	*	*	5.7	5.7	5.9	*	*	*	*	*

\* Indicates ratio of less than 5.0, that is odds of less than 1,341 to 1.

" Indicates no measurement was made.

TABLE II. THE DIFFERENCES BETWEEN THE MEANS OF HYBRIDS AND PARENT SPECIES AND THE RATIO OF THESE DIFFERENCES TO THEIR PROBABLE ERROR.

(The number outside the parenthesis is the difference between means with the P. E. and the number in the parenthesis is the ratio of the difference to the P. E.)

*Apocope oscula carringtoni*: number of anal rays  $1.53 \pm 0.080$  (19.1); least of depth of caudal peduncle  $1.81 \pm 0.092$  (19.7); length of caudal peduncle  $0.91 \pm 0.319$  (2.85); greatest diameter of eye  $1.93 \pm 0.168$  (11.5); length of mouth  $1.98 \pm 0.138$  (14.3); length of snout  $0.37 \pm 0.138$  (2.68); character index  $9.74 \pm 0.344$  (28.3).

*Richardsonius balteatus hydrophlox*: number of anal rays  $3.06 \pm 0.085$  (36.0); least depth of caudal peduncle  $1.05 \pm 0.080$  (13.1); length of caudal peduncle  $3.44 \pm 0.314$  (11.0); greatest diameter of eye  $0.16 \pm 0.170$  (0.94); length of mouth  $0.80 \pm 0.138$  (5.80); length of snout  $0.48 \pm 0.135$  (3.56); character index  $8.64 \pm 0.318$  (27.2).

II. *Apocope oscula carringtoni* Cope x *Richardsonius balteatus balteatus* (Richardson).

Hybrids of *Apocope oscula carringtoni* x *Richardsonius balteatus balteatus* were obtained as follows: four from a tributary of the Yakima River near Ellensburg May 27, 1926, collectors Hubbs and Schultz; one from Baker Creek, tributary to Powder R., Oregon, June 30, 1931, collectors Schultz and DeLacy; one from Umatilla R. at Rieth, Oregon, August 30-31, 1932, collectors Schultz and Bowers; and one from Latah Creek, 4 miles south of Spokane, Washington, Aug. 26, 1932, collectors Schultz and Bowers. The values of the measurements of these seven specimens are very similar to those given above for *Apocope oscula carringtoni* x *Richardsonius balteatus hydrophlox* but the number of anal rays average higher (one hybrid with 8 rays; 6 hybrids with 9 rays; one hybrid with 10 rays) which is to be expected since *R. b. balteatus* has an average of about 3 or 4 more anal rays than *R. b. hydrophlox*.

III. *Acrocheilus alutaceus* Agassiz and Pickering x *Mylocheilus caurinus* (Richardson).

Hubbs and Schultz pointed out in their paper (1931 : 1-6) that two specimens, one collected by Dr. J. O. Snyder and the other by Schultz and DeLacy, were probably hybrids between *Acrocheilus alutaceus* and *Mylocheilus caurinus*. We now have a third specimen in the collection of fishes, School of Fisheries, University of Washington, which was taken by Daniel Merriman, September 2, 1933, in the Silvies River about 20 miles north of Burns, Oregon. This specimen agrees closely with the other two and further corroborates the conclusions of Hubbs and Schultz (1931).

IV. *Cheonda cooperi* Girard.

The figure of *Cheonda cooperi* Girard (Suckley 1860 : 362, pl. LXIII, 1-5) has caused us much concern for a number of years as to just what it

really represents. Dr. G. S. Myers very kindly sent us the following description of *Cheonda cooperi*, taken from the holotype, No. 238, U.S.N.M. The measurements are given in millimeters and the figures in parenthesis represent the lengths expressed in hundredths of the standard length. Standard length 172; length of head 41 (24.0); diameter of eye 8.6 (5); length of snout 12.7 (7.4); tip of snout to rictus 11.4 (6.7); length of lower jaw to articulation 15 (8.7); greatest depth of body 42 (24.2); least depth of caudal peduncle 14 (8.2); number of anal rays 2–11½; dorsal rays 3–8½; ventral rays 1–9 both sides; scales in the lateral line to end of hypural plate, left side 63, right side 65; scales below the lateral line, 7 on both sides; and scales above the lateral line, left side 12, right side 13.

Our opinion that this fish may be a hybrid is based on the following reasons: although the lower Columbia River has had its fauna studied rather extensively yet no fish since Girard's time has ever been reported which closely resembles *Cheonda cooperi*. We think that it must occur rarely or it would have appeared in some of the collections made in that region. Among the 12 genera of Cyprinidae in the lower Columbia River, *Cheonda cooperi* resembles but four, namely *Acrocheilus*, *Mylocheilus*, *Ptychocheilus*, and *Richardsonius*. The other genera, *Apocope*, *Siphateles*, *Rhinichthys*, *Oregonichthys*, *Tinca*, *Cyprinus*, and *Carrasius* have less in common with *Cheonda* and for various reasons could not be considered as possible parents of this form.

*Richardsonius balteatus balteatus* probably is one of the parents because it has the largest number of anal rays (12 to 18) of any of the four genera (*Acrocheilus*, *Mylocheilus*, *Ptychocheilus* and *Richardsonius*), while *C. cooperi* has 11 (the last two rays, often branched at the base, are counted as one) and all the other four genera have 10 or fewer. *Richardsonius* has 16 dorsal rays. It is the only one of the four genera with fewer scales in the lateral line than *C. cooperi*, the former having 11 to 18—55 to 65—7 to 9, and the latter with 12 to 13—63 to 65—7. Therefore we conclude that *R. b. balteatus* is one of the parents.

If *C. cooperi* is a hybrid, and *Richardsonius b. balteatus* is one of the parents, then the other parent should have (if fish hybrids represent more or less of a blending of the two parents and we believe they do, see Hubbs and Schultz l.c. and the first section of this paper) fewer than 11 anal rays probably 7 or 8; and about 8 dorsal rays; probably about 13—75—7 scales. Not having seen the holotype we hesitate to speculate in regard to other characters.

Among the three possible genera (*Acrocheilus*, *Mylocheilus* and *Ptychocheilus*) the former species obviously is not the other parent because it has too many scales in the lateral line (20–81 to 93–16). There are (10) dorsal rays, and the mouth (see Suckley l.c. fig. 5) of *Cheonda* is not inferior in position and the lower jaw is not "chisel-like" as in *Acrocheilus*. *Ptychocheilus* has too many dorsal rays (9 or 10) and too many scales below the lateral line (16 to 20—68 to 79—7 to 9), besides the mouth or gape is too large, otherwise it resembles *Cheonda* fairly well. It has 8 anal rays and 9 or 10 dorsal rays. For *Mylocheilus caurinus* we find no serious objections which would exclude it from being the other parent. There are 8 anal and

8 dorsal rays and the number of scales are 12 to 15—75 to 80—7 to 8, about what should be expected. The mouth and general shape of the body are of the same form as *Mylocheilus*.

We conclude from the evidence given above that *Cheonda cooperi* probably is a hybrid, and that one parent is *Richardsonius balteatus balteatus* and that the other parent probably is *Mylocheilus caurinus*.

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PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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NOTES ON FISHES IN THE ZOOLOGICAL MUSEUM  
OF STANFORD UNIVERSITY. IV. A NEW CATOS-  
TOMID FROM MEXICO AND A NEW CALLIONY-  
MID FROM CELEBES AND THE PHILIPPINES.

BY ALBERT W. C. T. HERRE.

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The present paper continues the description of new and rare fishes in the Zoological Museum of Stanford University.<sup>1</sup>

**Catostomus wigginsi** Herre and Brock (1), new species.

Dorsal 12; anal 7; scales in lateral line 76 to 80; 2 or 3 on caudal base; in transverse series 14 above, 10 below lateral line; predorsal 42. Depth of the plump, rounded body is 4.2, head 3.35 to 3.4 times in length. Breadth of body equals depth of head, 5.4 to 5.5 in length, or 1.6 times in head; breadth of head 1.4 times in its own length; origin of dorsal midway between tip of snout and caudal base. Eye 5.2, snout 2 to 2.12, interorbital 3 to 2.85, least depth of caudal peduncle 3.1 to 3.4 times in head. Caudal little forked, lower lobe longest, 4.4 to 4.6 in length, 1.3 to 1.36 in head. Pectoral 5.5 to 6 times in length. Height of dorsal 1.88, length of its base 2.12 to 2.25 in head. Height of anal 1.5 to 1.6, length of its base 3.4 in head. The greatest depth is midway between opercle and dorsal origin; snout longer than postorbital; dorsal profile markedly convex. Upper lip with 5 rows of papillae, the broad lower lip with 6 or 7 rows. Anteriorly the scales are smaller, those on breast smallest.

Color in alcohol dusky gray above, with brown longitudinal lines on the back and sides; predorsal region rather uniformly dusky. Lower sides and under parts yellowish gray with a silvery lustre. Two black spots size of pupil on side, one above pectoral, the other above ventral. Fins

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<sup>1</sup>For previous papers of this series, see Notes on Fishes in the Zoological Museum of Stanford University.

- I. The Fishes of the Herre Philippine Expedition of 1931. Published by the author March 10, 1934.
- II. Two New Genera and Species of Squalioid Sharks and a new Alepocephalid from Japan. COPEIA, September, 1935.
- III. New Genera and Species of Gobies and Blennies and a new Myxus from the Pelew Islands and Celebes. Philippine Journal of Science. *In press.*

colorless. Head, body, and fins sprinkled with black dots, the cysts of some protozoan which has heavily parasitized the specimens.

Described from the type, 114 mm., and paratype 117 mm. in length, both in the Zoological Museum of Stanford University. They were taken from a pool about 3 feet wide, 15 feet long, and not over eighteen inches deep, in the west fork of the Rio San Miguel, 5 miles northwest of Cucurpe, and 29 miles southeast of Magdalena, Sonora, Mexico. According to the Mexicans, seepage keeps this pool filled the year around. Above and below it the stream bed was dry on September 12, 1934. This is over 150 miles from the coast, at an elevation of 2,580 feet.

From other Catostomids in northern Mexico this species differs in its much larger head. *C. bernardini* also has the dorsal base 1.33 in the head, in contrast with over 2 in *C. wigginsi*.

We take pleasure in naming the species for Dr. Ira L. Wiggins, botanist of Stanford University, who collected this and other rare Mexican fishes for Stanford Museum.

Mr. Vernon E. Brock, of Stanford University, has collaborated in the description.

#### **BRACHYCALLIONYMUS** Herre and Myers (2), new genus.

Body very short and heavy; head large, very broad, somewhat depressed. The snout very short and broadly rounded when viewed from above; pointed when viewed from the side. Origin of first dorsal at middle of standard length. Eyes widely separated, at least one orbit diameter apart. Pelvic fins 1-5, far apart, the outer borders not attached to the skin in front of the pectoral base as in *Synchiropus*. Gill opening small, latero-superior; opercle prolonged backward beyond pectoral base in a long, narrow, blunt-tipped projection. Mouth wide, evenly curved, transverse, with little lateral gape, its width about equal to distance from pupil to pupil; lower jaw very slightly inferior. Preopercle armed with a single long, straight, heavy spine, projecting far upward and outward, with 2 or 3 strong retrorse spines along its inner margin, the distal one almost at the tip; length of each preopercular spine more than width of mouth. These spines, together with the short body and broad head and thorax, give this little fish much of the appearance of the Californian cottoid fish, *Enophrys bison*. Lateral line conspicuous; first dorsal III. This genus differs widely from all other known *Callionymidae* in its extremely short, heavy body and the posterior position of the dorsal fins.

Genotype the following new species.

#### **Brachycallionymus mirus** Herre, new species.

Dorsal III—9; anal 9. Depth 3 to 3.25, head 1.6 to 1.7, breadth of head 2 to 2.1, caudal 3 to 3.2, pectoral 2.77 to 3.2, ventral 2.66 to 2.77 times in the standard length. Eye 4.5 to 5, snout 4.1 to 4.2, interorbital 4.4 to 4.55, preopercular spine 2.5 to 2.6, first dorsal 4 to 4.2, second dorsal 3.3 to 3.5, anal 3.3 to 3.75 times in head. Snout broadly rounded; mouth width 3.25 in head. The preopercular spines project upward and outward



continuously with the curve of the snout, their tips far apart, the distance between tips 1.25 in standard length. The gill opening is an elongate, more or less vertical slit at the side of the nape, in the curve of the skin connecting opercular flap with head. The other characters are indicated in the generic diagnosis.

Color in alcohol pale brown with 5 or 6 broad, darker brown cross bands, the first two before the first dorsal, the third under the first dorsal, the others narrower and below the second dorsal; ventrals velvety dusky brown above; other fins colorless.

The type, 18 mm. standard length, collected on the north coast of Celebes, is in the Stanford Museum. When I brought this specimen to the U. S. National Museum for comparison, Dr. G. S. Myers called my attention to three others collected in the Philippines by the U. S. S. *Albatross*. These specimens, U. S. N. M. 98,827, two each 16 mm. long, from Romblon, and U. S. N. M. 98,828, one, 15 mm. long, from Nasugbu, Batangas Province, are designated as paratypes.

Dr. G. S. Myers, of the U. S. National Museum, has collaborated in the generic allocation and description.



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A NEW BURROWING SPIDER OF THE GENUS *LYCOSA*  
FROM THE UINTAH MOUNTAINS, UTAH.

BY RALPH V. CHAMBERLIN,  
University of Utah.

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While recently on a short collecting trip to the high Uintah Mountains, in the company of Don M. Rees and Mr. and Mrs. Stephen D. Durrant of the department of Zoology of the University of Utah, burrows of a *Lycosa* were noticed. The opening of these burrows was surrounded by a low turret of straws similar to those made by several related species. Excavation discovered an adult female in one of the burrows. The specimen proves to represent a new species seemingly conspicuously different from previously known forms.

***Lycosa uinticolens*** Chamberlin, new species.

Similar to *Lycosa fatifera* Hentz and *L. gosoga* Chamberlin in having the entire ventral surface of the body light colored and quite without dark markings and in having only the last three joints of the first two pairs of legs black, this color embracing the dorsal as well as the ventral surface. Both carapace and dorsal surface of the abdomen decidedly darker than the ventral surface due to a dense coat of black hairs with gray hairs intermixed; carapace also with some appressed brown hairs about the eyes and back along the middle region of the pars cephalica and with some on middle line of anterior part of pars thoracica; clypeal region also with brown hairs. Chelicerae with anterior face covered with appressed brown hairs, its longer setae black. Legs light brown excepting for the black distal segments of the first two pairs. Distal fringes of labium and endites black.

Anterior row of eyes very slightly procurved, equal in length to the second; eyes equidistant, with the medians obviously larger than the laterals. Quadrangle of posterior eyes wider behind than in front (29 : 21), and wider behind than long (29 : 24). Lower margin of furrow of chelicerae with three teeth, all of which are stout.

The epigynum is of the same general type as in *L. gosoga*; the septal piece strongly bowed ventrad over about the posterior two-thirds of length, the anterior portion strongly narrowed; cross-piece short and nearly straight, not strongly bulging caudad at middle. (See Figure 1.)

Length of holotype, a female, 16 mm. Length of cephalothorax, 10 mm.; width, 6.4 mm. Length of tibia + patella IV, 8 mm.; of tibia + patella I, 7.8 mm.

*Locality.*—Utah: Uintah Mts., on border of gorge of the Green River, near Green Lake. Estimated elevation, 8,000 ft. 30 July, 1935. Type in author's collection.

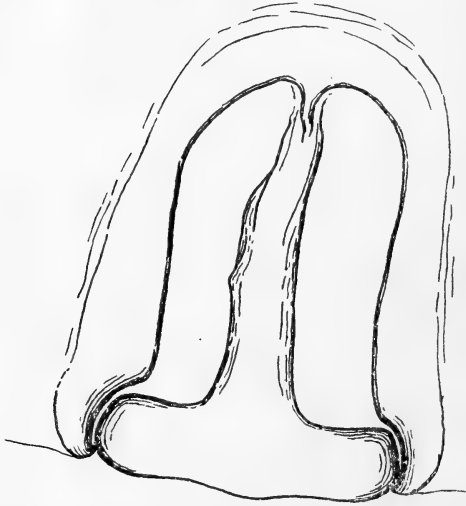


FIG. 1.—*Lycosa uinticolens* Chamberlin, new species. Epigynum.

PROCEEDINGS  
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SOME NEW SPECIES OF CICADELLIAN LEAFHOPPERS  
WITH FOOD PLANT NOTES ON OTHERS.<sup>1</sup>

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

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The partially completed monograph of this group by the late Dr. Melichar in which he breaks the "Tettigonia" of Signoret into 154 genera will ultimately require a number of changes in the generic references of our species. The writer has only had time to work out and assign these for the first subdivision *Proconiaria*. Before any stable nomenclature for our species can be established in the other division, it will be necessary to work out the synonymy of the Biologia material with the more northern forms.

*Homalodisca liturata* Ball.

The writer has taken this species in washes and along river beds in southern Arizona and adjacent California and down into Sonora, Mexico. They are most common on willows in Arizona, but by the Salton Sea, where willows are scarce, they were abundant on the Smoke Tree, a spiny gray-white legume (*Parosela spinosa*) and at Kino Bay, Sonora, they were abundant on a fleshy-stemmed legume in a lagoon back of the sand dunes.

*Homalodisca elongata* Ball, n. sp.

Resembling *insoleta* Walker in the coriaceous elytra. Form of *liturata* Ball nearly, longer and still more slender than either. Purple, head pronotum and scutellum literate with black and white, veins and faint markings on elytra darker. Length 11 mm., width of pronotum 1.8 mm.

Vertex, as in *liturata*, much narrower at base, thus appearing less tapering at apex. As seen from side apex is thicker, almost as thick as wide. Elytra very long and narrow, coriaceous throughout. Female segment very slightly roundly emarginate with a slight, black-marked, median projection. The pygofers flattened for two-thirds their length. Male plates

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<sup>1</sup>All types in the collection of the writer unless otherwise specified.

together one-half the width of the segment, equilaterally triangular one-third the length of the broad pygofers.

Color: Ground color purple, evanescent on head and pronotum, where the literate black and white marking of *liturata* predominate. Face pale irregularly maculate on sides, a black crescent below the apex, an irregular spot below this and a definite spot at apex of front. Scutellum black with light submarginal markings. Elytra purple, the nervures dark or dark margined, the costal and apical nervures light. The apical cells and appendix black.

Holotype ♀, allotype ♂ and ten paratypes together with large nymphs taken by the writer from a mountain grass in White House Canyon, Santa Rita Mountains, Arizona, October 20, 1929. This very distinct species would run in Melichar's key to *insolita*, but is much more closely related to *liturata* except for the pigmented elytra. It has also been taken in the Huachuca Mountains and at Nogales, Arizona.

*Oncometopia alpha* Fowler.

This pretty lavender-colored species described from Durango, Mexico, has been found in all the higher mountain areas of Arizona from Prescott south to the border; the nymphs are found on pines while the adults are more widely distributed.

*Cuerna lateralis* Fabr.

This species is rather rare in the desert regions but occurs abundantly in Arizona and Nevada both as nymphs and adults on the Joshua Tree (*Yucca brevifolia*). After discovering this habit, the writer tried the tall Yucca (*Yucca elata*) and found them occurring on this plant but in lesser numbers.

*Aulacizes pollinosa* Fowler.

After several years collecting in Florida, the writer was unable to find any intergrading of this form with *irrorata* and now believes it to be distinct. It only occurs in the extreme southern part from Miami south. The writer found a number of them on a low growing plant (probably an Ambrosia) near Homestead.

*Cicadella monticola* Fowler.

This short, stout black and red species with white panniers, described from 9500 feet in Guerrero, Mexico, has been taken in Madero Canyon, Santa Rita Mountains, Arizona, by Oman, Beamer, Ball and Bryant. The few specimens taken were swept one at a time from damp situations under pines where the brake fern was abundant.

*Cicadella multilineata* Fowler.

This large handsome yellow, black and white striped species has been reported from Arizona by Olsen. It is found by the thousands, nymphs

and adults, on the tree *Arbutus* (*Arbutus arizonicus*) in the Chiricahua, Huachuca and Santa Rita Mountains. Where the nymphs are abundant on a tree, the fine drops of honey dew fall like a mist and everything beneath becomes sticky or sugary. When the sun is in the right position a rainbow appears in the mist like the ones seen in the mists of a waterfall. In the recent drought years, so much sap was taken from these trees that the leaves wilted and fell.

***Cicadella huachucana* Ball, n. sp.**

Resembling *multilineata* Fowler in color and somewhat in pattern, but only about half the size, size of *confluens* nearly, broader with a narrower vertex. Blue-green, washed and lined with lemon yellow, abdomen and legs scarlet. Length ♀ 8 mm., width 2 mm.

Vertex and head about as in *hieroglyphica*, definitely wider than in *multilineata*, almost the length of pronotum, bluntly conical. Elytra somewhat shorter and broader than in the other species. Pattern of venation similar but dark-lined and distinct as in *multilineata* instead of obscure as in *hieroglyphica*. Male plates triangular with attenuate apices, as long as pygofers.

Color: Vertex with a *hieroglyphica*-like pattern, a basal white band, a median white line supporting an emarginate, apical triangle. Whole pattern black-margined, with a black spot in the triangle and another at tip. The reflexed portions and a line on either side from behind the eyes, extending obliquely on to the disc, yellow. Pronotum with disc blue-green, the anterior crescent washed with orange, irregular transverse vermiculate black lines cover the entire disc, posterior margin narrowly light, bordered with dark. In *multilineata* the pronotum has four irregular longitudinal stripes and the median stripe of vertex is black. Elytra with the margins and claval sutures blue green, discs washed with orange emphasized in two stripes, one down the middle of clavus and the other similarly placed on the corium. The nervures narrowly dark-lined and less definite lines in the middle of the cells. Face orange with black marks, legs and abdomen scarlet.

Holotype ♀, Huachuca Mountains August 2, 1931, paratype ♂ Chiricahua Mountains July 26, 1935. Both picked up by the writer in general sweeping at about 6000 foot elevation.

*Cicadella confluens* Uhler.

This somber colored species is found abundantly on willows from the San Bernadino Mountains of California north to British Columbia and Saskatchewan.

*Cicadella hieroglyphica* Say.

Several varieties of this protean species have been found to have quite definite hosts in the Southwest, but until the synonymy of a number of Biologia references has been worked out, it will not be possible to give permanent names to some of these forms.

*Cicadella harti* Ball.

The writer found this species on a scurfy gray spurge (*Crotonopsis linearis*) in Florida. This plant has almost exactly the same distribution as the insect.

*Cicadella taosa* Ball, n. sp.

Resembling the female of *harti* Ball but larger with a longer and more definitely angled vertex and with dark nervures in both sexes. Length ♀ 5 mm., width 1.8 mm.

Vertex but little longer than in *harti* but much more definitely angled, much longer than in *marathonensis* Olsen. Face in profile not nearly as much inflated as in *harti* and therefore less angled with clypeus and more definitely angled with vertex. The apex rounding. Venation as in *harti*, the outer sector not forming a closed apical as in *marathonensis*. Genitalia about as in *harti*, the posterior emargination of the female segment less pronounced and lacking the dark lines running back from the outer margins.

Color: Female, vertex straw-color, the apex, circles around the ocelli and a pair of crescents connecting the circles with the apex creamy; a round black spot either side at apex and a pair on the bases slightly closer to each other than the brown ocelli. Front straw, a narrow median light line bordered by a pair of brown ones uniting above. Outside of these, entirely covered with brown lines becoming concentric on the broadly reflexed areas on vertex. Pronotum pale straw, an abbreviated brown spear on median line and an irregular brown area either side. Scutellum yellow, a transverse line and basal triangles brown. Elytra uniform smoky brown. The white nervures and margins in sharp contrast. Male very similar, slightly darker throughout, the white nervures disappearing towards the apex.

Holotype ♀, allotype ♂ and one paratype female. Albuquerque, New Mexico. The male taken December 5th. The female was included in *harti* when that species was described but a large amount of additional material has served to establish more definite specific limits.

*Cicadella cucurbita* Ball, n. sp.

Similar to *taosa*, slightly larger with a much longer, parabolic vertex. A broad median, black-margined white line from apex of vertex to apex of scutellum. Nervures and margins of elytra white margined with black. Length ♀ 6 mm., width 2 mm.

Vertex fully as long as the pronotum, three times as long as against the eye, the apex paraboloid. As seen from side the front is more inflated above than below while in *harti* this is reversed. Apex conical, without an angle in the outline below. Pronotum broadly rounding behind with a median emargination. Venation as in *harti* no closed cell in the fork of the outer sector. Female segment triangularly produced; male plates long triangular with attenuated points about three times as long as in the allied species.

Color of sexes almost alike. Vertex, pronotum and scutellum straw color with a trace of orange towards the margins. Vertex with a pair of



white crescents setting off the very long reflexed portion, these tied together at a little more than  $1/3$  the distance from apex, a pair of black-bordered white lines arising on the ocelli, another pair between these and the eyes both running back across the pronotum separating posteriorly. Elytra gray, the nervures and margins white with narrow black borders, a secondary white line outside the inner margin. Face and below as in *taosa*.

Holotype ♀ and allotype ♂ taken by the writer 12 miles west of Congress Junction Ar., August 19, 1933, eleven paratypes, together with nymphs, taken by Oman, Beamer and Ball in the Mustang Mountains, Ar., June 12, 1933, and two paratypes taken by Beamer west of Wickenburg., Ar. All that the writer has taken were from the small divided-leaf gourd (*Cucurbita digitata*) growing in Tobosa grass (*Hilaria mutica*). No specimens have been taken in the grass where there were no melons nor on melon vines where there was none of the grass. Holotype, allotype and paratypes in the writer's collection, paratypes in collections of P. W. Oman and R. H. Beamer.

***Cicadella sidana* Ball, n. sp.**

Similar to *harti* but smaller and with a still blunter head with two black points at apex. Creamy and orange, the elytra smoky black with the nervures and a heavy triangle on each clavus creamy. Length ♀ 4.2 mm., width 1.4 mm. Male much smaller.

Vertex definitely obtusely rounding, only a little over half as long as its basal width. As seen from side very bluntly conical. Face inflated about evenly throughout, the front and clypeus in a uniform curve. Pronotum with the anterior third definitely depressed. The posterior margin broadly rounding. Elytra, venation and genitalia as in *harti*.

Color: Creamy with the anterior portion of pronotum and scutellum irregularly orange, the eyes blue-green. A pair of dots on apex of vertex. The front with faint lines widely broken by an ivory median line. The elytra smoky or black shading out towards the costal margin, a broad creamy triangle bordering each claval area and the veins narrowly light.

Holotype ♀, allotype ♂ and 8 paratypes Baboquivari Mountains, Arizona, August 11, 1931, and six paratypes from Patagonia, Arizona, in June and August. All taken by the writer. This pretty little species has been found feeding exclusively on a low, spreading mallow (*Sida diffusa*) that grows in under the range grasses. Examples have been taken as far south as Hermosillo, Mexico.

***Cicadella mollicula* Fowler.**

This pale brown-striped species resembling *tripunctata*, described from Central Mexico, is common in suitable locations along the extreme southern border of Arizona, especially at Patagonia, where it was found in low, damp, shaded places feeding exclusively on the mat amaranth (*Alternanthera repens*).

***Cicadella luculenta* Fowler.**

This red lined species was described from Guerrero, Mexico. The writer took a single male on Mt. Lemmon at about 9500 feet July 1, 1933. On

July 15, 1935, Robert Flock took three females at the same place, which he thinks came from a species of cone flower.

*Graphocephala cythura* Baker.

This lined and spotted green species is found in abundance both nymphs and adults on the cockle bur-like plant of our sandy washes (*Franseria ambrosioides*).

*Graphocephala ignava* Ball, n. sp.

Resembling the green variety of *versuta* but with a slightly shorter and more pointed head and a much broader reflexed area. Blue-green with reddish brown on vertex and pronotum and with the apical third of claval areas white. Length ♀ 5.5 mm., width 1.3 mm.

Vertex sloping, the reflexed portion broad and elevated, forming a triangle between. In profile the front is more inflated and the apex conical instead of angled as in *versuta*. Genitalia and venation of the *versuta* pattern. Three closed anteapical cells in elytra.

Color of *cythura* nearly. Disc of pronotum and elytra blue-green with smoky clouds instead of green as in that species. Vertex, anterior part of pronotum and scutellum creamy, a round dot on apex of vertex, a narrow bounding line of the reflexed portions with projections to the ocelli, and a pair of narrow lines margining the white median line, black. Scutellum with the basal triangles, the transverse suture, two dots in front of it, and usually narrow margins of the apical white line, black. Well colored examples have a long triangle in the vertex and a series of irregular clouds on anterior portion of pronotum rusty red. Front creamy, lined or mottled with faint brown. Below and legs mostly pale, tergum black. Elytra with the apical third of claval areas and a narrow apical band creamy white. The nervures mostly very narrowly pale.

Holotype ♀, allotype ♂ and four paratypes September 13, 1931, and six paratypes September 5, 1933. All taken by the writer from a clump composite (*Brickellia wrightii*) in the Santa Rita Mountains, Arizona.

*Kolla geometrica* var. *plutoniella* Ball, n. var.

Size and form of the species. Whole insect shining black with a coppery reflection except the legs, the antennae, the ledge above the antennal sockets, a pair of approximate dots back of the point of vertex, a pair of crescents in front of the ocelli, the tip of scutellum, and oblique dashes across the outer apical cells of elytra.

Holotype ♀, allotype ♂ and one paratype Biscayan Bay, Florida (Mrs. Slosson). One paratype Estero, May 14, 1928, three Homestead, May 16, 1928, and three from Sanford various dates. All except the first set taken by the writer in damp meadows in Florida. This is a striking and very constant variation of this well-marked species. An occasional example will show traces of the marginal white lines on the posterior margin of head and pronotum.

*Carneocephala gillettei* Ball.

The writer reported this species as taken from saline areas in Colorado where *Dondia* and *Sarcobatus* grew. On September 4, 1934, two males and a nymph were taken from near the Grand Canyon Bridge on a clump grass, and June 24, 1935, a number of adults were taken on this same grass. This is an alkaline area and the grass (*Sporobolus flexulosus*) is no doubt the true host of this rare species.

*Carneocephala triguttata* Nottingham.

The writer has found this species swarming on salt grass (*Distichis spicata*) growing in alkaline areas at St. George, Utah, Bunkerville, Nevada, Sacaton and Yuma, Arizona, and Calexico, California.

*Carneocephala flaviceps* Riley.

As restricted by Nottingham, this species is the one that swarms on the Bermuda grass areas of the Cotton States, as far west as Kansas, Texas and S. E. New Mexico. One wonders if the Wisconsin record is not a mistake in labeling.

*Carneocephala fulgida* Nottingham.

This longer headed species has been taken by the writer in numbers from Bermuda grass at Guadaloupe, Salinas, Watsonville and San Francisco, California.

*Carneocephala nuda* Nottingham.

This small, short-headed species swarms on Bermuda grass in damp or shaded situations in southern Arizona.



## PROCEEDINGS

OF THE

## BIOLOGICAL SOCIETY OF WASHINGTON

## A NEW BABBLER FROM SOUTHEASTERN SIAM.

BY J. H. RILEY.<sup>1</sup>

Dr. Hugh M. Smith collected a small series of birds of the genus *Alcippe* in the isolated mountain range of southeastern Siam that extends eastward into Cambodia. This series more closely resembles the form found in the mountains of the Malay Peninsula than it does that found in northern Siam or the one found in southern Annam. It may be known from the following description:

***Alcippe nipalensis eremita*, subsp. nov.**

*Type*.—Adult male, United States National Museum, number 311,093, Kao Seming, Krat, southeastern Siam, October 16, 1928, collected by Dr. Hugh M. Smith, original number 2507.

Similar to *Alcippe nipalensis peracensis* of the Malay Peninsula, but lighter brown on the back and tail; the pileum a lighter gray; the black line on each side of the crown and nape broader and a deeper black; the under tail coverts and thighs much lighter; the feet (in the skin) are deep grayish olive instead of tawny olive; and the bill averages larger; wing 67, tail 61, culmen, 12.

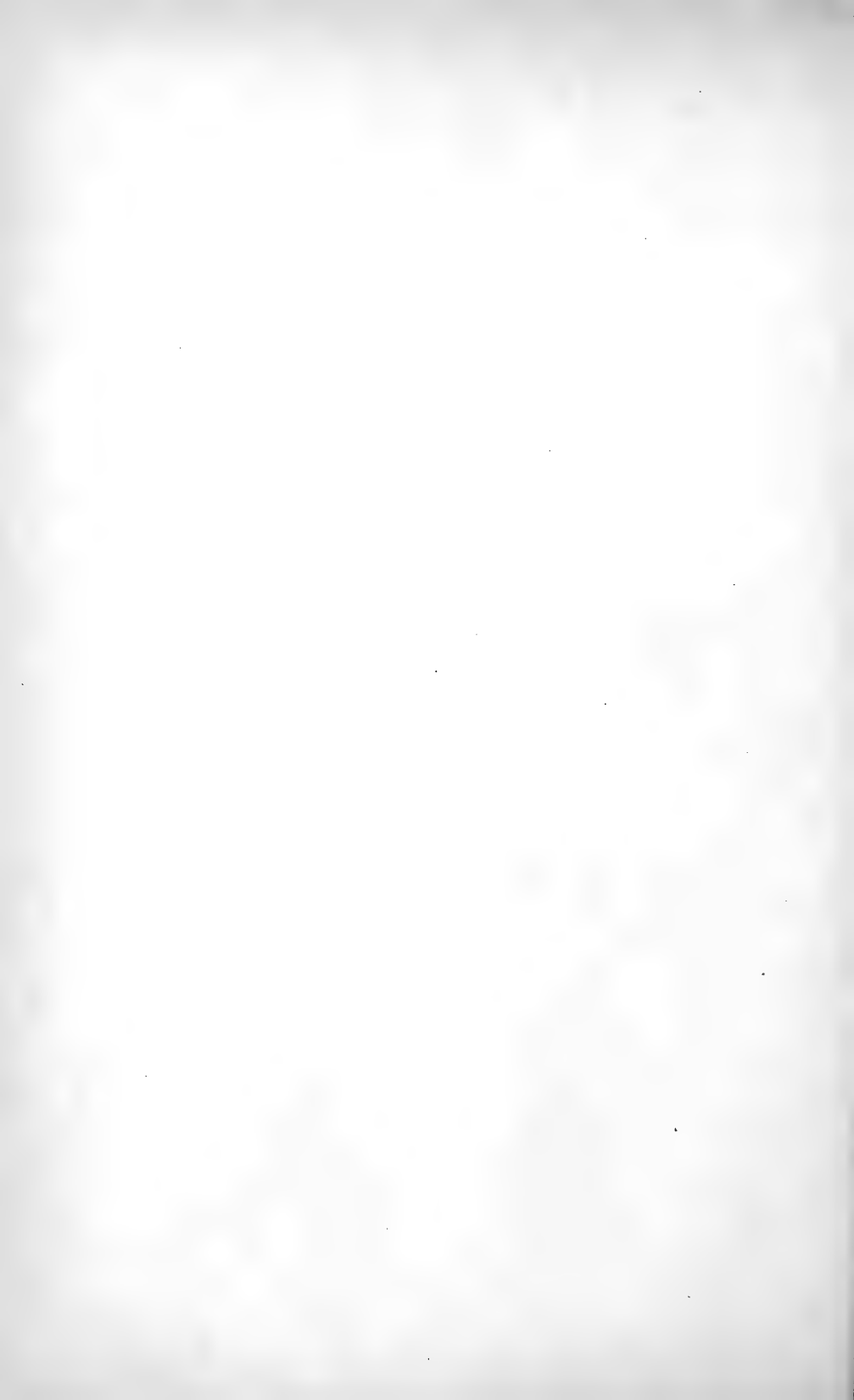
*Remarks*.—The above form is founded upon a pair from the type locality and one male and two females from Kao Sabab. These have been compared with two males and two females from the mountains of the Federated Malay States, *Alcippe nipalensis peracensis*. The United States National Museum possesses a pair of paratypes of *Alcippe nipalensis annamensis* from the mountains of southern Annam. The latter seems to be a very good race. Paler on the back and tail than *Alcippe nipalensis eremita*; the throat and chest tinged with grayish, whereas in the latter the throat is whitish and the chest light buff. The bill in *annamensis* is smaller. The ranges of the three forms are widely separated by country where no form of the species probably occurs.

Two males and two females of *A. n. peracensis* measure: wing 64-65.5 (64.7); tail 64-66.5 (65); culmen 11-12 (11.7).

Two males and three females of *A. n. eremita* measure: wing 65-68.5 (66.7); tail 59-65 (61.9); culmen 12-13 (12.5).

A pair of *A. n. annamensis* measure: wing 58-63; tail 61-64; culmen 10.5-11.

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PROCEEDINGS  
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A PRIMER FOR THE APHID HUNTER.

BY FREDERICK C. HOTTES.

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The objectives of the aphid hunter may be said to be only partially achieved when he returns to the laboratory with the trophies of his hunt, for there still remains the task of mounting the specimens if they are to be permanently preserved.

The collection of material calls for some knowledge of how and where to hunt if the collecting is to be done efficiently. If the minimum of labor is to be expended certain equipment is necessary, or at least desirable; and if ideal slides are desired, (and who wishes inferior ones), the aphids must be correctly mounted.

For convenience, I have divided the Aphid Hunter's Primer into several sections—the first of which will be devoted to equipment.

*The collecting equipment need not be extensive.* It is assumed that the collector will usually use a car, not only as a means of locomotion but as a center from which to make numerous short side-trips into desirable collecting territory while on a more extensive trip. By using a car as a base it will not be necessary for the collector to burden himself down with containers and collecting equipment necessary to last all day unless definite provisions for such extended periods away from the car are made.

We may list essential equipment as follows: A knapsack or other suitable container for the remaining equipment. For aphid containers the writer prefers large glass vials with spring metal caps. Glass containers permit frequent observation without endangering loss of the contents. They do not rust and are easily kept clean. Danger of loss by breakage is objectionable but occurs infrequently. Having all of one's containers of uniform size has obvious advantages. Cigarette tins, tobacco cans, salve boxes and seal tight containers of various sizes have ways of finding themselves in the aphid collector's kit, and serve excellently if one does not object to miscellaneous containers. At first glance containers of various sizes appear to have their points of superiority, for a container may be selected to

fit the desired amount of material of a given species. The writer has found it better to use as many small containers as necessary for a given species rather than to risk having something happen to the aphids in a single large container. Uniform containers are also much easier to pack. A good stout knife is essential for cutting twigs, trimming leaves, or removing sections of bark upon which aphids may be feeding. Some collectors will prefer not to bother with live material and such will place their material in vials containing seventy per cent alcohol. This method is perhaps best when one is limited for time, or when there is likelihood of the aphids not surviving the return trip to the laboratory; for once in alcohol the aphids need no further immediate attention. Such collectors will find it advantageous to partially fill the vials with alcohol before leaving the laboratory. Slides made from material preserved in alcohol are satisfactory when properly mounted but less attractive than slides mounted from freshly processed material. Hence the collector desiring the best slides possible will endeavor to keep his material alive until mounted.

Inasmuch as aphids occasionally occur on the roots of plants and probably occur more frequently than realized, a small trowel or chisel will be found most helpful in the collector's kit if subterranean forms are to be collected.

Aphids in containers appear to be quite easily affected by heat, especially when the car has to stand in the sun for various periods of time. The effect by heat may be somewhat delayed by packing the filled containers in grass in a large container, such as a bushel basket, and then covering it well.

Because aphids are so intimately associated with their hosts and because the host's name is highly desirable on a correctly labeled slide, the host will either have to be recorded on a slip of paper placed in the vial or the vial given a number corresponding to a number given the unknown host, which must then be collected and pressed so that it may be determined at some future time. Plants dry rapidly in arid regions so should be pressed as soon as possible. A Saturday Evening Post makes an ideal temporary plant press, being approximately the size of regulation drying blotters.

Some aphid hunters will prefer to carry and use a large sweep net. From time to time the collector may desire to beat certain species of plants in order to quickly determine the presence or absence of aphids on them. A net is especially useful when collecting aphids which occur singly or when collecting on conifers. It is the only efficient manner in which to collect *Essigella*. A small notebook in which to record such data and observations as are desired, a hand lens, a pair of forceps and a camel's hair brush complete the aphid hunter's essential equipment.

The second section of the primer will be devoted to notes regarding where to collect.

*Where and how the aphid hunter collects will depend upon his objectives. If his object is merely to make an aphid collection or to add to a list, he may follow some such procedure as here suggested.*

Assuming that he is familiar with the flora in the region in which he is



to hunt, let him make a list of the aphids known to frequent hosts found in that region by consulting such host plant indices as Wilson's or Davidson's or, lacking access to these, let him consult regional indices, such as those found in the aphid works of Oestlund, Williams, Sanborn, Patch, Swain, Essig, Gillette and Palmer, Knowlton or the Aphidiidae of Illinois. Then if he has access to aphid literature, let him acquaint himself with the habits of the various species likely to occur in his collecting territory so that he will not look on leaves or branches for species which occur on roots. Thus one might say that the collection of the aphid slide begins in the library. Certainly by following such a procedure the inexperienced collector may save himself hours of time in the field and almost assure himself satisfactory results. The collector desiring to merely add known species to a given list need only confine his searching to those hosts whose representative species are absent from his list or collection.

The collector desiring to discover new species must modify the procedure just given. For example, he may make a list of the plant species growing in his territory from which few or no aphids have been described and confine his searching for a time to these. This procedure produces results, but is often discouraging if continued for long. One who collects for new species must be content to take or at least observe many known forms in proportion to the species which he takes for new. He should, first of all, free himself from professional prejudices. If he would find forms overlooked by others, he must use unconventional methods; he must look on and where others before him have not first looked. Secondly, he must examine all plants for aphids even those which he considers too insignificant to harbor them. He must examine regions of plants from which aphids have not been described. Nor can the new species hunter confine his searching to a given host species growing in a given ecological habitat, for certain aphids show a preference to hosts growing in shaded areas, in open spaces, or in moist situations. Thus by confining his collecting to plants growing in a given restricted area, the aphid hunter is almost sure to reduce the number of his findings. By using these tactics the one whose objective is finding new species may even invade a territory seemingly posted not to have new species and achieve success.

The aphid collector will find it well to have a working understanding of the different ecological and geological regions of his state or of the areas within which he wishes to collect. The advantage of such information is most obvious to any insect collector but is especially important to the collector of aphids, for different ecological and geological areas are sure to mean different types of vegetation which in turn is indicative of possible aphid hosts. Thus we see that by carefully planning one's itinerary and objective before starting to collect that much time can be saved in the field and the success of the expedition almost assured.

Neither the professional collector nor the amateur hunter can ignore regions near to his home or office. The back yard, the neighbor's weed patch, the campus, an old cemetery, a railroad right-of-way or a nursery may be an excellent site in which to collect whenever time is limited.

The third section will deal with the subject what and how to collect.

*It is a decided advantage to have both alate and apterous forms available for study.* Lacking both forms, it is best to have alate specimens in most groups; not only because the alate forms possess the best diagnostic characters but because most keys are based on them. The time will no doubt come, if it is not already here, when immature forms will be necessary in the collection of one whose interest lies in a study of the phylogeny of the group. However, alate and apterous forms are not always present at the time the collector makes his visit. If the collector is so situated that he may conveniently return to the place at a future time, he need only take such forms as are available and mark the spot so that it may again be located.

If the material is especially rare or valuable, the collector may care to enclose a twig or branch of the host by means of a celluloid "lamp chimney" closed at both ends by muslin sleeves, which may be tightly tied after the chimney is in position over the desired region. When this method is employed, care must be exercised to see that all insect aphid hunters and their eggs have been removed. Another objection to cages is that they are quite conspicuous and for that reason rather impractical in frequented regions.

If it seems improbable that the collector will return to a particular site again, he may take some of the available forms alive with the hope of establishing them on similar hosts near at home, or he may consider transplanting the hosts to a site in his own garden. This procedure is impractical for most plants but has been tried successfully by Gillette and Palmer with conifers. Twigs of conifers can withstand relatively long periods of time with their proximal ends submerged in water or "planted" in damp sand. By resorting to the above methods most species of the genus *Cinara* can be persuaded to produce several generations. Such twigs, however, must be kept in a rather cool place, otherwise the spirit of the wanderlust gets the best of the aphids and they start going places.

There is a great paucity of knowledge regarding the sexual forms of the aphids and therefore collecting in the late fall for these forms should greatly increase our knowledge of these insects. Sexual forms are especially desirable in certain groups if the worker is interested in taxonomic divisions larger than genera, or in phylogeny.

Having located aphids which one desires they may be removed from the host directly into vials or other containers by means of a forceps or a small camel's hair brush, or small sections bearing aphids may be cut from the host. Sections of bark removed from conifers are inwardly sticky and care should be used to wedge such sections with the raw side to the edge of container so as to minimize the danger of the aphids mounting themselves in the natural balsam. Ordinarily it will be well to place some of the host into the container, not only to furnish food but a resting surface for the aphids until one is ready to mount them. The host material and aphids will cause the inside of the container to sweat, especially in summer. To prevent this, strips of blotting paper or bits of tissue paper should be placed in the container to absorb the excessive moisture. Care should be taken not to place too much material in a container and also to see that all aphid

feeders have been removed. It is also well to collect a little more material than one thinks is enough so that only the best need be used. Live material under ordinary conditions does not stand up for long. It is useless to spend time collecting more material than can be mounted at the end of a day's collecting unless one can slip his containers into the family refrigerator, or is satisfied with material preserved in alcohol.

The next section will be devoted to the various mounting media and the preparation of the aphids for mounting.

*Before describing the preparation of the ideal aphid slide, it may be well to define what we mean by the term.* First of all, it is assumed that representative adult alate and apterous forms are available so that both forms may be placed on the same slide. It is further assumed that the specimens are mounted in positions favorable for study and that the characters necessary for classification are clearly visible when observed under the microscope. It is further assumed the ideal slide will be properly labeled as to host, locality, date, and name of collector as well as the name of the person responsible for the determination of the genus and species. It might as well be stated first as last that no one method of treatment and no one mounting medium can be relied upon to give satisfactory results for all forms, and the aphid technician will have to vary his treatment and procedure accordingly. The choice of mounting medium will depend somewhat upon the results desired, the time available at the time the slides are made and the prior treatment of the specimens to be mounted.

Canada Balsam is perhaps the most universal mounting medium used by aphid technicians. There is no question of its permanency. Live aphids mounted in it clear only after a relatively long time, an objectionable feature if the slides are to be studied soon after being made. Such slides, even though sometimes badly stained, are serviceable, if not attractive. Canada Balsam is sometimes rather darkly tinted—a factor objectionable to some. It sets or hardens slowly—a rather disagreeable characteristic if slides are to be studied or transported soon after being made. Slides made from processed material or material which has been preserved in strong alcohol are immediately ready for study but the slides are soft and must be handled with care.

The writer prefers to use either Gum Damar or Euparal as a mounting medium and the choice between these depends entirely upon the prior treatment accorded the aphids and the time available when the slides are made.

Lee in his *Vade Mecum* speaks rather slurringly about the permanency of slides mounted in Gum Damar. This, I think, is rather unfounded. I have seen slides of aphids mounted in Gum Damar by Oestlund many years ago, which are as fresh looking as the day they were made. Gum Damar is absolutely worthless as a mounting medium for unprocessed aphids, for such material will not clear regardless of the amount of time allowed. Alcoholic material must be thoroughly dehydrated before mounting; otherwise it clears very slowly. It is the writer's first choice for processed material. The fact that it sets and hardens quickly makes it an

especially desirable mounting medium when the slides are to be used or transported soon after they have been made. It has little or no color.

Euparal is perhaps the best all around mounting medium. Like Gum Damar, it sets and hardens quickly, and is comparatively free from color. Live aphids may be mounted in it and clear in a shorter time than if mounted in Canada Balsam. Such slides are, however, open to the same objection as those mounted alive in Canada Balsam. Processed aphids need not be so thoroughly dehydrated as those intended for mounting in Gum Damar. Specimens in alcohol may be mounted directly from seventy per cent alcohol and the slides be cleared and ready for study within a week. Many of the early aphid workers used glycerine as a mounting medium. Glycerine makes a satisfactory temporary mounting medium, but should not be employed for permanent mounts even though these are ringed. Buxton's mounting medium, a mixture of water, glycerine, gum arabic and chloral hydrate in definite proportions, appears to be undesirable for mounting aphids. Slides made with it clear poorly, often crystallize and sometimes lose their cover slips and have to be remounted within a few years.

Now let us consider the preparation of an aphid slide. Most species of aphids will respond favorably to the following treatment: Kill aphids by pouring boiling hot 95% alcohol over them, perhaps allowing the boiling to continue for a second or two. Large, thick skinned aphids are best killed in boiling hot water and then transferred to hot 95% alcohol. After they have been killed they are allowed to stand in 95% alcohol for a short time, after which they are transferred to absolute alcohol. If large, they are punctured with a pin. From the absolute alcohol they are transferred to xylol from which they are mounted. No exact time can be given for each of the above stages in the process because the time will largely be governed by the peculiarities of the individual species. In general, it will be safe to allow as much time to clear and dehydrate as necessary without rendering the aphids and their appendages brittle. The entire process need not require more than fifteen to twenty minutes. After the aphids have been in xylol for a very brief period, the clearing process may be speeded up by the use of oil of wintergreen as a clearing agent. When using oil of wintergreen, however, care must be taken not to allow it to act too long as it quickly renders aphids too brittle. Some aphids after reaching the xylol will cause it to turn "milky." When this occurs the aphids should be transferred back to alcohol for further dehydration. Boiling for a second or two in 95% alcohol is usually sufficient to bring about the desired result. Color is more or less perfectly preserved by this procedure.

Small 50 cc. beakers are used for heating the alcohol with which to kill the aphids and only a limited amount (25-30 cc.) is heated at a time. The aphids are afterwards transferred to Syracuse watch glasses. Several species may be treated at the same time so that once the process is started work may continue without interruption. When many species are treated at the same time it will be necessary to carry the data slip through each stage along with the aphids so as to avoid the possibility of a mixup.

Some workers may object to the use of heat for killing because it compli-

ates the process of mounting, if this is to be done away from the home base. However, canned heat may be employed when away from a source of electricity and an electric grill or toaster when electricity is available. Thus aphids may be mounted in a hotel room or mountain cabin. Processed aphids retain original color more or less perfectly.

Aphid technicians have thought it necessary to boil or at least soak certain species in potassium hydroxide solution in order to bring out waxpore plates, or hair distribution on the abdomen. This is at best a drastic procedure. The integument of the forms needing this process most is often very thin and there is danger of the potassium hydroxide being allowed to act too long. Aphids treated with potassium hydroxide must be run carefully through a graded series of alcohols before mounting, in order to harden the chitin and prevent the collapsing of small parts. Inasmuch as the potassium hydroxide has for its object chiefly the destroying of pigment, the writer has found the mouth wash Zonite satisfactory for this purpose, after which the specimens may be dehydrated. This method has little or no effect on tissue and bleaches well.

W. Roepke's directions for treating aphids for microscopic study takes them through 70% alcohol, then 75% lactic acid heated in a hot water bath for twenty minutes. From this they are placed in a mixture of equal parts of chloral hydrate and carbolic acid crystals and kept hot in a water bath for twenty minutes or longer if necessary. I have not tried his methods but have seen beautiful slides prepared by Professor Palmer, in which his method was employed. Miss Palmer's criticism is that the method requires too much time. Roepke recommends Berlese fluid as a mounting medium, but as this is quite similar to Buxton's mounting medium which has proved unsatisfactory for aphids, Miss Palmer mounted her specimens in Canada Balsam with satisfactory results after, however, washing the specimens in xylol. Professor Palmer objects to this method because there is some danger of the doubling up and distorting the bodies of the aphids. In this respect it is quite similar to potassium hydroxide solution.

Professor Palmer has found the following procedure successful: Kill in boiling alcohol, dehydrate with high per cent alcohol, then put them on a cover glass and cover with a drop of clearing mixture (made of equal parts of carbolic acid and turpentine). Allow the clearing mixture to act for about fifteen minutes, then mount in Balsam. Color is more or less perfectly preserved by this method.

Recently Johannsen has recommended 2-4 Dioxane as a clearing agent for histological preparations. This material was tried out on a limited number of aphid species with highly satisfactory results. Small amounts of 2-4 Dioxane were placed in glass covered containers. The odor of 2-4 Dioxane is somewhat objectionable and covered containers were used to lessen the amount freed in the room. The aphids were killed by being placed in unheated, undiluted 2-4 Dioxane and allowed to remain in it for various periods of time. The material did not collapse the appendages, nor shrink the specimens in the least, nor did it affect the color.

Tests showed that specimens could be mounted directly from the 2-4 Dioxane after five minutes' treatment and the slides remain clear. However,

it should be pointed out that these were fall aphids whose bodies likely contained less water than aphids taken at other seasons of the year. The appendages could be manipulated after the specimens had been in the solution for twenty minutes but became quite stiff and brittle if allowed to remain for a longer period of time. The limited number of species on which 2-4 Dioxane has been used and the fact that the specimens were hardly typical does not permit an unqualified endorsement. However, it would appear that if present results can be duplicated that all other dehydrating media and processing methods would be rendered obsolete. Hence, much of the material treated in this section may be regarded as a sort of premature obituary.

The inevitable result of preserving aphids in alcohol is the drying up of the vials and the loss of the material thus preserved. Because such material may often be valuable, it may be worth while to give two procedures by which it may be salvaged.

Almost all of the Thomas collection of Illinois aphids was preserved in alcohol. The time between 1878 and 1928 was more than ample for the contents of the vials to dry up. Inasmuch as most of this was typical material a method by which it could be made available for study was much to be desired. After some consideration the following plan was put in operation: The vials were filled with a weak solution of potassium hydroxide. This softened the chitin and after a short time the aphids had assumed their natural form and except for loss of many appendages were none the worse for having been dried. All that remained to be done was to run the aphids through successive stages of alcohol and mount. The slides were usable and satisfactory. I mentioned the above procedure to my uncle, Professor Chas. F. Hottes, and he suggested that I try a mixture used by botanists to soften and prepare certain kinds of dried botanical material for sectioning. This material called lacto phenol is made as follows: 20 grams melted crystals of carbolic acid c.p., 40 grams lactic acid spec. gravity 1.25, 20 cc. distilled water. This mixture constitutes the concentrated stock solution.

Fortunately I had abundant dried material available for experimental purposes. One part stock solution to two parts of distilled water was tried as a softening agent. This strength worked well on small and medium sized aphids, completely plumping and relaxing them in a remarkably short time. Larger forms did not respond well unless placed in a solution made of 50% stock solution and 50% distilled water.

Botanists use this material cold. I tried keeping the material warm for some specimens and cold for others and achieved equally satisfactory results with both methods. Specimens kept in the stronger mixture clear more completely than those kept in the weaker solution. Specimens, especially small forms and those whose chitin is relatively thin, plump within twenty-four hours, some even plumping within twenty minutes. Air bubbles are objectionable and I found it best to treat aphids with the mixture till all of these had been destroyed. The time required for this was from three hours to four days. The material was then taken from the lacto phenol mixture, washed in absolute alcohol (I question the necessity

of this) and mounted. Slides made by this procedure are uniformly good. I next tried dehydrating live aphids and then treating them with lacto phenol. Yellow aphids treated thus when mounted retained their yellow color; red aphids did not. Nevertheless, such slides were about as good as any slides in my collection made from unprocessed aphids. Lacto Phenol treated aphids can not be sectioned to show internal structures but from the standpoint of whole mounts it can be recommended without qualification. In fact, I am seriously considering dehydrating some of my next season's catch and working it up at my leisure next winter without the fuss and bother of using heat, alcohol and xylol during the collecting season if 2-4 Dioxane upon further experimentation proves unsatisfactory.

The method of mounting aphids on a slide is always the same regardless of the prior treatment accorded them or of the mounting medium used. Only standard sized slides should be used for mounting aphids. The cover slips should be of noncorrosive glass of No. II thickness. Whether round or square cover slips are used is a personal matter. The size of cover slips is optional but it is well to have two sizes, one 12 mm. for single specimens and 22 mm. for use when several specimens are to be mounted under the same cover.

The process of making a slide is at best a sticky one. Therefore, I prefer to have several sheets of white paper on my table top. These may be conveniently held in place by means of a thumb tack. It is then a simple matter to pull off the top sheet when it becomes soiled or sticky. A slide is roughly outlined in a convenient place on the paper and the same procedure is followed with a cover slip somewhere near the center of the outline of the slide. This easily made diagram insures the proper orientation of the cover slip on the finished slide. Slides are placed in the outlined area and the aphid to be mounted on the slide selected and placed within the area representing the cover slip.

Excess fluid may now be removed by means of a strip of blotting paper if the aphids have been processed. The proper amount of mounting medium is now placed on the aphids and the process of orientation of specimens begun with dissecting needles. If several aphids are to be mounted on the same slide it will be well to mount some specimens with the ventral surface up so that the beak may be observed without turning the slide over. Single specimens should always be mounted with the dorsal surface uppermost. Care should be taken to spread the wings if the specimens are alate and not to break off the legs and antennae. Attempts should be made to pull the antennae and legs away from the body so that they may be observed and measured and not obscured by it. If bubbles form during the orientation process they may be easily punctured by placing the needles into the solvent of the mounting medium and then placing them while still wet into the bubbles. After the aphids are in position a cover slip is placed so that one side of it is in contact with the mounting medium and gently allowed to fall. If bubbles form they will be carried to the opposite side of the cover slip where they may be easily punctured without again lifting the glass. If the cover slips are placed directly from the top bubbles are sure to form and being near the center will require that

the glass be lifted before they may be destroyed. If not enough mounting medium was used in the first place more may be added from the side after the cover slip is in position. The cover slip should be parallel with the surface of the slide. Aphids may be placed in strategic points to hold the cover slip level or small bits of broken slide may be used as props to hold the cover slip up. If one wishes especially nice slides he may mount his aphids within horn rings such as used by bacteriologists in hanging drop studies. If rings are used, however, care must be used to fill the ring to overflowing before placing the cover slip so as to avoid bubbles.

Ordinarily one does not take time to completely label slides at the time they are made, hence the slides are usually given a number with a grease pencil, this number corresponding to data recorded in an accession book.

The freshly made slides are then placed in a slide box which is kept in a vertical position until the mounting medium has had time to set.

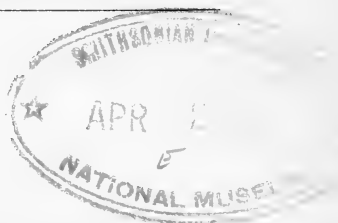


PROCEEDINGS  
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GENERAL NOTES.

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CORRECTIONS OF NAMES OF FOSSIL DECAPOD  
CRUSTACEANS.

Dr. H. B. Stenzel's article on "Middle Eocene and Oligocene Decapod Crustaceans from Texas, Louisiana and Mississippi"<sup>1</sup> was published while my "Fossil Crustacea of the Atlantic and Gulf Coastal Plain"<sup>2</sup> was in press, with the result that several names must be changed.

*Necronectes vaughani* Rathbun is now *N. vicksburgensis* (Stenzel) = *Portunus* (?) *vicksburgensis* Stenzel.

*Callianassa alpha* Rathbun is now *C. zeta* nov.

*C. beta* is *C. eta* nov.

*C. gamma* is *C. theta* nov.

In addition to the above, it is deemed best to place *Plagiolophus bakeri* in the genus *Lobonotus*.

—Mary J. Rathbun.

MAMMALS FROM A NATIVE VILLAGE SITE ON  
KODIAK ISLAND.<sup>3</sup>

During the summer of 1935, Dr. Ales Hrdlicka excavated a large number of mammalian bones in an old native village site on the shore of Uyak Bay, one mile southeast from Larsen's Bay, on the northwestern coast of Kodiak Island, Alaska. The material consists for the most part of bones belonging to red fox (*Vulpes harrimani*), a domestic dog (*Canis familiaris*), and the hair seal (*Phoca richardii*). The harbor porpoise (*Phocaena phocaena*), Dall's porpoise (*Phocoenoides dalli*), fur seal (*Callorhinus alascanus*), sea lion (*Eumetopias jubata*), sea otter (*Enhydra lutris*), river otter (*Lutra canadensis kodiacensis*), and brown bear (*Ursus middendorffi*), judging from the relative numbers of bones, were less frequently taken by the natives. A few skulls or other skeletal parts were identified as belonging to the Kodiak weasel (*Mustela kodiacensis*), meadow mouse (*Microtus kodiacensis*), beaver (*Castor canadensis* subsp.?), caribou (*Rangifer granti*?), white whale (*Delphinapterus leucas*), and striped porpoise (*Lagenorhynchus* sp.).

<sup>1</sup>The American Midland Naturalist, vol. 16, No. 3, pp. 379-400, 1935.

<sup>2</sup>Geological Society of America, Special Papers, No. 2, 1935.

<sup>3</sup>Published by permission of the Secretary of the Smithsonian Institution.

The animals hunted by the original inhabitants of this old village are essentially the same as those sought by natives at a somewhat later date. During the visit of the Billings expedition in 1790, Martin Sauer<sup>4</sup> observed that the natives in the vicinity of the Russian establishment on Kodiak Island were hunting the sea-lion, ursine seal, common seals, sea otter, and porpoises in small leather canoes. Sauer also states that whistling marmots and mice are numerous, but that "foxes, and stone foxes, are scarce since the establishment of the Russians." In view of this statement, it is rather curious that no marmot remains were recognized among the thousands of bones brought to Washington. On the shore of the Alaska Peninsula opposite Kodiak Island, however, whistling marmots (*Marmota caligata caligata*) occur in the mountains near Kanatak on Portage Bay and near Cold Bay. Furthermore, the "stone fox," if by this name Sauer intended to designate *Alopex*, has not been satisfactorily identified, since no bones attributable to any fox other than *Vulpes* were recognized. During the later part of the past century, the arctic fox (*Alopex lagopus*) not infrequently was found as far south as the coast along the northern end of Bristol Bay, but there are no known records for the Shelikof Strait shore. Of the recent records the nearest to Kodiak Island is Igagik on the western shore of the northern end of the Alaska Peninsula. It is also of interest that Sauer states that "bears now and then appear upon the island of Kadiak, swimming across the straits that divide it from Alaska five miles."

—Remington Kellogg.

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<sup>4</sup>Sauer, Martin. 1802. An account of a geographical and astronomical expedition to the northern parts of Russia . . . ; of the whole coast of the Tshutski, to East Cape; and of the islands in the Eastern Ocean, stretching to the American Coast. Performed . . . by Commodore Joseph Billings in the years 1785, etc., to 1794. London, pp. 179-181.

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A NEW GENUS OF SPIDERS IN THE ERIGONEAE.

BY S. C. BISHOP AND C. R. CROSBY.

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In our revision of the Erigoneae we have hitherto been unable to place the three species treated in this paper because of uncertainty as to the identity of *Tmeticus alatus* Emerton. In November, 1934, we were able to study the type of this species in the Canadian National Museum in Ottawa. We then found we already had it from several localities in the United States and Canada under a manuscript name.

**ADUVA**, new genus.

Type, *Tmeticus longisetosus* Emerton.

In this genus we place three species in which the hairs at the base of the paracymbium are greatly lengthened and enlarged. The tibia of the male palpus does not have a long process. The embolic division has a broad tail-piece; the embolus itself is rather short, broad at base and either flattened or pointed at tip.

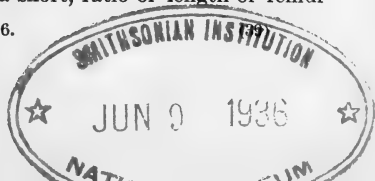
*Aduva alata* Emerton.

*Tmeticus alatus*, Emerton, Rept. Can. Arct. Exp. 1913-18, 3:3H, pl. 1, f. 5-7, 1919.

Male. Length, 1.6 mm. Cephalothorax pale brownish yellow; viewed from above rather broad, the sides evenly rounded on the posterior two-thirds, straight and convergent towards the front, broadly rounded across the front; viewed from the side, gradually ascending behind, then more gently ascending and rounded over the head. Clypeus nearly straight, slightly protruding. No tooth on face of chelicerae. Sternum gray over pale yellow. Endites pale orange-yellow. Legs pale yellow. Abdomen light gray.

Posterior eyes in a very gently procurved line, the median separated by two-thirds the diameter and a little farther from the lateral. Anterior eyes in a slightly procurved line, the median smaller than the lateral, separated by a little less than the radius and from the lateral by the radius.

Femur of palpus nearly straight, patella short, ratio of length of femur



to that of patella as 20 to 6. Tibia longer than patella produced dorsally into a broad quadrate, diagonally truncate lobe bounded mesally by a deep broad, rounded notch mesally from which the margin is thin and depressed. On the base of the paracymbium there are three closely appressed spatulate hairs. Each hair is basally slender, then widened and flattened and ends in a sharp point, the dorsal edge smooth and the ventral finely dentate. The paracymbium is basally rather narrow, it then curves sharply over and the terminal part is thick, smooth, rhombic with rounded angles and has a small, deeply rounded notch on the inner edge. Tail-piece of the embolic division very broad, very deeply concave, the edge of the concavity next to the tegulum strongly upturned, on the opposite side of the concavity the edge is produced into a thin, blade-like process. The embolus is connected with the tail-piece by a rather narrow neck, it is a thin, diagonally truncate process; the duct opens in one corner of this process; it is accompanied by a stout black tooth arising on its lateral side.

Female. Length, 1.8 mm. Very similar to the male in form and color. The epigynum has the posterior margin with a squarish notch in which there is a short median finger-like process.

*Type locality*.—Cockburn Point, Northwest Territory, Canada.

New Hampshire: Mt. Washington, July 1, 1920, 3 ♂ 2 ♀ (Banks).

Vermont: Mt. Mansfield, June 14, 1927, 3 ♂.

New York: Mt. Marcy, August 26, 1930, 4 ♂ 3 ♀; Johns Brook, Mt. Marcy, Aug. 25, 1930, 1 ♂; Mt. MacIntyre, July 25, 1925, 2 ♂ 6 ♀.

Wyoming: Summit of pass west of Buffalo over the Big Horn Mts., July 3, 1933, 1 ♂ 4 ♀.

Saskatchewan: Saskatoon, June 3, 1920, 1 ♂ (Gertsch).

Colorado: Copeland Mt., Rocky Mt. National Park, Aug. 10, 1926, 1 ♂, Alt. 13,000 Ft. (Cleaves).

Alaska: Admiralty Island, June, 1933, 3 ♂ 2 ♀ (Sheppard).

Our specimens were compared with Emerton's types in the Canadian National Museum at Ottawa.

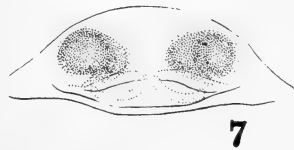
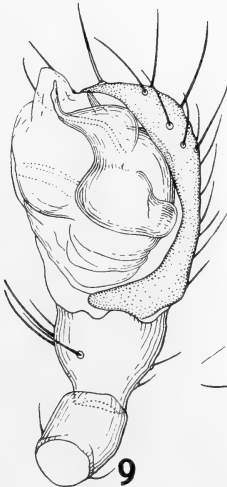
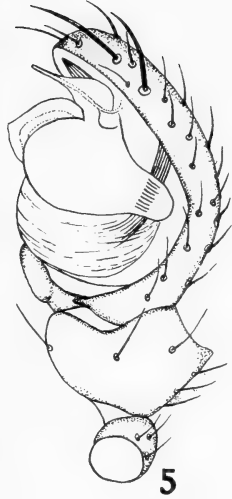
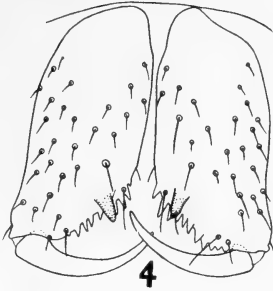
#### *Adwa flaveola* Banks.

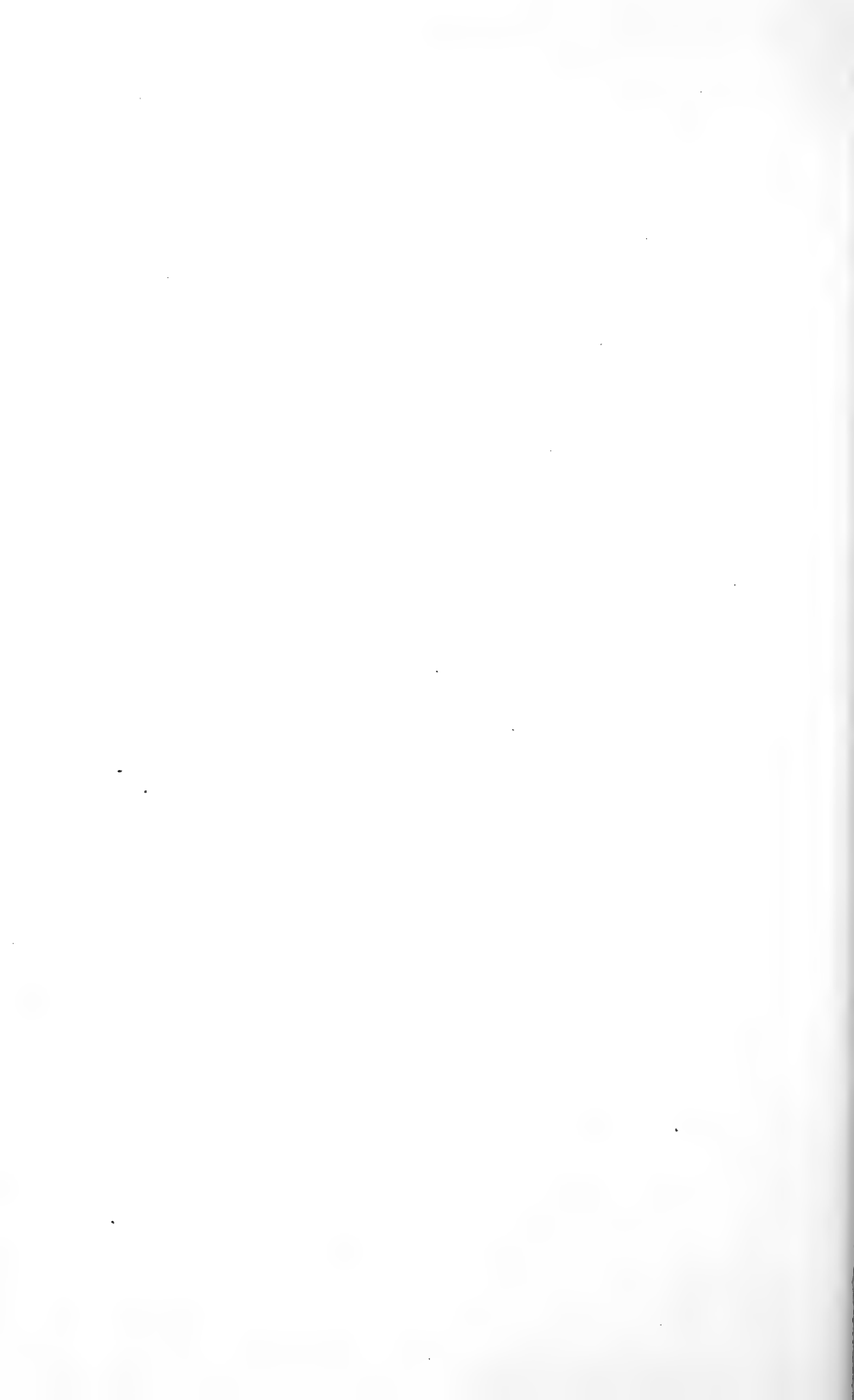
*Tmetiscus flaveolus* Banks. Phila. Acad. Nat. Sci. Proc. 1892, p. 39, pl. 4, f. 15.

*Oedothorax flaveolus* Crosby, Phila. Acad. Nat. Sci. Proc. 1905, p. 311.

*Tmetiscus flaveolus* Emerton, Conn. Acad. Sci. Trans. 14:193, pl. 4, f. 8, 1909.

Male. Length, 1.4 mm. Cephalothorax dusky orange-yellow darker at the margin; viewed from above evenly rounded on the sides, convergent towards the front, rounded in front; viewed from the side steeply ascending on the posterior declivity and then nearly flat on the back. Clypeus slightly convex and slightly protruding. Sternum rather long, triangular, rather broadly produced behind the hind coxae, which are separated by the diameter. Legs and palpi yellowish. A tooth on the face of the chelicera longer than in *longisetosa*. Abdomen dark gray, almost black.





Posterior eyes in a straight line, equal, the median separated by a little less than the diameter and from the lateral by the radius. Anterior eyes in a straight line, the median smaller than the lateral, separated from each other and from the lateral by one-third the diameter. Clypeus a little narrower than the median ocular area.

Femur of palpus strongly curved inward. Patella short, strongly arched above. Ratio of length of femur to that of patella as 17 to 6. Tibia broad, the dorso-lateral margin black, thickened and armed with three triangular teeth, the middle one the longest and incurved toward the cymbium farther than the others. The dorsal tooth is minutely denticulate on the side next to the paracymbium. On the base of the paracymbium are four spines, the two basal ones long and curved, greatly thickened, fusiform and sharp-pointed; the others very short and slender. The two basal spines are shorter than in *longisetosa*. Paracymbium broad, greatly thickened at base and strongly hooked. Bezel high and strongly convex. Tail-piece of the embolic division very large, triangular, the tip rounded and extending over the edge of the tegulum to the cymbium. The embolus is a short, black process rather thick at base, flattened and pointed at apex. It arises under the edge of the cymbium and projects forward. The median apophysis appears as a small black tooth behind the embolus.

Female. Length, 1.5 mm. Similar to the male. The epigynum is a transverse plate broadly rounded behind with the posterior margin narrowly turned up. The receptacles are round and show through the integument at the sides of the epigynum in front.

*Type locality*.—Ithaca, New York.

Massachusetts: Gloucester, Coffins Beach, under straw on the shore, April 20, 1908, ♂ ♀ (Emerton).

New Hampshire: Hanover, 1 ♂ (Banks).

New York: Otto, Oct. 25, 1902, 1 ♂ (Comstock); Geneva, Nov. 14, 1914, ♂, on cabbage in field; Ithaca, Dec. 1 ♂; Nov. 18, 1934, 1 ♂; Sea Cliff, 1 ♂; Orient, June 21, 1934, 1 ♂.

Missouri: Columbia, Nov. 22, 1904, 3 ♂ 1 ♀; May, 1 ♂; Jan., 1905, 3 ♂; March, 1 ♂.

Iowa: Ames, Fall 1933, 2 ♂ (Mills).

Illinois: Augerville, Oct. 30, 1924, 1 ♂ (Rutherford); Salts, Nov. 11, 1925, 3 ♂ 2 ♀; Oct. 11, 1925, 2 ♂ 2 ♀; May 19, 1926, 1 ♂; July 10, 1926, 1 ♂; June 19, 1926, 1 ♂ (Smith).

*Aduva longisetosa* Emerton.

*Tmeticus longisetosus* Emerton, Conn. Acad. Sci. Trans. 6:54, pl. 16, f. 1, 1882.

*Oedothorax longisetosus* Crosby, Phila. Acad. Nat. Sci. Proc. 1905, p. 311.

*Tmeticus longisetosus* Emerton. Conn. Acad. Sci. Trans. 14:192, pl. 4, f. 9, 1909.

Male. Length, 1.5 mm. Cephalothorax dusky orange with dull radiating lines; viewed from above rounded on the sides, convergent toward the front, broadly rounded in front, the eyes not occupying the

whole width of the head; viewed from the side, steeply ascending to the dorsal groove where there is a slight depression, then rounded over the head to the posterior eyes, highest just behind the posterior eyes. Clypeus almost straight and slightly protruding. Sternum dusky orange, darker at the margin, broad and convex, rounded on the sides, convergent behind and produced in a truncate point between the hind coxae which are separated by the diameter. Labium and endites dusky orange. Legs and palpi dusky yellow, a tooth on the face of chelicera. Abdomen dark gray with the usual two light lines beneath.

Posterior eyes in a nearly straight line, equal, the median separated by two-thirds the diameter and a little closer to the lateral. Anterior eyes in a straight line, the median smaller than the lateral, all separated by less than the radius. Clypeus as wide as median ocular area.

Femur of palpus rather long, slender, curved, widened slightly distally. Patella rather short, moderately arched above. Ratio of length of femur to that of patella as 18 to 5. Tibia a little longer than patella, widened distally, the dorsal margin armed with a short blunt tooth, the dorsolateral angle rounded, with a notch on the lateral side. The base of the paracymbium armed with four spines, two of which are very long, curved, and finely serrate towards the tip, the distal one not so much thickened as in *flaveola*, the second one more nearly as in *flaveola* but considerably longer, reaching nearly to the tip of the cymbium. The bezel strongly convex and very high. Tail-piece of the embolic division very large and triangular, the tip extending to the edge of the cymbium. The embolus is very broad at the base, short, flattened, pointed and ends in a short slender style. The median apophysis appears as a short black tooth between the embolus and the edge of the cymbium.

*Type locality.*—New Haven, Connecticut.

Massachusetts: Allston, March 28, 1907, 1 ♂ 1 ♀ (Emerton); Holliston, Nov. 4, 1932, 1 ♂ 1 ♀ (Emerton and Banks).

Illinois: Salts, August 29, 1925, 1 ♂ (V. G. Smith).

Emerton also recorded this species from Manitoba: Daupin.

#### EXPLANATION OF PLATE.

- Fig. 1. *Aduwa alata* ♂, right palpus, ventromesal view.  
 Fig. 2. *Aduwa alata* ♂, right palpus, tibia, dorsolateral view.  
 Fig. 3. *Aduwa alata* ♀, epigynum.  
 Fig. 4. *Aduwa flaveola* ♂, chelicerae, front view.  
 Fig. 5. *Aduwa flaveola* ♂, right palpus, ventromesal view.  
 Fig. 6. *Aduwa flaveola* ♂, right palpus, tibia, dorsolateral view.  
 Fig. 7. *Aduwa flaveola* ♀, epigynum.  
 Fig. 8. *Aduwa longisetosa* ♂, right palpus, dorsolateral view.  
 Fig. 9. *Aduwa longisetosa* ♂, right palpus, ventromesal view.



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NEW AMPHIBIANS AND REPTILES FROM HONDURAS  
IN THE MUSEUM OF COMPARATIVE ZOOLOGY.

BY KARL PATTERSON SCHMIDT.

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In the course of identification of a collection of amphibians and reptiles collected by Mr. Raymond E. Stadelman in Honduras for the Museum of Comparative Zoology, I find no less than ten new forms. I am much indebted to Dr. Thomas Barbour for the privilege of examining this material from a region in which I have been especially interested since 1923, and to Messrs. Arthur Loveridge and Benjamin Shreve for the packing and forwarding of the specimens. It is hoped that a more extended account of this important collection may be incorporated in further reports on the herpetology of Upper Central America; my studies in this region, in collaboration with those of Dr. E. R. Dunn on Lower Central America, have been carried on under the joint auspices of Field Museum of Natural History and the John Simon Guggenheim Memorial Foundation. The new forms include one salamander, three frogs, two lizards, and four snakes.

***Oedipus barbouri*, sp. nov.**

*Type*.—From Portillo Grande, Yoro, Honduras, Museum of Comparative Zoology No. 21247, adult male, collected May 9, 1934, by R. E. Stadelman.

*Diagnosis*.—A small *Oedipus* of normal form with the tail longer than the body; maxilla toothed; nostrils not enlarged; toes free; basal constriction of tail slight; four costal folds between appressed toes.

*Description of type*.—Body slender, tail longer than head and body; length of head to gular fold five times in length of head and body; width of head a little more than six times in the same measurement; limbs reduced; head rounded in outline, as viewed from above; upper jaw scarcely projecting beyond the lower; costal grooves thirteen, four folds between the appressed toes; fingers and toes free, toes 3-2-4-5-1 in order of length;



maxillary teeth present; vomerine teeth nine or ten; an obscure groove from the corner of the eye meets the vertical groove behind the angle of the jaw and continues to the gular fold, outlining an obscure paratid gland; a middorsal and dorsolateral groove; tail only slightly constricted at base; anal lips with papillae; projection of upper lip at naso-labial groove moderate.

Black above, dark gray beneath.

*Measurements.*—Total length, 85 mm.; tail, 49 mm.; head to gular fold, 7 mm.; width of head, 5.8 mm.; arm, 7 mm., leg, 8 mm.

*Notes on paratypes.*—There are five female paratypes, M. C. Z. Nos. 21248–50, and F. M. N. H. Nos. 21866–67, all from the type locality and all, like the type, from bromeliads, and from altitudes between 5000 feet (the type), and 6000 feet. In two of these the dorsal ground color is light and a herringbone pattern of posteriorly directed chevrons is present on the back. No. 21249 measures 86 mm.; tail 48 mm.

*Remarks.*—This species may be the Central American representative of the Mexican *Oedipus chiropterus*. It is well distinguished from that species by the relatively shorter limbs and much better developed first toe.

#### ***Eleutherodactylus stadelmani*, sp. nov.**

*Type.*—From Portillo Grande, Yoro, Honduras, at 4800 feet altitude. Museum of Comparative Zoology No. 21290, adult female, collected May 28, 1934, by Raymond E. Stadelman.

*Diagnosis.*—A medium sized *Eleutherodactylus* with rugose dorsum and smooth belly; closely allied to *E. milesi*, from which it differs in the complete absence of tympanum, less prominent metatarsal tubercles, larger discs on fingers and toes, and a less rugose dorsum.

*Description of type.*—Head as wide as body; snout short, the nostril but little nearer its tip than to the eye; canthus distinct, loreal region sloping; length of eye much more than its distance from the nostril; heels overlapping when the legs are placed at right angles to the body; heel reaching tip of snout when leg is extended along the body; disks of fingers and toes subequal, about twice as wide as the phalanx immediately behind them; the toes bordered by a narrow fold; a trace of web, extending to the first subarticular tubercle of the third toe; inner metatarsal tubercle enlarged, one half the length of the inner toe, outer small; skin of back rugose, more coarsely on the sides, some of the tubercles uniting into glandular elongations; upper surfaces of thighs and tibiae as rough as the back; a glandular fold from the eye over the tympanic region; belly and lower surfaces of thighs perfectly smooth; vomerine teeth in small oblique groups, behind and within the very small choanae; tongue nearly circular, slightly notched behind.

Dark brown above, light beneath, with brown mottling; feet and lips with traces of light crossbars; a light area on each side of the anus on the posterior face of the thighs which are otherwise uniform dark brown.

*Measurements.*—Length from tip of snout to anus, 40 mm.; width of head, 18 mm.; arm, 27 mm.; leg, 69 mm.; tibia, 24.5 mm.

*Notes on Paratypes.*—There are nine additional specimens from Portillo Grande (M. C. Z. Nos. 21292, F. M. N. H. 21862–4) and one from Sta.

Marta, which are in excellent agreement with the type, especially in the complete absence of the tympanum. A male, No. 21292, measures 31 mm. from snout to anus; the snout is brown with a few light specks; there is a subgular median vocal sac with short slit-like openings.

***Hyla stadelmani*, sp. nov.**

*Type*.—From Subirana Valley, 2800 feet altitude, Yoro, Honduras. Museum of Comparative Zoology No. 21310, adult male, collected January 19, 1933, by R. E. Stadelman.

*Diagnosis*.—A *Hyla* of medium size, allied to *Hyla gabbii*, from which it is distinguished by the absence of dorsal pattern and of a nuptial pad on the pollex of the adult male; vomerine tooth patches close together between the choanae; fingers half webbed, toes fully webbed except for the distal phalanx of the fourth toe; tympanum ill-defined, less than half the diameter of the eye; no distinctive color pattern or markings; male with a very large median external vocal sac.

*Description of type*.—Head short, its width greater than the distance from snout to posterior border of tympanum; snout obtuse, interorbital space broader than the upper eyelid; the heels overlap when the legs are placed at right angles to the body; heel reaches nearly to tip of snout; nostril nearer to tip of snout than the eye; canthus rounded; tympanum  $2/5$  the diameter of the eye, wider than its distance from the eye; a strong curved glandular fold over the tympanum, continuous with the lateral skin fold; vomerine teeth in two small closely approximated patches, in line with the choanae, and well separated from them; tongue small, round, slightly notched behind; skin perfectly smooth above, granular beneath and on the lower posterior border of the thighs; fingers webbed to base of distal phalanges; toes webbed to discs except on fourth, which has one phalanx free; a dermal fold on the outer side of the first toe; a well defined tarsal fold; discs of fingers large, equal to the diameter of the tympanum, slightly larger than those of the toes; when the arms are drawn forward the ventral skin is seen to be attached nearly to the elbow; a large median vocal sac, the external skin very much folded and wrinkled, apparently involving the strong pectoral fold; vocal sac openings a long slit on each side of the tongue.

Brown above, light beneath, without color pattern; no markings on the concealed surfaces; a white line on a slightly wrinkled transverse fold above the anus.

*Measurements*.—Length, 41 mm.; width of head, 16 mm.; hind leg, 66 mm.; tibia, 22 mm.

*Notes on paratypes*.—Two male paratypes, M. C. Z. Nos. 21311 and F. M. N. H. 21842, from the type-locality, agree closely with the type. These have an obscure dark bar on mid-tibia.

***Hyla spinipollex*, sp. nov.**

*Type*.—From mountains behind Ceiba, Atlantida, Honduras, Museum of Comparative Zoology No. 21300, adult male, collected by R. E. Stadelman, April 18, 1931.

*Diagnosis*.—A medium sized *Hyla* with slightly tuberculate dorsal

surface and coarsely granulate venter; vomerine teeth prominent, in line with the choanae; fingers moderately, toes fully, webbed; tympanum small but distinct; male with a triangular patch of about fifty very strong nuptial asperities on the middle of the upper surface of the thumb.

*Description of type.*—Head broader than the body, its width equal to the distance from the snout to posterior border of the tympanum; snout short, vertical; heels overlapping; heel reaching to tip of snout; nostril nearer to tip of snout than to eye; canthus well-defined, loreal region nearly vertical; tympanum small, sharply outlined, two-fifths the diameter of the eye; vomerine teeth in two prominent well-separated patches in line with the choanae; a slight fold over the tympanum; tongue rounded, very little free behind; skin sparsely tuberculate above; venter strongly granular; posterior and lower sides of thighs still more coarsely granular; fingers webbed to middle of penultimate phalanx, toes nearly fully webbed, with one phalanx of fourth toe free; disks of fingers moderate, as large as the tympanum, larger than those of the toes; an obscure tarsal fold; a median vocal sac, opening by a pair of slits at the sides of the tongue, the external skin only a little wrinkled; forearm much enlarged; first finger with about fifty strong black equal nuptial asperities in a triangular patch equidistant from the base and tip; a faint suggestion of a row of tubercles on the outer posterior side of the forearm.

Dark grayish brown above, lighter beneath, without markings.

*Measurements.*—Length, 35 mm.; width of head, 12.5 mm.; leg, 59 mm.; tibia, 19 mm.

*Remarks.*—The numerous discrepancies between the present form and *Hyla euthysanota* Kellog, from El Salvador, to which the present specimen was referred by Dunn and Emlen (Proc. Acad. Nat. Sci. Phila., **84**, p. 25, 1932), seem to be ample to warrant distinguishing a new species. The geographic and ecological distribution of the Central American hylas is, however, much in need of clarification.

#### ***Sphaerodactylus dunnii*, sp. nov.**

*Type.*—From Naco River, near Cofradia, Honduras. No. 32199 Museum of Comparative Zoology. Collected August 10, 1931, by R. E. Stadelman.

*Diagnosis.*—A small species of *Sphaerodactylus* with imbricate keeled dorsal scales, unmodified on the mid-dorsal line, a supraciliary spine, and a pattern of narrow transverse light lines. Apparently most nearly allied to *Sphaerodactylus difficilis* of Hispaniola, from which it is at once distinguished by its unique pattern.

*Description of type.*—Head moderate, limbs short, snout acute; dorsal scales keeled, imbricate, 10 in length from snout to middle of eye; ventrals smooth, 8 in same distance; scales on snout flat, keeled, larger than posterior head scales; upper and lower labials 5 on each side; mental truncate, with two slightly enlarged chin shields bordering it between the first lower labials; ear minute, scarcely distinguishable; a superciliary spine on one side, wanting on the other.

A narrow yellowish band across the dark brown back in front of the shoulders extends downward to a latero-ventral line; a second distinct cross-band behind the shoulders, followed by more obscure and more oblique

transverse markings; a median light line extends forward from the first cross-band, forking on the occiput and joining a somewhat broader post-ocular light band; lower surfaces light yellowish brown, the scales dark margined; throat and chin heavily maculate with brown; upper labials light, with brown spots.

*Measurements*.—Body 25 mm., tail reproduced; snout to ear opening 6 mm., width of head 4.5 mm., leg about 8 mm.

*Remarks*.—The type of *dunni* does not agree in any point with Werner's description of *Sphaerodactylus argus* var. *continentalis*, from Honduras. His description is inadequate and contradictory, since he writes of a dorsal pattern of rows of black dots while comparing the specimen to *argus*, which exhibits characteristic rows of light ocellae. The larger scales of *S. dunni* distinguish it at once from *lineolatus*, and its keeled dorsals separate it from *glaucus*. My friend and colleague in Central American studies, Dr. Emmett Reid Dunn, of Haverford College, first called my attention to the species.

***Anolis loveridgei*, sp. nov.**

*Type*.—From Portillo Grande, 4100 feet altitude, Yoro, Honduras. Museum of Comparative Zoology No. 38700, adult male, collected 1934 by R. E. Stadelman.

*Diagnosis*.—An anole with a short, high head, small obtusely keeled ventrals, no enlarged dorsals, four scales between semi-circles, six or more scales between semicircles and occipital, and with frontal scales keeled.

*Description of type*.—Body stout, head large, snout concave in lateral view, short; ear opening small, vertical; hind limb reaching anterior border of eye; tail somewhat compressed, ridged above, without a fin; a sharp canthus, with loreal region slightly concave; twelve loreal scales in a vertical line; infra-orbital semicircle not extending to the canthal scales, almost completely separated from the labials by a row of scales; eight scales between the nasals; frontal ridges indistinguishable; four frontal scales between the supraorbital semicircles; a group of about twelve enlarged keeled supraoculars; three scales between the semicircles and the supraciliaries at the anterior border of the supraocular region, occipital very small, separated from the semicircles by seven scales; twelve upper labials to a point below the center of the eye.

Dorsal scales small, sharply keeled on mid-dorsal region, granular on the sides; the ventrals small but larger than the lateral granules, obtusely keeled on the chest, keels indistinguishable on many scales posteriorly; limbs with keeled scales above and anteriorly, smaller and smooth beneath and posteriorly; forty-three lamellae beneath the fourth toe to the end of the pad, and thirteen beneath the terminal clawed phalanx; dewlap large; no enlarged postanal scales.

General color tawny gray, with black head markings, of which the most conspicuous is a postocular longitudinal black bar. Dewlap yellowish with traces of a purplish darker marking at the base.

*Measurements*.—Total length 330 mm.; tail 219 mm., arm 49 mm., tibia 31.7 mm.; leg 85 mm., head to posterior border of tympanum 30.3 mm., width of head 19.3 mm.

*Notes on paratypes.*—Four specimens in the Museum of Comparative Zoology and two in Field Museum are paratypes of this species; M. C. Z. Nos. 38831–33 and F. M. N. H. No. 21776 are from the Mataderos Mts., at 3400 feet altitude, in the Dept. of Yoro, and M. C. Z. No. 38834 and F. M. N. H. No. 21870 are from the type locality. The larger specimens agree very closely with the type. The single juvenile specimen, No. 38834, has the keels of the ventrals even more obscure, so that at first glance they appear to be smooth. This specimen is colored as follows: General color fawn, with narrow radiating lines about the eye; a dark band from the posterior corner of the eye extends to the shoulder, where it meets the first of four transverse dark bars which curve obliquely backward on the sides; six crossbars on the base of the tail, whose terminal third is black; limbs crossbarred; no color visible on throatfan.

*Remarks.*—This large anole is readily distinguished from *Anolis copei* by its smaller and less sharply keeled ventrals. There seems to be no possibility of identifying it with *Anolis petersii*, the type of which is figured with only one or two scales between the supraorbital semicircles and with much larger scales between the occipital and the semicircles.

#### ***Typhlops stadelmani*, sp. nov.**

*Type.*—From Subirana Valley, 2800 feet altitude, Yoro, Honduras, Museum of Comparative Zoology, No. 38701, collected January 26, 1933, by R. E. Stadelman.

*Diagnosis.*—Allied to *Typhlops tenuis* of the Alta Verapaz highland, but much stockier, the diameter contained into the length 37 times, against 50–62 in *tenuis*, and the scales from rostral to tail spine 347 instead of 430.

*Description of type.*—Snout rounded, prominent; rostral about one-third the width of the head; nostril between two nasals, of which the anterior is in contact with the first and second labials; a preocular, about as large as the ocular, in contact with the second and third labials; eye barely visible; six head scales between the oculars and rostral, slightly larger than the body scales; tail as broad as long, ending in an obtuse spine; scales in eighteen rows throughout the length of the body; 347 scales from the rostral to the tip of the tail.

Uniform pale yellow.

*Measurements.*—Total length, 112 mm.; diameter, 3 mm.

#### ***Sibynophis annulatus hondurensis*, subsp. nov.**

*Type.*—From Portillo Grande, 4100 feet altitude, Yoro, Honduras, Museum of Comparative Zoology No. 38703, adult male, collected May 5, 1934, by R. E. Stadelman.

*Diagnosis.*—In close argument with *Sibynophis annulatus annulatus* in scale characters, but with the pairs of dark crossbars on the anterior part of the body set close together, and without black spots on the scales of the red interspaces.

*Description of type.*—Rostral wider than high, well visible from above; upper head shields normal; parietals extending to the lower postocular; nostrils between two nasals; loreal about as high as long; nine upper labials, the fourth, fifth, and sixth entering the eye; ten lower labials; oculars,

1-2; temporals 1-2-2; dorsal scales in seventeen rows; ventrals, 145, anal divided, caudals, 149.

A white band across the snout, in front of the eyes, rest of head black; five pairs of narrow black cross-bars, separated by gray spaces of about the same width, the first of which is four scales behind the parietals; intervening spaces dark red, the scales clouded, but without black apical spots; the posterior part of the body brownish gray above, with three rows of spots, one on the mid-dorsal line and a pair on the fifth scale rows, underside uniform light, the ends of the ventrals with black spots.

*Measurements*.—Total length, 617 mm., tail, 295 mm.

*Notes on paratypes*.—Two specimens from the Yoro highland, F. M. N. H. No. 21877, male, from Portillo Grande, and M. C. Z. No. 38702, female, from Subirana Valley at 2800 feet, are in excellent agreement with the type, the male with ventrals 142, tail incomplete, the female with 162 ventrals and 127 caudals. In addition, five males, three females, and five specimens of which the heads only are preserved, M. C. Z. Nos. 21201, 21769, 21777, 21797-98, 27564, 32006, 33341, and 19957-61, from various United Fruit Company plantations near Tela, are also to be regarded as paratypes. The lowland specimens agree with those from the Yoro district in the characters of coloration regarded as diagnostic of *hondurensis*, but have somewhat lower ventral and caudal counts; ventrals 128-142, caudals 132-137, in males, 153-156 and 128-132 in females. The largest male and female specimens in this series measure respectively 739 mm., tail 350 mm. and 782 mm., tail 336 mm.

***Erythrolamprus aesculapii impar*, subsp. nov.**

*Type*.—From Mataderos Mts., 3300 feet altitude, Yoro, Honduras, Museum of Comparative Zoology No. 38765, adult female, collected February 22, 1933, by R. E. Stadelman.

*Diagnosis*.—Closely allied to *Erythrolamprus aesculapii*, but the black bars very imperfectly separated into pairs, a sharply defined immaculate reddish crossband across the parietals, and the scales of the red zones very heavily spotted with black.

*Description of type*.—Body stout, tail short, head little wider than body, upper head shields normal; rostral a little wider than high, just visible from above; loreal a little higher than long; upper labials 7, lower labials 9; oculars 1-2; temporals 1-3 and 1-2; dorsal scales 15-15-15; ventrals 176; anal divided; caudals 46.

Top of head black to posterior borders of supraoculars and frontal, with a light spot on the prefrontal suture; first four labials, nasal, loreal, and preoculars dark bordered; post-oculars with dark anterior edges; a sharply defined nuchal black band, just behind the parietals, six scales long; the succeeding red one is eleven scales long, each scale with a black spot, the spots largest above, reduced on the sides; fourteen black rings follow, which after the fourth tend to be offset on the mid-dorsal and mid-ventral lines; each of these black zones (except the nuchal), when attentively examined, is seen to have more or less yellow spotting in a vertical line at the middle.

*Measurements*.—Total length, 638 mm.; tail, 85 mm.

*Notes on paratype*.—A single paratype, F. M. N. H. No. 21830 from

La Libertad, Comayagua, Honduras, collected June 30, 1933, by J. B. Edwards, agrees in detail with the type.

***Trimeresurus lansbergii annectens*, subsp. nov.**

*Type*.—From Subirana Valley, 2800 feet altitude, Yoro, Honduras. Museum of Comparative Zoology No. 38783, adult female, collected February 18, 1933, by R. E. Stadelman.

*Diagnosis*.—Intermediate in scale count between *Trimeresurus lansbergii lansbergii* and *Trimeresurus lansbergii ophryomegas*, nearest the latter in having four canthal scales.

*Description of type*.—Habitus of *Trimeresurus lansbergii ophryomegas*, snout not at all turned up in front; dorsal scales 26–25–19; four canthal scales on each side; a long subocular separated from the labials by two rows of scales; preoculars 2, post-oculars 4–3; a group of small scales between the posterior nasal and the scale forming the anterior border of the pit; six scales between the supraoculars; upper head scales sharply keeled, three pairs of chin shields; upper labials 12; ventrals 165, anal entire, 38 subcaudals, undivided.

A narrow white mid-dorsal line from the nuchal region, the whole length of the body; more or less alternate dark brown blotches, with light outlines, on a grayish brown ground color, on each side of the line; some of these are partly divided, the maximum count of spots being 54; ventral surfaces light, more and more heavily marked with black posteriorly; scales of first row black, tipped or outlined with white; tip of tail grayish brown above, yellow beneath; an obscure dark mark from the eye to the angle of the mouth; three sharply defined white spots on the lower labial border, the posterior a narrow white line extended to the gulars.

*Measurements*.—Length, 527 mm.; tail, 60 mm.

*Notes on paratypes*.—In two additional juvenile specimens from the type locality M. C. Z. No. 38782 and F. M. N. H. 21797, the ventrals are respectively 157 and 160, the caudals 43 and 41; the coloration is somewhat more vivid, and the white spots on the lower labials are seen to correspond with similar marks on the upper lip.

*Remarks*.—The arrangement of the forms allied to *T. lansbergii* proposed by Amaral (Bull. Antiv. Inst. Amer., **1**, p. 22, 1927), leaves two widely isolated populations of *lansbergii*, one in upper central America, the other in the Santa Marta region in Colombia; and leaves the very distinct *T. ophryomegas* of the Pacific side of Central America and the long-snouted *T. nasutus* of the more humid Atlantic side as distinct species. The scale counts of the small series of snakes allied to these species discovered by Mr. Stadelman are intermediate between those of both populations of *T. lansbergii* and those of *T. ophryomegas* in Amaral's tables; and the description of this intermediate form seems to warrant the trinomial designation of the several forms. Much additional material is required to clarify the questions of subspecific arrangement and distribution thus reopened.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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DESCRIPTION OF A NEW SONORAN SNAKE OF THE  
GENUS *FICIMIA*, WITH NOTES ON OTHER  
MEXICAN SPECIES.

BY EDWARD H. TAYLOR.

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Our knowledge of the various species of the genus *Ficimia* is in a rather confused state due largely to the dearth of these small subterranean snakes in collections. No sufficient series is available from one locality to permit the determination of the extent of variation in a given species at a given place. I am convinced that some reported specimens have been placed incorrectly under *Ficimia olivacea* Gray, and I believe that Boulenger<sup>1</sup> has erred in placing *F. ornata* Bocourt, *F. publia* Cope and *Amblymetopon variegatum* Günther as synonyms of *Ficimia olivacea* Gray.

In this small, slow-moving, subterranean genus one must expect a tendency for the formation of species and subspecies occupying relatively limited areas; conditions that obtain in other subterranean genera as, for example, *Tantilla*, *Micrurus*, and *Calamaria*.

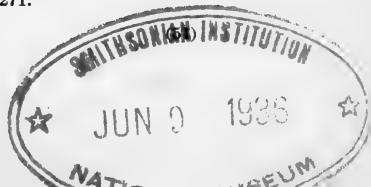
***Ficimia desertorum* sp. nov.**

*Type*.—No. 385. Collected about 12 kilometers northwest of Guaymas, Sonora, July 6, 1934, by E. H. Taylor.

*Diagnosis*.—Snout with a transverse cutting edge strongly recurved; scales in seventeen rows, with apical pits; the rostral separated from the frontal by prefrontals only; the internasals wanting; differing from the other members of the genus in having a well developed loreal, and the anal scale single. A series of black dorsal blotches separated by cream-white spots dorsally and magenta areas laterally.

*Description of the holotype*.—Rostral large, with a sharp, transverse edge, somewhat upturned, leaving a hollow depression above; rostral widely separated from the frontal by a pair of large prefrontals; the common suture of these scales is three-fourths the length of the scales, the scale

<sup>1</sup> Cat. Snakes British Museum, 2d Ed., Vol. II, 1894, p. 271.



nearly as wide as long; frontonasals small, widely separated by the rostral, their posterior edges not extending back as far as the rostral; frontal large, its anterior angle approaching a straight line, the anterior part as wide as posterior, the posterior angle approaching a right angle; supraoculars about the same width anteriorly as posteriorly; parietals large, their length about one-fourth to one-fifth greater than that of frontal, their width equal to the length of the frontal. Character of the nasal not certainly determinable but probably fused with the first labial; a large, well defined loreal; two preoculars; two-three postoculars; temporals 1 + 3, 1 + 2; eye moderate; pupil vertically oval; seven upper labials, the sixth largest, the seventh smallest; the third and fourth labials enter orbit.

Mental small; first pair of lower labials in contact; two pairs of chin-shields, first pair large, broadly in contact, second pair small, separated by a single scale; these separated from the first wide ventral by three pairs of scales and four narrow ventrals; 23 scale rows around the anterior part of the neck; 17, 2 centimeters back of head; 17 at anus; anal single; four scales bound anus laterally; 26 paired subcaudals, and a terminal conical scale; ventrals 131. Scales all with a single apical pit. Total length 275; tail 35.

*Color in life.*—Dorsal surface with a series of dark bars, the median part of each quadrangular and of solid color, while on the sides, the centers of the scales are paper white and their edges black, the dark color involving fewer scale rows than on the dorsal part; thirty-four blotches on body, eight on the tail, the anterior blotches involving about four and one-half scale rows, those of the posterior part involving two and one-half or less; the dorsal areas between the blotches are cream white, while on sides the color is dull magenta; lower on side the color is yellowish; the entire ventral surface nearly white. The two anterior spots on the head and neck are united, and the snout, sides of head, and temporal region are yellowish.

*Remarks.*—The species is apparently most closely related to *Ficimia cana* (Cope), and *Ficimia quadrangularis* Günther, agreeing with each in having the rostral separated from the frontal by the prefrontals instead of being directly in contact as in the other members of the genus, but differing from both in having a large loreal and an undivided anal scale, characters which would seem to warrant generic definition. However, it seems wiser to redefine *Ficimia* to include the form, rather than erect a new genus, since the relationship is very obviously with the group of species now associated under that generic name.

The dorsal markings show some resemblance to *F. quadrangularis* Günther, a species known from a single specimen collected 700 kilometers to the south of the type locality of the species here described.

*Ficimia olivacea* Gray.

1849. *Ficimia olivacea* Gray, Cat. Snakes British Museum, 1849, p. 80. (Type description; type locality Mexico, Hugo Finck Coll. 2 types ♂. Normally no internasals; on one side one is present); Cope, Proceedings Acad. Nat. Sci., Philadelphia, 1866, p. 132 (Orizaba, Vera Cruz; Sumichrast Coll.); Bocourt, Mission Scientifique au Mexique et dans l'Amerique Central, Reptiles, liv. 9,

1883, p. 570, pl. XXXV, fig. 11; Garman, Mem. Mus. Comp. Zool., VIII, no. 3, 1883, p. 84; Günther, Biologia Centrali-Americana, Rept. and Batr., 1893 (part), p. 98, pl. XXXV, fig. B (entire dorsal view, and lateral; dorsal and ventral views of head); ? Stuart, Univ. Michigan Mus. Zool. Publ. no. 29, Oct. 1, 1935 (La Libertad, Peten, Guatemala).

1862. *Ficimia elaiocroma* Jan, Arch. Zool. Anat. Phys., II, 1862, p. 58 (ventrals 155, subcaudals 34; no internasals).

A specimen (No. 2194) was collected at Tierra Colorado, Vera Cruz, July 14, 1932, by E. H. Taylor and Hobart M. Smith. It presents the following characteristics:

Rostral sharp-edged, strongly recurved, with only a slight depression on the dorsal anterior surface of the scale, the sides parallel for the greater part of its length, broadly in contact with the frontal; prefrontals large, bordering the second labial, widely separated from each other by the rostral; nasal at least partly divided, the anterior portion fused with the first labial; frontal distinctly wider than long (4.7 wide x 4.3 mm. long); supra-ocular somewhat wider posteriorly than anteriorly; a large preocular; two postoculars, the lower very small; parietals 4.1 long x 3.5 mm. wide. 7 upper labials, third and fourth entering orbit; sixth largest, seventh not especially small; temporals 1 + 2; 7 lower labials, three touching first pair of chinshields; second pair of chinshields very small, separated by two scales, and touching two labials; three pairs of small scales separate these from the ventrals.

Scales smooth, in 23 rows about anterior part of neck; 19 two centimeters back of head; at three centimeters, 17 rows which continue to anus; 142 ventrals; anal divided; 38 subcaudals; apical pits present.

*Color*.—Above nearly uniform olive (olive-brown in alcohol); ventral surfaces yellowish (dirty white in alcohol).

*Ficimia publia* Cope.

1866. *Ficimia publia* Cope, Proc. Acad. Nat. Sci., Philadelphia, May 1866, p. 126 (Type description; type locality, Mexico [Commission Collection]); Amer. Nat., 1884, p. 163; Günther, Biologia Centrali-Americana, Reptiles and Batrachians, 1893, p. 98.

1894. *Ficimia olivacea* Boulenger (part), Cat. Snakes British Museum, II, 1894, p. 271; Bocourt, Mission Scientifique au Mexique et dans l'Amérique Central, Reptilia, liv. 9, 1883, p. 570, pl. XXXV, fig. 11.

This form is characterized by the presence of internasals. Yellowish or pale brown above, with dark brown transverse spots or bars; sides with dark brown spots; head with symmetrical markings.

Ventrals vary between 138 and 142; subcaudals 36 and 37.

Localities known: Cuernavaca, Morelos; Yucatan.

*Ficimia variegata* Günther.

1858. *Ficimia variegata* Günther, Cat. Col. Snakes Brit Mus., 1858, p. 7-8 (Type description; type locality, Mexico; M. Salle, Coll.).
1870. ? *Ficimia olivacea* Steindachner, Sitzb. Akad. Wiss., LXI, Abt. 1, May Heft, Jahrg. 1870, p. 19 (Tustla).
1894. *Ficimia olivacea* Boulenger (part), Cat. Snakes British Mus. II, 1894, p. 272.

A specimen of this rare form was collected by Mr. John A. Rickard at Minatitlan, Vera Cruz, July, 1934. It presents the following characters:

Rostral with a sharp recurved edge, the dorsal part with a marked shallow depression; the portion of the scale visible above is much longer than wide (5.1 x 4 mm.) and *distinctly longer than the frontal*; the suture formed with the latter scale is as wide as the rostral at its posterior part; internasals wanting; prefrontals large, widely separated by the rostral, in contact with the second labial; frontal short, slightly broader than long (4.5 x 4.4 mm.); parietals slightly longer than wide (4.7 x 4.5 mm.); nostril between two nasals, the anterior fused with the first labial; one large preocular; an elongate supraocular, wider posteriorly than anteriorly; one very large postocular, seven upper labials, the sixth (and largest) fused with the anterior temporal on the right side but not on left; temporals normally 1+2; third and fourth labials enter orbit.

Seven lower labials, fourth very large, first pair in contact; two pairs of chinshields, the anterior large, touching three labials; the second pair small, separated by one scale, touching a single labial; these separated from first widened ventral by three pairs of small scales and three narrow ventrals; 22 scales on anterior part of neck; 17, 2 centimeters back of head; 17, to one centimeter in front of anus; ventrals 155; anal divided; 34 paired and one conical subcaudal; at least a part of the scales show a very small apical pit. Length 450 mm.; tail 61; width of head 11 mm.; width of body 15 mm.; length of head 11 mm.

*Color in formalin.*—Above, with a series of dark, irregular blotches, about 32 on body, 9 on tail; intervening areas narrower, of a light tan color, all or part of the scales showing darker and lighter areas; on the sides the bars are broken up into smaller angular spots involving one to three scales, some reaching to edge of ventrals; below dirty whitish; a small dark spot on neck bordering parietals; this connects with two elongate spots on the parietals only partially separated; a light spot on frontal surrounded by black; a black elongate blotch on the rostral; a dark spot below eye; remainder of head light olive-brown.

*Remarks.*—It seems likely that the *Ficimia olivacea* of Steindachner (*non* Gray) belongs with this form. Although he does not number the dorsal blotches, one judges by the drawing that the blotches are much more numerous than in the present specimen. The Steindachner specimens are from "Tustla" (probably Tuxla Gutierrez, Chiapas).

PROCEEDINGS  
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THE REDISCOVERY OF THE LIZARD *EUMECES*  
*ALTAMIRANI* (DUGÈS) WITH NOTES ON TWO  
OTHER MEXICAN SPECIES OF THE GENUS.

BY EDWARD H. TAYLOR.

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Among the herpetological rarities collected by Hobart Muir Smith in southwestern Mexico during the summer of 1935, is a specimen of a skink, *Eumeces altamirani*, originally described by Alfredo Dugès in 1891. The type, which was collected in "las regiones cálidas del Estado de Michoacán" Mexico by Sr. Dr. Fernando Altamirano, has remained the only known specimen. Smith's specimen was obtained at Hacienda El Sabino, Michoacán, southwest of Uruapan, but on the edge of the plateau rather than in the "regiones cálidas" at lower elevation.

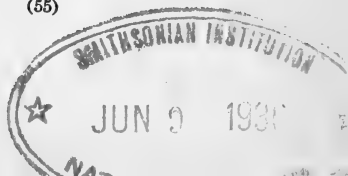
In 1932 I examined, very superficially, the type which is now in the "Alfredo Dugès Museum" at Guanajuato, Guanajuato.<sup>1</sup> Since data published by Dugès in the type description<sup>2</sup> is very incomplete and the description is not generally accessible, I append a more detailed description of this very rare form.

*Description of species.*—From no. 3424 (EHT-HS) from El Sabino, Michoacán, Mexico.

Rostral much broader than high, the part visible above about one-third area of the frontonasal; supranasals moderate, forming a suture somewhat less than half their length; frontonasal moderately large, touching frontal narrowly, broadly in contact with the anterior loreal, the sutures with the prefrontals longest; frontal relatively narrow, somewhat shield-shape, the sides equally concave, as wide posteriorly as anteriorly, the scale divided (abnormally) by a transverse suture; frontoparietals quadrangular, in contact medially by a narrow margin; interparietal of about same area as

<sup>1</sup> See comments Copeia, July 20, 1933, no. 2, p. 97.

<sup>2</sup> *Eumeces altamirani* A. Dug. La Naturelle, Ser. 2, Vol. 1, pp. 485-486, pl. XXXII, figs. 1-6 and a hand-colored drawing of dorsal surface which is unnumbered.



single frontoparietal; parietals diagonal, narrow, about twice as long as wide, enclosing the interparietal; nuchals five-four, all very broad.

Nasal small, at least partially divided; the ventral suture from nostril reaches rostral; anterior part generally triangular, the posterior part merely a rim about nostril; postnasal relatively very large, at least half the area of entire nasal; anterior loreal much higher than wide, touching second and third labials, as large as the posterior loreal; latter not twice as long as high; three presuboculars; five postsuboculars, the three lower very small; four supraoculars, three touching frontal; eight superciliaries, first somewhat larger than last; upper palpebral scales in contact with supraoculars save one or two anteriorly, which are separated by one or two granular scales; lower eyelid with three enlarged scutes which are separated from the subocular by two or three rows of granules (on left side these scales appear to be united into a single large scale or disk, probably abnormally); primary temporal rather small, in contact with the lower secondary; latter very large, larger than the last labial or the upper secondary temporal, subtriangular; upper secondary temporal elongate, narrow, somewhat wider posteriorly; tertiary temporal small, narrow, separated from the first nuchal by a scale which might be interpreted as the upper part of a divided tertiary; eight upper labials, the fifth smallest, eighth largest, the latter separated from the auricular lobules by two superimposed pairs of postlabial scales; three auricular lobules, the upper largest, all rather low; auricular opening high and narrow, surrounded by about 22 scales.

Mental with a labial border distinctly longer than rostral; postmental undivided; first pair of chinshields narrowly separated anteriorly; second pair much the largest, narrowly separated, but the first two pairs enclose a quadrangular scale; third pair, separated by three scales, fan-shaped, the inner and posterior border forming a continuous curve; a pair of postgenials, the inner narrow, larger than outer; seven lower labials.

Scales from parietals to above anus, are as follows: 4-5 nuchals, 7 paired but widened body scales, followed by three fused single scales; then follow 2 paired, and 44 widened scales, making a total of 69 scales. Behind this point are three widened scales, after which the median scales are paired; a pair of somewhat enlarged preanal scales which overlap the adjoining scales bordering anus; these adjoining scales in turn overlap the outer scale bordering anus; 85 subcaudal scales, the first separated from the anus by three rows of small scales.

Twenty-three scale rows around narrow part of neck; 19 scales around middle of body; 11 scales around tail at base; lateral postanal scale not strongly differentiated, apparently; a group of small scales in axilla and two or three series of small scales behind the hind limb insertion. Terminal lamellæ of toes tightly bound about base of claw; lamellar formula of fingers and toes:

$$\begin{array}{cccccccccc} 5 & 9 & 10 & 10 & 6 & 5 & 9 & 13 & 14 & 9 \\ \hline 5 & 8 & 10 & 10 & 6 & 5 & 9 & 12 & 15 & 10 \end{array}$$

Palm covered with nearly equal-sized scales; a small inconspicuous wrist

tubercle; two padlike tubercles on the heel, the inner the larger; the lamellar scales continue down from the base of first and fifth toes to these tubercles in unbroken series, the last three on each side not counted in the above formula.

*Color* (in alcohol, freshly preserved).—Light brown on head and back, the median widened scale series slightly darker than the two adjoining rows; each of the outer rows has an irregular series of darker dots on every other, or every third scale, forming rows; the median scale row has two such rows of dots; a blackish brown stripe extends from nostril, through eye to groin, involving the third lateral row entirely and parts of the second and fourth rows; the fifth and sixth rows are olive-brown; under surface of throat, and abdomen with a very light wash of tan, appearing whitish where scales are shed; pads on heel, and small wrist tubercle, white; labials black and light olive, the black either forming spots or a rim about the upper or posterior part of the labials; underside of tail distinctly darker than abdomen, but lacking spots.

*Measurements*.—Snout to vent, 53 mm.; width of head, 8 mm.; length snout to first nuchal, 10 mm.; foreleg, 11.5 mm.; hind leg, 16.2 mm.; tail, 76 mm.; adpressed limbs fail to touch by 4 mm.

*Remarks*.—Field book notes taken by Smith record the following: "*Eumeces altamirani* was found under a rock in a small rock ledge in the middle of a rice field. Water surrounded the spot, but was not near enough to soak the ground about the ledge. Another very large specimen, three times as robust and about twice as long was discovered under an adjacent rock, but it escaped into a crack in the ledge. No others were seen although many rocks were turned."

*Eumeces altamirani* belongs to the *Schwartzei* group of the genus, which includes *E. schwartzei* and *E. managuae*, two lowland forms which occupy territory in southeastern Mexico and Central America. All are characterized by broadened medial scales on the back. Dugès proposed a new generic name *Platypholis* (preoccupied) for this form. He states—"creo que si no hay lugar de establecer un género especial para el *Eumeces altamirani*, a lo menos se le debe conservar con justicia el nombre específico que le impongo; pero si se creyese conveniente formarlo, se le puede llamar *Platypholis*."

I am of the opinion that a different generic designation for the three species mentioned above is unwarranted.

*Eumeces copei* Taylor.

In a small collection of reptiles made by Mr. John Rickards of Mexico City, I find a single immature specimen of this species which agrees with the type in all pertinent characters, save that the dark lines on the back are obsolete or have, at this age, not developed. The specimen was captured Aug. 1931, at Tenancingo, Mexico.

*Eumeces callicephalus* Bocourt.

Three specimens of this rare Mexican species (nos. 2133, 2794, 2794a) were collected by Hobart M. Smith, June 11 and June 29, 1935, near

Magdalena, Jalisco. As the type locality is Guanajuato the specimens are well within the expected range. The color markings agree well with the type description.

Scale rows about the body are 28, 28, and 30.

All agree in the presence of a postnasal, a divided postmental, prefrontals in contact, parietals enclosing the interparietal, two pairs of nuchals (one 2-3); 7 upper labials, the sixth and seventh subequal; primary temporal with an area as large as the last labial, and only a third smaller than the upper secondary; a single large postlabial; the subcaudals not or but slightly enlarged. The two lines on the head unite on the nuchals and continue back as a dim medial stripe for a short distance; a black-brown lateral stripe. Tail rather bluish.

Adpressed limbs separated by two millimeters in the two larger forms; they touch in the smaller. Scales from parietals to above anus 58 in all; subcaudals in 2794a, 95. The postgenial is fused with its narrow, elongate, adjoining scale on one side in each of two specimens.

Snout to vent measurements 57, 59 and 46 mm.



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NEW GECKOS OF THE GENUS *HEMIDACTYLUS* FROM  
ZANZIBAR AND MANDA ISLANDS.

BY ARTHUR LOVERIDGE.

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The two geckos described in this paper have been the subject of repeated study during the past two years without their characteristics being found to conform with any known African species. Much as I dislike describing new species from single individuals, I feel satisfied that these geckos represent unrecognized forms.

Both have been submitted to Mr. H. W. Parker, who recently (1932, Proc. Zool. Soc. London, p. 357) produced so useful a key to the northeast African members of the genus. It is with much pleasure that I associate Mr. Parker's name with the first specimen which on two occasions in the last five years he has compared with various types in the British Museum Collection. While there is no doubt as to this gecko having come from Zanzibar, where Mr. Cooke made extensive collections during an expedition on behalf of the Museum of Comparative Zoölogy, the possibility of its having been imported from northeast Africa as a result of the extensive dhow trade should not be overlooked.

The second gecko was collected on Manda Island near Lamu Island off the coast of Kenya Colony, during the course of an expedition under the auspices of the John Simon Guggenheim Memorial Foundation.

***Hemidactylus parkeri*, sp. nov.**

*Holotype*.—Museum of Comparative Zoölogy, No. 22976. A ♂ from Zanzibar Island, collected by Caleb Cooke, 1862.

*Diagnosis*.—A small species with rather feebly keeled, subtrihedral tubercles extending from the back, where they are arranged in from 14 to 16 longitudinal series, on to the occiput; anterior chin shields in contact behind the symphysial; claws extending far beyond the digital expansion 5 lamellae under the 1st (inner) toe, 8 under the 3rd (median) toe, 8 under the 5th (outer) toe; tail above with flat, almost smooth, nail-like tubercles arranged in 5 longitudinal series. Pattern of dark brown spots, most



numerous on nape, tending to form transverse bars on base of tail; a streak from nostril, through eye, to side of neck.

*Description.*—Head oviform; distance between anterior border of orbit and tip of snout equal to the distance between the posterior border of orbit and that of the ear; eye slightly shorter than its distance from the nostril; forehead only very slightly concave; ear-opening large, laterally compressed. Body and limbs moderate; digits rather long, well dilated, with long terminal phalanges, the claws extending far beyond the digital expansion; subdigital lamellae not extending on to the soles of the feet; 6, 6, 7, 7, and 7 beneath the first to fifth fingers, respectively, and 5, 7, 8, 9, and 8 beneath the first to fifth toes. Head with juxtaposed granules, largest on the loreal region; rostral quadrangular, twice as broad as high, with a median cleft above; nostril pierced between the rostral and three nasals, the uppermost of which is separated from its fellow by a single granule; 9 upper and 7 lower labials; symphyial pentagonal, scarcely twice as long as an adjacent labial; 2 pairs of chin-shields, the inner broadly in contact behind the symphyial. Above covered with uniform small granules and scattered, rather feebly keeled, subtriangular tubercles arranged in from 14 to 16 longitudinal series on the dorsum, about 35 transverse series between base of tail and back of head. Below with small cycloid, imbricate scales, forming about 30 longitudinal rows at midbody, a subtriangular area of much enlarged scales in front of the anus posterior to 6 preanal pores. Tail tapering, rounded above, flattened beneath; above with flat, almost smooth, nail-like tubercles arranged in 5 longitudinal series; below, a median series of enlarged plates flanked by small flat scales.

*Coloration in alcohol.*—Faded. Above, drab with a series of dark brown spots and dashes arranged in longitudinal lines on the nape where they are most numerous, they tend to form transverse bars on base of tail; a streak from the nostril, through the eye, to the side of the neck. Below, uniformly white.

*Measurements.*—♂. Snout to anus 36 mm.; tail 36 mm., allowing for slightly injured tip; head 10 mm., breadth of head 7 mm.; fore limb 12.5 mm.; hind limb 16 mm.

*Affinities.*—Most nearly related to *H. citernii* Boulenger from Rahanium district, Italian Somaliland. Mr. H. W. Parker has compared it with the type, and writes: "it seems to agree fairly well except for the size of the enlarged dorsal tubercles which are much smaller in your No. 22976. They seem to stand to one another in much the same relation as *H. brookii* to *H. mabouia*."

#### **Hemidactylus mandanus, sp. nov.**

*Holotype.*—Museum of Comparative Zoölogy, No. 39995. An adult ♀ from Kitau, Manda Island, near Lamu Island, Kenya Colony, collected by Arthur Loveridge, May 15, 1934.

*Diagnosis.*—A small species with prominent, though rather low, striated tubercles extending from the back, where they are arranged in 10 longitudinal series, on to the occiput; anterior chin shields in contact behind the symphyial; 4 lamellae under the 1st (inner) toe, 6 under the 3rd (median)

toe, 7 under the 5th (outer) toe; tail above with high, conical, spike-like tubercles arranged in 6 longitudinal series widely separated both transversely and longitudinally. Pattern of longitudinal bands, not crossbars.

*Description.* Head oviform; distance between anterior border of orbit and tip of snout slightly greater than the distance between posterior border of orbit and that of the ear; eye slightly shorter than its distance from the nostril; forehead slightly concave; ear-opening small, circular. Body and limbs moderate; digits moderate, well dilated, with long terminal phalanges, the claws extending far beyond the digital expansion; subdigital lamellae not extending on to the soles of the feet; 4, 5, 6, 6, and 6 lamellae beneath the first to fifth fingers, respectively, and 4, 4, 4, 7, and 7 beneath the first to fifth toes. Head with juxtaposed granules, largest on the snout; rostral quadrangular, twice as broad as high, with a median cleft above; nostril pierced between the rostral and three nasals, the supranasal much the largest, separated from its fellow by a single granule; 9 upper and 8–9 lower labials; symphyseal pentagonal, twice as long as an adjacent labial; 2 pairs of chin shields, the inner broadly in contact behind the symphyseal. Above covered with uniform small granules, and conspicuous, though rather low, striated tubercles arranged in 10 longitudinal series on the dorsum, about 30 transverse series between base of tail and back of head. Below with small cycloid, imbricate scales, forming 30 longitudinal rows at mid-body, a triangular area of much enlarged scales in front of the anus. Tail tapering, rounded above, flattened beneath; numerous high, conical, spike-like tubercles arranged in 6 longitudinal series above, having a semiannulate appearance; below a median series of enlarged plates flanked by granules.

*Coloration in alcohol.*—Above pinkish buff with five dark brown, longitudinal bands from occiput to base of tail, the lower lateral band continued forward through the lower part of the eye to the nostril. Below, uniformly white.

*Measurements.*—♀. Snout to anus 37 mm.; tail 30 mm., but the tip is regenerated, the regenerated portion lacking the enlarged plates below; head 10 mm., breadth of head 7.5 mm.; fore limb 11 mm.; hind limb 12 mm.

*Affinities.*—Most nearly related to *H. puccionii* Calabresi from Obbia, Italian Somaliland, from which it differs in most of the characters cited in the diagnosis.



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NEW TREE SNAKES OF THE GENERA THRASOPS  
AND DENDRASPIIS FROM KENYA COLONY.

BY ARTHUR LOVERIDGE.

As a result of investigations into the rain-forest fauna of East Africa, sponsored by the John Simon Guggenheim Memorial Foundation, a careful study of large series of the western *Thrasops jacksonii* and *Dendraspis jamesoni* show that the eastern forms may be differentiated. In so far as the colubrine *Thrasops* is concerned, as much was hinted at over a decade ago by my friend Mr. K. P. Schmidt, with whose name I have much pleasure in associating the new race which may be called:

***Thrasops jacksonii schmidti*, subsp. nov.**

*Thrasops rothschildi* Lönnberg (not of Mocquard), 1911, Svenska. Vetensk.-Akad. Handl., 47, No. 6, p. 22, fig. 4.

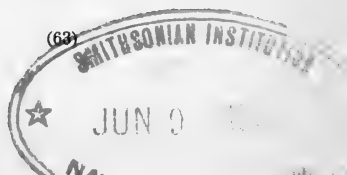
*Rhamnophis jacksonii* Loveridge (not of Günther), 1923, Proc. Zool. Soc. London, p. 879.

As suggested by K. P. Schmidt (1923, Bull. Amer. Mus. Nat. Hist., 49, p. 87) after whom I have the pleasure of naming this new race, *rothschildi* Mocquard is a synonym of *T. j. jacksonii* Günther, the evidence for which, based on an extensive series recently collected in Uganda and western Kenya, will shortly be published.

Schmidt further suggested that if *rothschildi* did prove to be synonymous with *jacksonii*, then the snakes from Meru figured by Lönnberg (*loc. cit. supra*) might "represent a distinct, though closely allied, form." In this assumption, Schmidt is undoubtedly correct, the snakes from the forest outlyer in the extreme east of the transcontinental range of this arboreal species have fewer ventrals and a lower average of midbody scale-rows.

*Type*.—Museum of Comparative Zoölogy, No. 9276, an adult ♂ from Meru Forest, northeast of Mount Kenya, Kenya Colony, collected by Dr. Glover M. Allen, August 21-26, 1909.

*Paratypes*.—Royal Swedish Museum, the two specimens from Meru Boma, figured by Lönnberg (*loc. cit. supra*), collected by the Swedish Zoological Expedition of 1911; also the Coryndon Memorial Museum, Nairobi, specimen, mentioned by Loveridge (*loc. cit. supra*), from Muthaiga, near Nairobi, collected by A. J. Klein, 1919.



*Diagnosis.*—Ventrals 172–178; midbody scale rows constantly  
 17<sup>1</sup> (4 specimens) ..... *T. j. schmidti*  
 Ventrals 187–211; midbody scale-rows normally  
 19, rarely 17 or 21 (37 specimens)..... *T. j. jacksonii*

*Description.*—Midbody scale-rows 17; ventrals 172; anal divided; subcaudals 142; labials 8, the 4th and 5th entering the orbit; preocular 1; postoculars 3; temporals 1 + 1.

Above, tan, each scale edged with black. Below, cream on the throat shading to light gray beneath the tail; a dusky median line along the whole length of the underside of the tail.

Total length 1065 (700 + 365) mm.

*Variation.*—Scales 17; ventrals 172–178; subcaudals 140–144. The wholly black, probably female, paratype from Muthaiga, is not only the largest of the race as it measures 2255 (1671 + 584) mm., but exceeds in length all recorded examples of the typical form.

#### ***Dendraspis jamesoni kaimosae*, subsp. nov.**

*Type.*—Museum of Comparative Zoölogy, No. 40743, an adult ♂ from Kaimosi Forest, near the Friends' Africa Mission, Kakamega district, Nyanza Province, Kenya Colony, collected by Arthur Loveridge, February 22, 1934.

*Paratypes.*—Thirteen specimens from the type locality and two from the Belgian Congo as follows: Museum of Comparative Zoölogy, Nos. 40744–8, as listed above. Nairobi Museum, Nos. 60–62, 63, 65, 194 (the last without definite locality) collected by H. J. Allen Turner. United States National Museum, No. 49014, “? Kakamega” collected by Edmund Heller, 1912 (Heller's camp site was close to mine at Kaimosi, from where the snake undoubtedly came). Field Museum of Natural History, No. 12822, from Mambawanga Hill, Belgian Congo, and No. 12839, from Ruchuru, Belgian Congo, both collected by Edmund Heller, 1925.

*Intermediate.*—As might be expected, Ruchuru is in the area of intermediates and a second snake from there, F. M. N. H. 12840, combines the high subcaudal count of the typical (West African) snake with the uniformly black tail of the new (East African) form, as does a ♀ from Eskibondo (A. N. S. P. 20503) eastern Belgian Congo.

*Diagnosis.*—The Jameson's Mamba from the extreme eastern part of the range of this species is so strikingly different in coloration of both body and tail from the typical form that it merits a new name, more particularly as the difference is supported by a difference in scalation, *viz.*

Subcaudals 94–104<sup>2</sup> (14 + 2 specimens); tail  
 uniformly black; East Africa..... *D. j. kaimosae*  
 Subcaudals 103–122 (27 specimens); tail green,  
 each dorsal and subcaudal scale margined with  
 black; West Africa..... *D. j. jamesoni*

<sup>1</sup> I take this opportunity of thanking Dr. V. G. L. van Someren of the Coryndon Museum for checking my counts on the Muthaiga paratype. He informs me that he makes both 17 and 18 for the midbody count.

<sup>2</sup> Dr. van Someren states that the specimen (No. 60), which I recorded in 1916 as having 107 subcaudals, can not now be located in the Coryndon Museum.

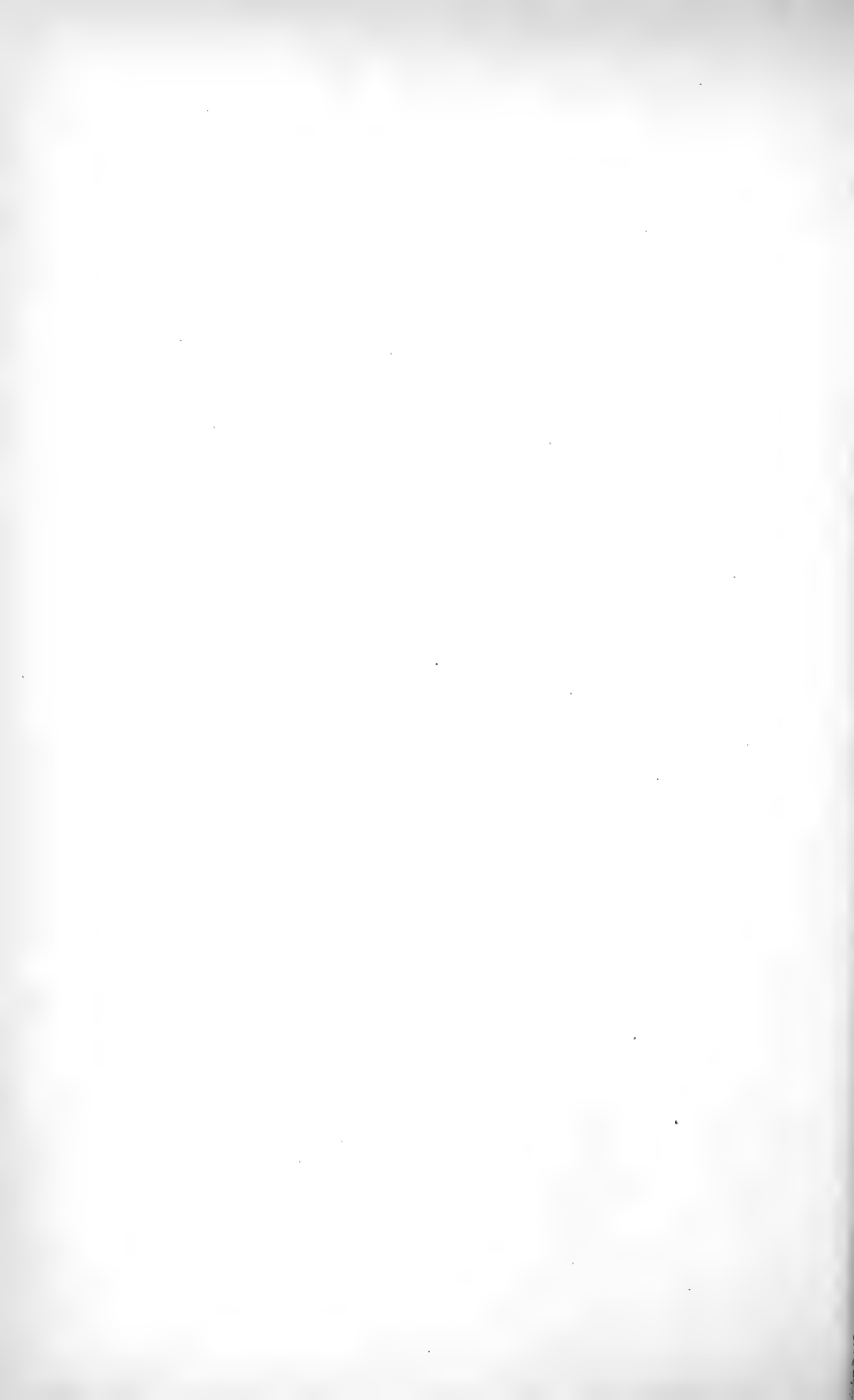
*Description.* Midbody scale-rows 15; ventrals 219; anal divided; subcaudals 104; labials 8, the 4th entering the orbit; preoculars 3; postoculars 3; subocular 1.

*Variation.*—M. C. Z. 40744–8. Midbody scale-rows 15–17; ventrals 210–221; anal divided; subcaudals 94–102; labials, etc., as in type.

*Coloration.*—I am indebted to Captain C. R. S. Pitman for the following description of the beautiful coloration in life of the eastern form. His remarks are based on a specimen from Entebbe.

Above, the anterior third is vivid green, the medial third is green with black or purplish black, the posterior third is black or purplish black with a distinct “bloom” superimposed.

*Measurements.*—The ♂ type measures 2080 (1610 + 470) mm., the largest ♀ (M. C. Z. 40745) measures 2070 (1595 + 475) mm.





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GENERAL NOTES.

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THE DRUMMING SPIDER (*LYCOSA GULOSA* WALCKENAER).

In late April, 1935, I made a collecting trip into the Bull Run Mountains, Virginia, visiting one of the highest points on the ridge known as High Point, located nearly northeast of Broad Run Postoffice, in Fauquier County.

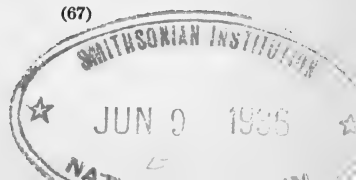
While reclining upon the leaves in the warm afternoon sun, I heard around me a distinct purring sound from time to time, which at once stimulated similar responses in the leaves around. Close watching revealed an active spider making the sounds. Mr. Irving Fox, who is engaged in identifying spiders in the collections of the U. S. National Museum found mine to be males of *Lycosa gulosa* Walckenaer.

The sounds are not stridulations due to the rubbing together of two external chitinous surfaces, but were actual tattoos rapidly executed upon the dry leaf surfaces.

The creatures were very wary, but with care I was able to examine their movements critically from a distance of only a few inches. When the spider moved and made its sounds, the fore part of the body quivered perceptibly and the palpi, too, executed gentle up and down movements. The quivering movements brought the chelicerae directly in contact with the dry leaf surface, and the latter alone appeared to be responsible for the rather loud sounds I had heard.

These sounds have no musical pitch or tonality such as is characteristic of cricket music, but are dry, toneless, rustling sounds bearing more resemblance to the sounds of the katydids known as the shield bearers of the genus *Atlanticus*. They can not well be expressed in written symbols, but the expression *pr - r - r - r - t* is perhaps as near as any, this phrase being delivered once or sometimes twice in quick succession at the time the spider comes to rest. The spiders not only produced a fast tattoo with their chelicerae, but at the end of these notes *pr - r - r - r - t*, also tapped out several distinct notes on the dry leaves with the tip of the abdomen raised and lowered briskly during the act. When after a period of silence one spider began its thrumming, others joined, until there were sounds all around. When travelling over rocks and sticks sounds were not heard, and did not appear to be attempted. These tapping sounds were surprisingly loud and could be heard readily a distance of ten feet or more.

The alertness and quick responsiveness of the spiders made it appear



that they heard each other readily. Oftentimes, they clearly oriented themselves and followed one another by the sounds made. John Burroughs appears to have been the first observer to refer to the *purring* of these spiders in the chapter "Notes by the Way" of his book *Pepacton* published in 1881. He did not determine how the sounds were made.

In 1904 Fred H. Lahee published a short paper "The Calls of Spiders" (*Psyche*, XI, No. 4, p. 74) describing the sounds of *Lycosa kochii* in Massachusetts. He concluded they were made by the tips of the palpi (pedipalps) striking upon the dry leaves. He observed the up and down movements of the abdomen but heard no sounds.

William T. Davis next refers to these spiders in a brief note "Spider Calls," (*Psyche*, XI, No. 6, 1904, p. 120), mentioning their purring. His material and those of Lahee were all males, and were identified by Emerton as *Lycosa kochii*. These spiders of Lahee and Davis, known at that time as *Lycosa kochii*, are without doubt identical with the species I observed in the Bull Run Mountains as *Lycosa gulosa* in keeping with more recent revisions.

To say the least, this is a most remarkable method of sound making, and is quite comparable to the drumming of woodpeckers with the bill upon resonant limbs, the spiders having learned to use the hard chelicerae.

—H. A. Allard, Washington, D. C.

#### FRANKLINIELLA GOSSYPIANA, NEW NAME.

The common *Frankliniella gossypii* (Morgan) of the Southwestern United States, originally described in *Euthrips* (Proc. U. S. Nat. Mus., Vol. 46, p. 9, figs. 19–22; August 23, 1913), must be re-named because the combination *Euthrips gossypii* has been previously used by Shiraki (Spl. Rept. No. 5, Agr. Exp. Sta., Govt. Gen. Formosa, *Insect Pests of Cotton*, pp. 65–67, Pl. IV, fig. 4; 1912; in Japanese). Although the American species is not by any means restricted to cotton as a food plant, it seems best to make as little change in the old name as possible; and hence *gossypiana* is proposed as a substitute. *Frankliniella gossypii* (Shiraki), comb. nov., is a quite different insect.

I am indebted to Mr. Sato, of the Yokohama office of the U. S. Bureau of Entomology and Plant Quarantine, for a translation of Dr. Shiraki's description and the verification of the reference and date of publication; to Messrs. R. W. Burrell and C. P. Clausen, also of the Bureau; and to Dr. R. Takahashi, Entomologist of the Formosan Agricultural Experiment Station, for aid extended to Mr. Sato.

—J. Douglas Hood.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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TAXONOMIC REMARKS ON THE CAROLINA  
CHICKADEE, *PENTHESTES CAROLINENSIS*.

BY W. E. CLYDE TODD AND GEORGE M. SUTTON.

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At the Charleston meeting of the American Ornithologists' Union in 1928 the senior author made some informal remarks on this species, the substance of which may here be placed on record, together with certain additional considerations. The Carolina Chickadee is a good example of the gradual increase in size from south to north which some species of birds show. Specimens from the southern limit of its range in peninsular Florida are remarkably small, and mainly on this account were separated by Bangs in 1903 under the appropriate subspecific name *impiger*. Ridgway promptly accepted the name on this basis, as also did the A. O. U. Committee. Ridgway (Bull. U. S. Nat. Mus. No. 50, III, 1904, 404) was also the first to call attention to the relatively large size of northern examples. When the senior author came to work over the series in the Carnegie Museum collection some years ago he was able to confirm Ridgway's remarks on this point. Ten adult males (in good plumage) from Virginia, the District of Columbia, western Pennsylvania, and Indiana average: wing, 63.5 mm.; tail, 55.5 mm. The same number of comparable specimens from western Florida (Whitfield), on the contrary, average: wing, 61; tail, 51. The study of a larger series which has come in since the original measurements were made does not change the results.

The western Florida series were identified as true *carolinensis*, on the basis of their close agreement in size with the measurements of South Carolina specimens given by Ridgway (l. c.). Now we find that while the 1931 edition of the A. O. U. Check-List restricts *impiger* to the "Peninsula

of Florida" Mr. Arthur H. Howell (Florida Bird Life, 1932, 343) extends its range to include Walton County, whence our Whitfield series came, and inferentially excludes typical *carolinensis* from the avifauna of that State. We are loath to accept this alignment, and after again going over the Whitfield birds (28 specimens) still think that they should be referred to *carolinensis* proper. If we are correct in so doing, there remains the question of the disposition of the specimens from the northern portion of the range of the species. Certainly they are fully as different from the western Florida series as these are from the small birds of southern Florida, and if the latter are to stand under a different name so ought the northern birds also. It is simply a question of whether it is desirable to recognize three races instead of only two, in a case where the original specific name is based on an intermediate form. At the Charleston meeting the opinion was expressed that the northern bird was scarcely worth naming, since it would be only a "millimeter race" at best. Clearly, however, the southern race *impiger* rests on no better basis. If the one is entitled to a name, so also is the other. The time may come when it may be adjudged best to sink *impiger* under *carolinensis* proper—a procedure which would leave the northern bird stranded on the shore of taxonomic uncertainty and instability. Perhaps after all it would be better, at least provisionally, to provide the latter with a name.

***Penthestes carolinensis extimus*, subsp. nov.**

*Type*.—No. 117,167, Collection Carnegie Museum, adult male; Bethany, West Virginia, January 3, 1934; George M. Sutton. Measurements: wing, 67; tail, 56.

*Subspecific characters*.—Similar to *Penthestes carolinensis carolinensis* (Audubon), but averaging larger, sex for sex; pale edgings of wings and tail averaging considerably more conspicuous; sides and flanks brighter reddish brown; and sides of head slightly grayer.<sup>1</sup>

*Range*.—New Jersey west at least to Missouri, and southward to Tennessee and western North Carolina.

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<sup>1</sup> In the junior author's collection are 24 specimens of *extimus*, all of which were carefully washed at the time of preparation. The lightness of the wing- and tail-edgings and brightness of the red-brown sides and flanks show plainly in these. Specimens in worn breeding plumage (late May, June, July) do not show these characters so plainly as do specimens in fresh fall plumage, however.—G. M. S.

PROCEEDINGS  
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BIOLOGICAL SOCIETY OF WASHINGTON*CATOSTOMUS SYNCHEILUS PALOUSEANUS*, A NEW  
SUBSPECIES OF A CATOSTOMID FISH FROM THE  
PALOUSE RIVER (COLUMBIA R. SYSTEM).

BY LEONARD P. SCHULTZ AND ROBERT J. THOMPSON  
School of Fisheries, University of Washington, Seattle, Washington.

In 1932 Hubbs and Schultz described as new, *Catostomus syncheilus*, from the Columbia River. This well marked species was reported as occurring in Crab Creek, in Moses Lake, in a tributary of the Yakima River at Ellensburg, and in a tributary of the Snake River near King Hill, Idaho. Since that time much collecting has been done in eastern Washington and elsewhere in northwestern United States (Schultz and DeLacy 1935, 1936). A study of this material indicates that Hubbs and Schultz (1932 : 6) were partially correct in assuming that *C. syncheilus* "obviously has a wide range throughout the upper parts of the Columbia River system." However, the fine-scaled sucker of the Palouse River system differs so much from typical *syncheilus* in the middle Columbia River system, in the Snake River, and in many of their tributaries, that it must receive a new subspecific name, which we propose to call *Catostomus syncheilus palouseanus*, after the river in which it is found. The Columbia River form, then, takes the name *Catostomus syncheilus syncheilus*.

The Palouse River enters the Snake River about 12 miles south of Hooper, Washington. It is a small river that flows over lava rock throughout most of its course. A few miles below Hooper is to be found the Lower Palouse Falls, 196 feet high, which acts as a barrier to any upstream migration of fish and probably to downstream migration too. Below the falls, the "Palouse Canyon (the lower 10 miles of the river) is 400 to 800 feet deep in basalt" (Bretz 1928). The Palouse River Falls are rather old, dating back to at least the great Spokane flood which flowed southwestward

across eastern Washington and cut numerous coulees. Thus, the fish in the Palouse system have been isolated so that in addition to the fine-scaled sucker, we find above the falls *Richardsonius balteatus hydrophlox* and below the falls *Richardsonius balteatus balteatus*. There is a slight difference too between the *Cottus rotheus* above and below the falls, which we are not prepared to discuss at this time.

*Catostomus syncheilus syncheilus* has been taken from the following localities: Crab Creek—1 and 7 miles above Beverly, and at Smyrna, Washington, collectors Schultz and Erkila; Moses Lake, collector, S. J. Hutchinson; mouth of Umatilla River, Oregon, collectors Schultz and Bowers; Tucannon River, 45 miles east of Walla Walla, Washington, collectors Schultz and DeLacy; Grande Ronde River in Oregon—1 mile above Elgin, 1 mile below Perry, collectors Schultz and Bowers; Minam River, 1 mile above Minam, Oregon, collectors Schultz and Bowers; Wallowa Lake, Oregon, collector William Nicholson; Weiser River, 1 mile above Weiser, Idaho, collectors Schultz and DeLacy; Clearwater River near Lewiston, Idaho, collector Arthur Svihla; Rock Island Dam of Columbia River, near Wenatchee, collector, L. Royal and assistant; Little Deep Creek, 9 miles south of Chattaroy, Washington, collectors Schultz and Bowers; Little Spokane River near Dartford, Washington, collectors Schultz and Bowers; Malheur River, 8 miles above Drewsey, Oregon, collectors Schultz and Welander.

Extensive collecting of fine-scaled suckers in Glacier National Park, Montana, by the senior author in 1934 indicates the absence of *syncheilus* in that region. Instead *Catostomus catostomus griseus* is found on both sides of the Continental Divide. So far we have not had the opportunity to investigate the eastward extension of the range of *Catostomus syncheilus syncheilus* in the Columbia system nor the western range of *Catostomus catostomus griseus*, which is closely related to *Catostomus pocatello* of Idaho and perhaps the same species.

#### ***Catostomus syncheilus palouseanus*, new subspecies.**

*Holotype*.—A specimen 110 mm. long to base of caudal fin, collected in Smokle Creek, north of Almota, and 14 miles west of Pullman, Washington, on August 28, 1932, by Leonard P. Schultz and Marvin Bowers; Cat. no. 3764, Collection of Fishes, School of Fisheries, University of Washington, Seattle.

The numerous paratypes were collected in Washington by the senior author, Marvin Bowers, and Leo Erkila, as follows: from the type locality: Palouse River 2 miles above Colfax; South Fork Palouse River, 2 miles, and  $\frac{1}{2}$  mile above Pullman; Palouse River near Hooper; Palouse River between Lancaster and Endicott; and the Palouse River at Palouse.

*Description* based on the 125 mm. holotype and on numerous paratypes. The measurements of the holotype are given outside the parenthesis, and the range and average for 19 paratypes are in the parenthesis. These range in length from 101 to 120 mm. All measurements are expressed in hundredths of the standard length. Additional counts were made on other

paratypes as given in Table I. The greatest depth of the body is 23.1 (range 19.3 to 24.1; average 22.5) which is at the origin of the dorsal fin; the depth of the body is about a third greater than its width; the least depth of the moderately constricted caudal peduncle is 9.9 (7.7 to 9.9; 8.4); the length of the head is 24.5 (21.0 to 25.4; 23.2); the head is a little wider than deep at the occiput; the snout is rounded and extends a little forward of the upper lip; the anterior edge of the eye is a trifle in front of one half the length of the head, it is located far up dorsally on the head; the length of the snout is 11.3 (10.2 to 12.5; 11.1); the interorbital is flattish, only moderately convex, the least width is 10.0 (8.9 to 10.9; 9.8); the diameter of the eye is 4.5 (3.5 to 5.5; 4.3); the posterior margin of the dorsal fin is slightly concave, the distance from tip of snout to its origin is 51.3 (46.4 to 52.9; 50.0); the distance from the tip of the snout to the insertion of the pelvic fin is 59.1 (52.8 to 60.1; 56.6); this fin is slightly rounded posteriorly; the length of the mouth (measured from the anterior center to rear edge of lip) is 7.7 (6.7 to 8.6; 7.6); the width of the mouth is 10.0 (8.3 to 10.9; 9.8); the length of the caudal peduncle is 15.4 (13.8 to 17.8; 15.9).

The lips of *palouseanus* are exactly like those of *syncheilus*, therefore, we quote the description by Hubbs and Schultz (1932 : 12):

“The upper lip has the outer and inner faces separated by a sharp edge toward the middle of the mouth but not at the angles. The outer face of the upper lip [of large adults] is papillo-plicate; the edge is strongly crenate, and the inner face bears two rows of large papillae opposite the edge of upper jaw. Toward the angle of the mouth the rows of papillae become more numerous. Here the upper lip shows little tendency to overlap the lower, as both lips flatten out to a common plane. The marginal indentation between the lips is but slightly developed. [To this we add that the young and half-grown of both subspecies have a well defined notch or marginal indentation at the outer corner where the upper and lower lips join.] The lower lip is only moderately incised, leaving room for from two to four rows to cross the mid-line in advance of the point of the incision. The papillae of the lower lip are large, round and isolated forward, but distally they become lower, oval and seriated into radial rows. The edges of the jaws are hard and rather sharp, and rather weakly curved. The ends of the hardened edges do not form conspicuous angles, but merge into the structure of the jaw.”

The scales are small anteriorly, and enlarge gradually from below the region of the dorsal fin posteriorly. There are 120 (104 to 121; average 113.9) oblique rows of scales on the side of the body from upper edge of opercular opening to base of caudal fin rays. The scales above the lateral line (origin of dorsal obliquely downward and backward to lateral line) number 22 (18 to 25; 22.4); those below the lateral line (insertion of pelvic fins obliquely upward to lateral line) number 22 (17 to 23; 20.0). In front of the dorsal fin there are 59 (45 to 60); 53.5 scales, and behind the dorsal fin there are 48 (39 to 50; 44.1) scales. The fin rays are as follows: dorsal 12 (11 or 12; 11.1); anal 7 (7); pectoral 18 (17 or 18; 17.75). For additional counts of both subspecies see Table I.

The color of the body of *palouseanus* is mottled dark brown above, paler below. The blotches occur on the sides as is usual in the young of most of

the species of suckers. The peritoneum is jet black in the young and yearlings as well as in most of the adults, although occasionally an adult will have the peritoneum a little lighter than jet black, but not much. The color of the peritoneum of *syncheilus* is the same as in *palouseanus*.

Since Hubbs and Schultz (1932) have separated *Catostomus syncheilus syncheilus* from all other known species of fine-scaled suckers, it is only necessary for us to distinguish *C. s. palouseanus* from *C. s. syncheilus*. In *palouseanus* numerous proportions of the body and other structures were carefully compared with *syncheilus* and found not to differ significantly. The two subspecies differ (see Table I) in regard to the average number of scales, in the lateral line, above the lateral line, below the lateral line, before the dorsal fin, and behind the dorsal fin. *C. s. palouseanus* always averages more than *C. s. syncheilus*. The number of dorsal rays in *palouseanus* average 11.1 while in *syncheilus* they average 11.9.

The *character index* may be used to separate closely related forms as was done by Schultz and Welander (1934) and Schultz and Schaefer (1936). In this case the *character index* is equal to a sum of the number of oblique rows of scales on the side of the body + the number of scales above the lateral line + the number of scales below the lateral line + the number of scales before the dorsal + the number of scales behind the dorsal fin — the dorsal fin rays, for each individual. Thus, we add together the many small differences to form a frequency distribution, Table II. An examination of the data in this table indicates an average difference of 26.8 for the *character index* between the two subspecies.

TABLE I. Counts of *Catostomus syncheilus syncheilus* from the lower Snake River and its tributaries, the middle Columbia River and its tributaries, and of *Catostomus syncheilus palouseanus* from the Palouse River and one of its tributaries, Smokle Creek.

*Number of scales in the lateral line:*

*C. s. syncheilus:* 41 specimens, 88 to 115 (average 102.8).

*C. s. palouseanus:* 21 specimens, 104 to 121 (113.8).

*Number of scales above the lateral line:*

*C. s. syncheilus:* 41 specimens, 16 to 23 (20.1).

*C. s. palouseanus:* 21 specimens, 18 to 29 (22.4).

*Number of scales below the lateral line:*

*C. s. syncheilus:* 41 specimens, 14 to 21 (16.7).

*C. s. palouseanus:* 21 specimens, 17 to 23 (19.96).

*Number of scales before the dorsal fin:*

*C. s. syncheilus:* 31 specimens, 39 to 60 (49.1).

*C. s. palouseanus:* 20 specimens, 45 to 60 (53.5).

*Number of scales behind the dorsal fin:*

*C. s. syncheilus:* 32 specimens, 29 to 44 (38.1).

*C. s. palouseanus:* 20 specimens, 39 to 50 (44.1).

*Number of dorsal rays:*

*C. s. syncheilus:* 78 specimens, 10 to 13 (11.9).

*C. s. palouseanus:* 21 specimens, 11 or 12 (11.1).



Number of anal rays:

*C. s. syncheilus*: 64 specimens, always 7 rays.

*C. s. palouseanus*: 21 specimens, always 7 rays.

Number of pectoral rays:

*C. s. syncheilus*: 16 specimens, 17 to 19 (17.81).

*C. s. palouseanus*: 16 specimens, 17 or 18 (17.75).

TABLE II. The character index.

	176	186	196	206	216	226	236	246	256	To-	Aver-
	to	to	to	to	to	to	to	to	to	tal	age
	185	195	205	215	225	235	245	255	265		
<i>C. s. syncheilus</i>	2	1	3	7	11	5	2	....	....	31	215.7
<i>C. s. palouseanus</i>	....	....	....	....	1	4	8	4	3	20	242.5

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## FOUR NEW PLANTS OF THE GENUS DIPLOSTEPHIUM.

BY S. F. BLAKE.

Since the publication in 1928 of my second review<sup>1</sup> of the asteraceous genus *Diplostephium*, in which 43 species were recognized, four undescribed species have been found in material in the United States National Herbarium or among specimens lent for study from other herbaria. Two new species from Colombia have recently been described by Cuatrecasas,<sup>2</sup> of which one, *D. mutisii*, is closely allied to *D. rupestre* (H.B.K.) Wedd., the other, *D. tolimense*, a member of the group of *D. ochraceum* and *D. floribundum*.

***Diplostephium vaccinioides* Blake, sp. nov.**

Frutex supra dense foliosus, ramis tomentulosis et densissime flavido-setosis; folia lanceolata acuta brevipetiolata integra angustissime revolutomarginata supra lucidula prope marginem tuberculato-spinulosa subtus griseo-tomentosa; capitula pro genere majuscula radiata solitaria sessilia; involucri ca. 1.3 cm. alti valde gradati phyllaria e triangulari-ovatis linearia; achenia glabra.

Shrub 30 cm. high or more, apparently erect, much branched above, the branches erect; stem (or branch) 3.5 mm. thick, denudate and cicatricose below, densely leafy in the upper half, glabrescent below; branches and branchlets obscurely tomentulose and very densely and persistently short-setose with many-celled yellowish more or less spreading hairs; internodes mostly about 1 mm. long; leaves alternate, wide-spreading; petioles about 1 mm. long, 1-1.5 mm. wide, puberulous, glabrescent, subappressed; leaf blades lanceolate, 6-12 mm. long, 2-3.5 mm. wide, acute, rather bluntly callous-pointed, at base rounded, plane or nearly so, very narrowly revolute-margined, coriaceous, above deep green, somewhat shining, tuberculate-spinulose toward margin, otherwise glabrous, beneath grayish-tomentose, the costa impressed above, evident and broad beneath; heads about 2.5 cm. wide, solitary and sessile at tips of the numerous branchlets,

<sup>1</sup> Amer. Journ. Bot. 15 : 43-64. 1928.

<sup>2</sup> Trab. Mus. Nac. Cienc. Nat. Madrid, Ser. Bot. 29 : 25-28. f. 7-8. 1935.

forming a flattish-topped inflorescence 20 cm. wide; disk 1-1.2 cm. high, 8-10 mm. thick; involucre (moistened) campanulate, 13-14 mm. high, about 7 mm. thick, rounded at base, about 7-seriate, strongly graduate, the outer phyllaries triangular-ovate, acute, the middle ones lance-linear, the inner linear, scarcely widened at apex, obtuse, all firmly chartaceous, brownish-white, with thinner lacerate-ciliate tips, sparsely appressed-pilose or nearly glabrous on back, somewhat gray-tomentose toward apex; rays about 38, glabrous, the tube 1-1.5 mm. long, the lamina linear, 3-denticulate, 4-nerved, about 15 mm. long, 1-1.5 mm. wide; disk flowers numerous, their corollas sparsely puberulous with club-shaped hairs on throat and teeth, 6 mm. long (tube 1.5 mm., throat subcylindric, 3.2 mm., teeth triangular, acute, 1.3 mm. long); receptacle rounded, fimbriate toward the center; achenes (immature) of ray and disk glabrous, 5-angled, up to 1.5 mm. long; pappus indistinctly double, dull whitish, the outer of about 8 bristles 1.5-2.5 mm. long, the inner of about 38 unequal minutely hispidulous bristles 3.5-5.8 mm. long; style branches (hermaphrodite flowers, these apparently fertile) 2.3 mm. long, the stigmatic region oblong, 0.9 mm. long, with strong stigmatic lines, the appendages narrowly triangular, acuminate, short-hispid, 1.4 mm. long.

PERU: Hacienda Runatullu, Dept. Junín, alt. 3800 m., 1909-1914, A. *Weberbauer* 6633 (type in Gray Herb.; photog. and fragm., U. S. Nat. Herb.).

A species of the series *Lavandulifolia*, allied to *D. hippophae* Blake, but at once separable by its leaves (in that species linear, 1.2-1.8 cm. long, 1-2 mm. wide). In appearance, the heads neglected, it is strikingly similar to such Andean species of *Vaccinium* as *V. floribundum* H. B. K.

#### ***Diplostephium glutinosum* Blake, sp. nov.**

Fruticulus, ramis glabris glutinosis apice dense foliosis; folia anguste oblanceolata vel lineari-elliptica parva integra sessilia supra mox glabrata glutinosa subtus dense ochroleuco-tomentosa margine angustissime revoluta; capitula mediocria radiata solitaria pedunculata.

Low subdichotomously branched shrub, up to 30 cm. high, the stem and branches naked, thickly covered with leaf scars, the branchlets leafy only for 1-2 cm. at the tip; leaves crowded, 6-20 mm. long, 1-4 mm. wide, obtuse, bluntly and shortly apiculate, broadest toward the apex, gradually narrowed to the sessile or subsessile base, coriaceous, plane with very narrowly revolute margin, above at first thinly tomentose, quickly glabrate and deep green, not obviously punctate, glutinous, beneath densely and compactly tomentose except on the glutinous midrib, without evident lateral veins; peduncles slender, 1.3-2.5 cm. long, naked or 1-2-bracteate, ochroleucous-tomentose, glabrescent; heads about 1.8-2 cm. wide; disk (as pressed) 7-10 mm. high, 7-13 mm. thick; involucre 5-6-seriate, graduate, 7-9 mm. high, the outermost phyllaries narrowly triangular, acute, the others linear or lance-linear, acuminate, appressed, at first rather densely ochroleucous-pilose-tomentose, later glabrescent and glandular above, purplish above and on margin, subindurate with narrow greenish 1-ribbed central area above; rays about 25 or more, white, the tube sparsely

puberulous toward apex, 2.8 mm. long, the lamina linear-elliptic, 3-denticulate, about 5-nerved, 6 mm. long, 2 mm. wide; disk flowers numerous, their corollas whitish when dried, "pink" or "deep pink" in life, puberulous toward base of throat, 5 mm. long (tube 2 mm., throat funnellform, 2 mm., teeth ovate, 1 mm. long); ray achenes narrowly obovate, compressed, densely hispidulous, 2.8 mm. long, their pappus double, the outer bristles 1 mm. long, the inner rather copious, unequal, 2-4 mm. long; disk achenes linear, 4-nerved, apparently infertile, densely hispidulous, 3 mm. long, their pappus double, the outer bristles few, 1-1.2 mm. long, the inner unequal, brownish, slightly clavellate above, up to 3.8 mm. long; style branches in the hermaphrodite flowers linear-subulate, minutely hispidulous outside, 1.2 mm. long, with minute acute terminal appendages.

COLOMBIA: Páramo de las Coloradas, above La Baja, Dept. Santander, alt. 3900-4100 m., 27 Jan. 1927, *E. P. Killip & A. C. Smith* 18440 (type no 1,353,854, U. S. Nat. Herb.); Páramo de Santurbán, near Vetás, Dept. Santander, alt. 3950-4160 m., 17 Jan. 1927, *Killip & Smith* 17487.

Related to *Diplostephium anaetnotum* Wedd. and *D. parvifolium* Blake, but at once distinguished by its longer and narrower leaves and conspicuously radiate heads.

#### ***Diplostephium apiculatum* Blake, sp. nov.**

Fruticulus decumbens cinereo-tomentosus densissime foliosus; folia linearia vel anguste lineari-oblancoolata ca. 1.2 cm. longa 1.2 mm. lata sessilia obtuse callosa-apiculata margine revoluta ubique (supra vix dense) tomentosa; capitula solitaria mediocria radiata ramos et ramulos terminantia breviter nudo-pedunculata.

Decumbent much-branched undershrub, becoming 30 cm. long, or up to about 1 m. high; branches and branchlets densely cinereous- or rufidulous-tomentose; leaves crowded, spreading or erectish, 7-18 mm. long, 1-1.5 mm. wide, acutish and tipped with an obtuse or acutish callous mucro, gradually narrowed into a petioliform base, entire, coriaceous, above thinly but persistently grayish-tomentose or in age sometimes glabrescent, beneath densely cinereous- or rufidulous-tomentose; peduncles densely tomentose, 7-15 mm. long, naked or with 1 or 2 small bracts; heads about 11-14 mm. wide; disk (as pressed) 6-8 mm. high, 8-14 mm. thick; involucre 5-6-seriate, graduate, appressed, 5-6 mm. high, the outer phyllaries triangular or ovate-triangular, obtuse, the inner linear or lance-linear, acute to acuminate, all densely gray-tomentose on back, subindurate, all (except the outermost) with thinner, narrow, deep purple, nearly glabrous margin and tip; rays about 18-28, white, the tube puberulous toward apex or nearly glabrous, 2-2.5 mm. long, the lamina spreading, linear-elliptic, 3-denticulate, 2-nerved, puberulous at base below, 3.2-3.5 mm. long, 1 mm. wide; disk flowers numerous, their corollas "greenish yellow" or "greenish," 4.5-4.8 mm. long (tube glabrous, 1.8-2 mm. long, throat funnellform, puberulous with clavellate hairs, 1.5 mm. long, teeth sparsely subglandular-puberulous at apex dorsally, 1-1.3 mm. long); achenes densely glandular and sparsely hirsutulous, 1.8-2 mm. long; pappus at length rufidulous or somewhat purplish, the outer scanty, aristiform,

0.5–1 mm. long, the inner bristles thickened at apex, 4–4.5 mm. long; style branches of hermaphrodite flower merely papillose outside, 0.5 mm. long, oblong with broadly triangular acutish appendages.

COLOMBIA: Páramo de Santurbán, en route from Tona to Mutiscua, Dept. Norte de Santander, alt. 3900 m., 19 Feb. 1927, *E. P. Killip & A. C. Smith* 19571 (type no. 1,354,776, U. S. Nat. Herb.); Páramo de Santurbán, near Vetas, Dept. Santander, alt. 3950–4160 m., 17 Jan. 1927, *Killip & Smith* 17499; Páramo Rico, near Vetas, Dept. Santander, alt. 3750–3850 m., 18 Jan. 1927, *Killip & Smith* 17669; Páramo de las Puentes, above La Baja, Dept. Santander, alt. 3500–3700 m., 25 Jan. 1927, *Killip & Smith* 18240; Páramo de las Coloradas, above La Baja, Dept. Santander, alt. 3900–4100 m., 27 Jan. 1927, *Killip & Smith* 18430; Páramo de Romeral, Dept. Santander, alt. 3800–4100 m., 29–30 Jan. 1927, *Killip & Smith* 18547.

Related to *Diplostephium lavandulifolium* H.B.K. and *D. hartwegii* Hieron., but distinguished by its definitely naked-peduncled heads, and leaves permanently pubescent above.

***Diplostephium foliosissimum* Blake, sp. nov.**

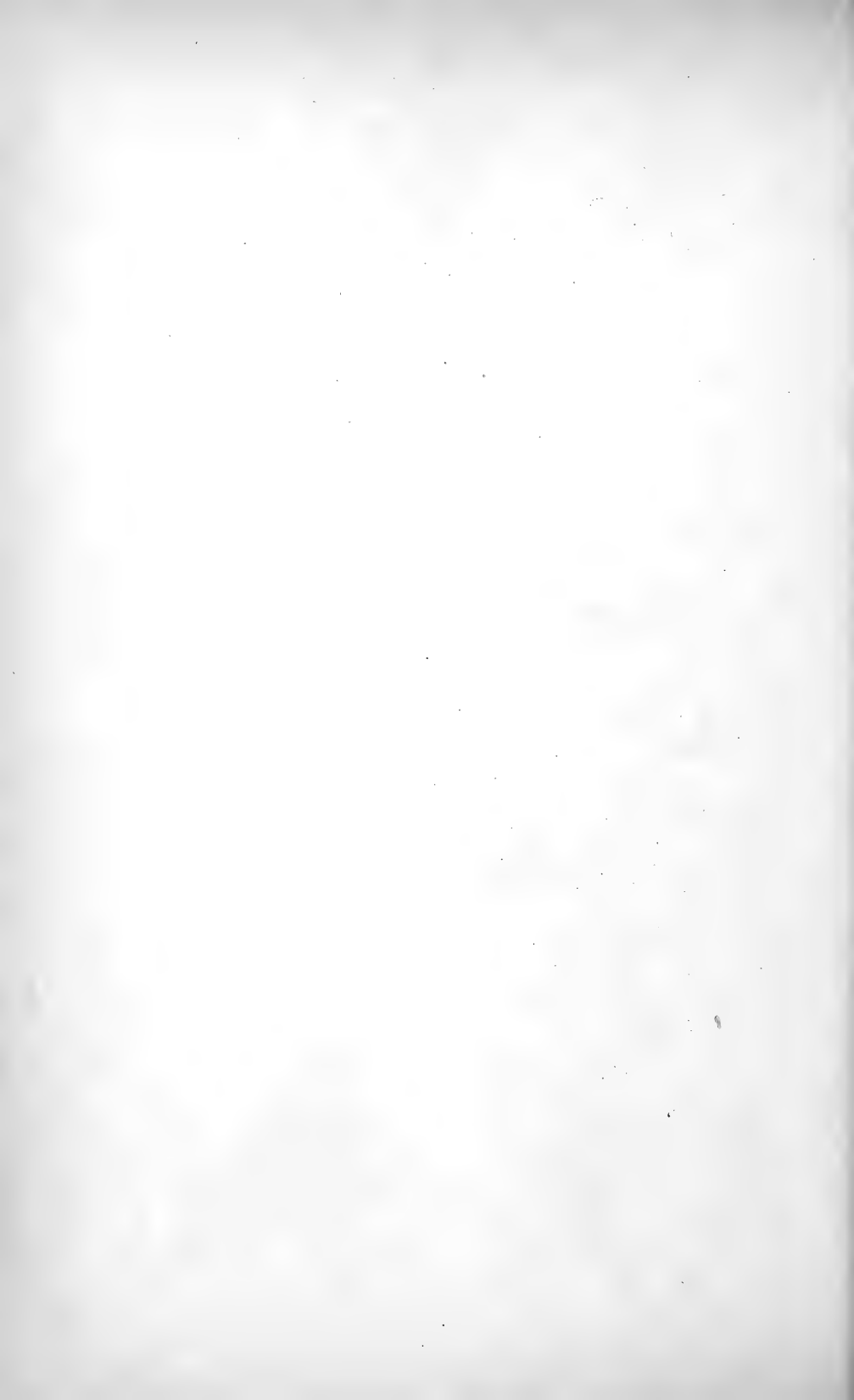
Frutex supra densissime foliosus, ramis dense griseo-vel ochroleucotomentosis; folia minima ovata brevipetiolata 3 mm. longa 1.5 mm. lata obtusa supra puberula demum glabrescentia et reticulato-rugosa subtus densissime tomentosa; capitula parva radiata solitaria sessilia v. breviter pedunculata; involucri 5 mm. alti phyllaria e triangulari-ovatis linearia; achenia glandulosa et hispida.

Shrub 1 m. high, very densely branched above; stem (or branch) 3.5 mm. thick, below denudate, cicatricose, and glabrescent; branches and branchlets densely grayish- or ochroleucous-tomentose, densely leafy, the leaves almost always with axillary fascicles; internodes 2 mm. long or less; leaves alternate; petioles puberulous above, tomentose beneath, 0.5 mm. long to almost none, about 0.6 mm. wide; blades of the principal leaves ovate or oblong-ovate, 2.5–3 mm. long, 1.2–1.5 mm. wide, obtuse or acutish, bluntly callous-tipped, rounded at base, somewhat tumid, revolute-margined, above deep green, slightly shining, at first thinly crisped-puberulous, in age glabrate or glabrescent and somewhat reticulate-rugose, beneath very densely grayish- or ochroleucous-tomentose, the costa obsolete above, entirely concealed beneath; leaves of the fascicles similar but smaller; heads about 1.4 cm. wide, sessile or on peduncles 3 mm. long or less, solitary at tips of short densely tomentose often nearly leafless branchlets mostly 2–4 mm. long, these often aggregated toward tips of branches; disk (as pressed) 6–7 mm. high and thick; involucre 5 mm. high, about 5-seriate, strongly graduate, the outermost phyllaries triangular-ovate, acute, the next ovate-oblong, the inner linear, acute or obtusish, all firmly chartaceous, brownish-white, rather obscurely 1-ribbed, with subscarios margin (lacerate-ciliate toward tip), the outermost subtomentose-pilose, the inner nearly or quite glabrous; rays about 17, "white," sparsely puberulous on tube and base of limb, the tube 1.5 mm. long, the lamina about 7 mm. long, 1.2 mm. wide, 3-denticulate, 4-nerved; disk flowers about 15, "yellow, later brown," sparsely puberulous on tube and

base of throat, about 5.4 mm. long (tube 1.8 mm., throat slender-funnelform, 2.4–2.8 mm., teeth narrowly triangular, acute, 1 mm. long); receptacle flattish, shallowly alveolate, the alveolae with dentate edges; achenes (immature) of ray and disk similar, sessile-glandular and sparsely hispidulous, 1.8 mm. long; pappus whitish, distinctly double, the outer of about 17 narrow paleae 1 mm. long, the inner of about 20 minutely hispidulous bristles, slightly dilated toward apex, 5 mm. long; style branches (hermaphrodite flowers) 1.9 mm. long, the stigmatic region 0.7 mm. long, the appendage subulate-acuminate, short-hispid, 1.2 mm. long.

PERU: Cordillera west of Huancabamba, Dept. Piura, Prov. Huancabamba, alt. 3200–3300 m., April 1912, A. *Weberbauer* 6044 (type in Gray Herb.; photog. and fragm., U. S. Nat. Herb.).

A member of the series *Lavandulifolia*, allied to *D. artisanense* Hieron., which has linear or elliptic-linear leaves 5–8 mm. long, 0.8–2 mm. wide, without axillary fascicles.





PROCEEDINGS  
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ON THE INDO-AUSTRALIAN FISHES OF THE GENUS  
*SCATOPHAGUS*, WITH DESCRIPTION OF A  
NEW GENUS, *SELENOTOCA*.

BY GEORGE S. MYERS.<sup>1</sup>

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In the winter of 1932-1933, aquarists in New York and Philadelphia obtained living specimens of a vertically-banded species of *Scatophagus* very different from the common spotted *S. argus*, which has been known as an aquarium fish in Europe and America for many years. Mr. W. T. Innes of Philadelphia gave a fine photograph (Innes, 1933, and 1935, p. 424) of the banded form under the name *Scatophagus tetracanthus* (Lacépède). The identification was undoubtedly based on the concept of the species of the genus as expressed by Fowler and Bean (1929, pp. 34-40). In this 1929 paper, but two species are recognized, a spotted one (*argus*) and a banded one (*tetracanthus*). Fowler and Bean mention the color as the sole distinguishing feature of the two species, and on this inadequate basis propose a new subgenus (*Desmoprenes*) with *Chaetodon tetracanthus* Lacépède as genotype. With both *argus* and *tetracanthus* Fowler and Bean synonymize several nominal forms.

Pellegrin (1935), evidently without knowledge of Fowler and Bean's paper, has criticized Innes's use of the name *tetracanthus* for the figured species. Pellegrin recognizes three species of *Scatophagus*, the spotted *argus* of the Indo-Malayan region, the banded *tetracanthus* of Africa and the banded *multifasciatus* of the Australian-Papuan region, and asserts that Innes's figure represents the last. Mr. Innes has asked me to pass judgment on the matter and I have examined the literature and the material in the National Museum.

I find that Pellegrin, in his differentiation of at least three species, is certainly correct. Further, Fowler and Bean have lumped at least two

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generically distinct forms under *tetracanthus*. Pellegrin shows clearly that the spotted *argus* and the banded *tetracanthus* are alike in form and in the comparatively large scales, which are very different from the minute, almost invisible scales of the banded Australian *multifasciatus*. Pellegrin, and apparently all other authors have, however, missed one very important and easily-seen difference, which, together with the trenchant character of the scales, seems to me to be of generic significance. In *argus* the gill-membranes, although connected with the isthmus anteriorly, form a distinct, deep, free fold across it. In *multifasciatus*, on the contrary, the gill-membranes are fully fused with the body, and the isthmus, though narrow, is smoothly connected with the thorax. No sign of a fold is present. Unfortunately, I have not been able to examine specimens of the true *tetracanthus*, but since it is so similar to *argus* in squamation and other respects (Pellegrin, 1933, pp. 106-107, fig. 62) I have little doubt in regard to its generic position.

Fowler and Bean's new subgenus *Desmoprenes*, based wholly on the color, is thus an erroneous conception, and since its stated genotype is *tetracanthus*, it falls as a synonym of *Scatophagus*. The distinct subgenus or genus represented by *multifasciatus* is left without a name.

I therefore propose the new genus **SELENOTOCA**, with *Scatophagus multifasciatus* Richardson (Voy. Erebus and Terror: 57, pl. 35) as its genotype, the generic characters being the tiny, almost invisible scales and the absence of a free fold across the isthmus. *Selenotoca multifasciata* is distinctly different from *S. argus* and *S. tetracanthus* in its form, the body being less elevated, the head longer, and the preorbital bone more elongate.

Some others of the nominal species of *Scatophagus* may be valid, but I am unable to comment on them due to lack of critical material. Certain young specimens (supposedly from the East Indies) which I have seen in aquaria have vertical bands or vertical rows of spots, as well as areas of bright red on the frontal region, below the origin of the spiny dorsal, below the origin of the soft dorsal, and on the upper part of the caudal peduncle. These specimens have recently received the name *Scatophagus rubifrons* from a certain German aquarium fish dealer. This name was evidently proposed only in his commercial correspondence or advertising matter, but it has gotten rather firmly fixed in some aquarium journals. Stoye (1932, pl. 165) figures four of these specimens in color under the name *S. rubifrons*. This fish has nothing to do with *Selenotoca multifasciata*. It is the young of *S. argus*, *S. tetracanthus*, or some other form.

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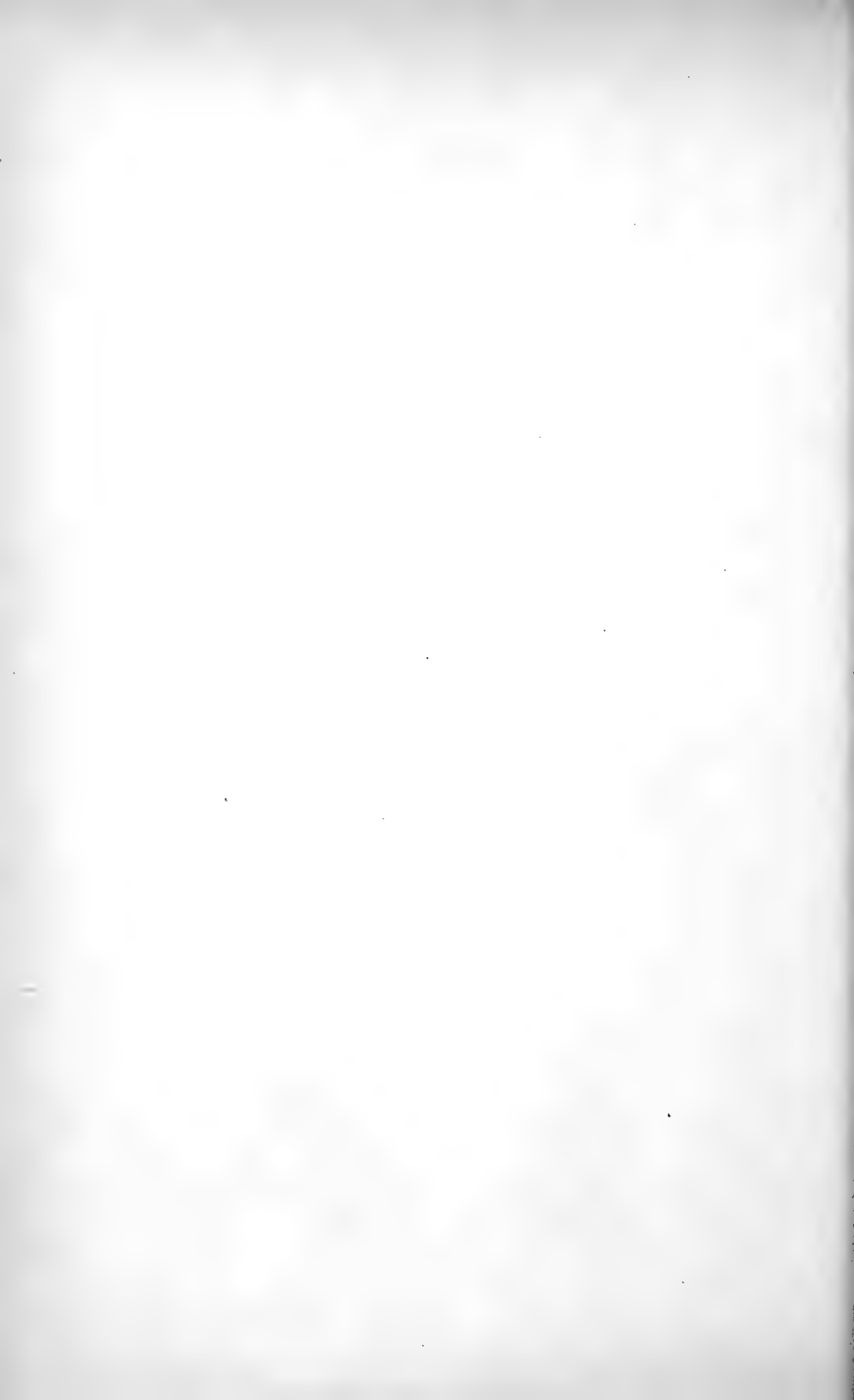
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DESCRIPTIONS OF NEW SPECIES OF LIZARDS OF  
THE GENUS *SCELOPORUS* FROM MEXICO.

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

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The following descriptions are based for the most part upon specimens collected by Dr. Edward H. Taylor and myself in Mexico. One species is described from a specimen in the National Museum, and a specimen in the American Museum of Natural History forms a paratype of another species.<sup>1</sup>

***Sceloporus cochranae*, sp. n.**

*Holotype*.—Male, U. S. N. M. No. 47605, collected on Mt. Zempoaltepec, Oaxaca, July 8, 1894, by E. W. Nelson and A. E. Goldman.

*Diagnosis*.—Head scales rugose; lateral scales in oblique series; dorsal scales about 44 from occiput to base of tail; two canthal scales; nasals and internasals separated from rostral; lateral nuchal scales strongly differentiated from dorsal nuchals; no postfemoral dermal pocket; scales on posterior surface of femora very small; femoral pores about 14; postanals enlarged in males; subcaudals keeled; venter uniform white or cream in males.

*Description of holotype*.—Head scales rugose; supraoculars five, the anterior three in contact with the median head scales; two to three incomplete rows of scales between supraoculars and superciliaries; interparietal three times as large as either parietal, triangular; parietal long; frontoparietals small, rounded, broadly in contact medially; frontal divided both transversely and longitudinally; prefrontals narrowly in contact; frontonasals three, subequal in size, the laterals in contact with canthals; two pairs of internasals, the posterior pair slightly smaller; two large, transversely elongate scales posterior to rostral, separating nasals and internasals from rostral; two canthals, the anterior not touching the

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<sup>1</sup> I am indebted to Dr. Doris Cochran, Dr. Leonhard Stejneger, Dr. G. K. Noble and Mr. C. F. Kauffield for numerous courtesies which made possible a study and description of specimens in the museums with which they are associated. Dr. Edward H. Taylor has given much valuable assistance. The study of Mexican *Sceloporus* has been forwarded by a grant from the Graduate Research Fund of the University of Kansas.

lorilabials and the posterior forming but a very small portion of the superciliary series; loreal and subnasal present; preocular represented by a small scale segmented from lower anterior edge of subocular; the latter contacts the second canthal above, separating preocular from second canthal; a single row of lorilabials, complete under subocular, composed of long, imbricate scales; upper labials four to a point below middle of eye, elongate, imbricating anteriorly, as do also the lorilabials; lower labials five to a point below middle of eye, imbricating posteriorly; labiomenal scales normal, not lengthened extremely; postmentals normal, the scales of the anterior pair in contact with each other medially and with the first infralabial laterally; the remainder of the postmentals separated medially and gradually decreasing in size posteriorly.

Two auricular lobules on each side, slightly smaller than preceding scales; lateral nuchal fold not surmounted by enlarged scales; scales in temporal region three or four times as large as those between ear and foreleg; scales in the latter region even smaller than or subequal in size to those in axilla; dorsal scales keeled, not or but very weakly mucronate, in about 15 rows across neck, distinctly differentiated from lateral nuchal scales, which are much smaller; lateral scales on body smaller than dorsals or ventrals, more weakly keeled than dorsals; ventrals slightly smaller than dorsals, slightly larger than laterals, not keeled or mucronate, not indented; no postfemoral dermal pocket; dorsals in ten rows between hind legs; dorsal caudals at base of tail slightly larger than dorsals on body, more strongly keeled; enlarged postanals present; tail strongly constricted behind base, round in cross section; subcaudals strongly keeled posterior to basal constriction.

Scales on dorsal surface of foreleg weakly keeled distally, more strongly keeled proximally, those on humerus somewhat larger than those of lower foreleg, subequal in size to dorsals of body; ventral scales of humerus very small, about equal in size to axillary scales, keeled; ventral scales of lower foreleg subequal in size to dorsals of the same member, smooth; lamellar formula for fingers, 7-?-17-17-10 (8-?-?-17-10); dorsal scales of hind leg subequal in size, strongly keeled, weakly mucronate, slightly larger than dorsals of body; scales on posterior surface of femur very small, much smaller than preanals, keeled; ventral scales of tibia almost as large as dorsals of same member; lamellar formula for toes, ?-13-17-21-14 (7-12-?-21-14).

*Color.*—A broad, lateral, dark brown band extending from temporal region onto base of tail; above this a broad, blue-green band extends from temporal region onto tail, sharply defined from dark lateral band; a broad median brownish band from occiput to tail, about five scale rows wide in middle of back, narrower on tail and not sharply defined from dorsolateral light band; ventral surfaces whitish, without distinctive lateral abdominal coloration; gular region with indistinct, broad, convergent, gray-blue bars, fading completely toward middle of throat; top of head brown.

*Remarks.*—One of the most distinctive characters of this species is the small size of the lateral nuchal scales, which character separates it from any other species of the *chrysoictis-siniiferus* group. In this character

it resembles various species of the *variabilis* group, from which *cochranae* is distinguished by lacking a postfemoral dorsal pocket. *Squamosus* and *carinatus* differ in possessing fewer femoral pores and a single canthal; *siniferus* has fewer femoral pores and no enlarged postanals in males; *chrysostrictus* has large scales on the posterior surface of the femur, keeled ventral caudals, and lacks a sharp constriction near the base of the tail; *jalapae*, *ochoterenae* and *maculosus* have more numerous femoral pores, closely approximated medially.

MEASUREMENTS AND SCALE COUNTS OF *Sceloporus cochranae*.

Snout to vent.....	43.0 mm.
Snout to occiput.....	9.7 "
Snout to ear.....	12.0 "
Tail.....	.....
Hind leg.....	34.7 "
4th toe.....	14.9 "
5th toe.....	6.4 "
Tibia.....	10.7 "
Lamellae 4th toe.....	20-21
Femoral pores.....	14-14
Dorsals.....	44
Ventrals.....	47
Scales around body.....	54
Scales to head length.....	13

***Sceloporus carinatus* sp. n.**

*Holotype*.—Male, EHT & HMS No. 4866, collected near Tuxtla Gutierrez, Chiapas, Mexico, September 4, 1935, by E. H. Taylor and Hobart M. Smith. *Paratype*.—Male, A. M. N. H. 58053, Tuxtla Gutierrez, Chiapas.

*Diagnosis*.—Head scales strongly keeled, frontal ridges prominent; laterals in oblique rows; femoral pores, 11-12, widely separated medially; one canthal scale; nasal separated from rostral; postanals in males not or but very slightly enlarged; scales on posterior surface of femur very small, but not granular; no dermal pocket at posterior margin of insertion of hind leg; dorsals 38-44 from occiput to base of tail, keeled and mucronate, about twice as large as laterals; labials imbricating; males uniform white below.

*Description of holotype*.—Dorsal head scales keeled or striated; frontal ridges very prominent, enclosing a depression; interparietal large, subtriangular in shape; a parietal on each side, each a little over 1/3 as large as interparietals; frontoparietals very broadly in contact medially; posterior section of frontal very small, about 1/5 or 1/6 as large as anterior section of frontal; latter divided longitudinally, its anterior edge about 1 1/3 wider than the posterior edge; a small median scale inserted between the prefrontals and frontal, separating the prefrontals but projecting only a short distance posteriorly between the halves of the anterior frontal; median frontonasal quite large, in contact with median scale between prefrontals;

lateral frontonasals subequal in size to median frontonasal; three small scales behind nasal, separating the latter from the posterior internasals and lateral frontonasals; two pairs of large internasals, the scales of the anterior pair in contact medially and separating the posterior pair from the rostral; nasal more or less rectangular, the naris pierced in the extreme posterior end, leaving only a narrow posterior rim; anterior part of nasal about as large as actual opening of naris; a pair of broad scales separating nasals and internasals from rostral.

Supraoculars large, in single series of five scales; row of scales between supraoculars and median head scales reduced, permitting several of the supraoculars to contact the median head scales; a single row of small scales between supraoculars and superciliaries (another incomplete row on one side); one large canthal; subnasal large; loreal single, square, somewhat smaller than subnasal; preocular divided, the lower part twice as large as the upper; a single row of lorilabials, the scales keeled; about 3 1/2 upper labials to a point below middle of eye; fourth upper labial narrowly in contact with subocular posteriorly; infralabials long, about three to a point below middle of eye; only a single row of labimentals, consisting of a series of very long, narrow scales, becoming increasingly narrow anteriorly, separated from mental by 1/3 or 1/4 the length of the first infralabial; three pairs of well differentiated postmentals, the scales of the anterior pair in contact, separated in the others.

Several large, irregular scales behind parietals and interparietal; scales in temporal and median gular regions and in area between ear and lateral nuchal fold subequal in size; two very small, median auricular lobules, smaller than the preceding scales; lateral nuchal fold extremely deep; dorsal nuchals above fold in 10 longitudinal rows, not well differentiated from lateral nuchals; scales in axilla and groin squamous, not granular; dorsals 38 from occiput to base of tail, rather strongly keeled, moderately strongly mucronate; eight rows of dorsals between insertions of hind legs; ventrals and laterals subequal in size, about half as large as dorsals; laterals not strongly differentiated from dorsals, and not so strongly keeled; ventral scales pointed, smooth (a slight indication of keels on preanal scale); ventral nuchal scales about half as large as median ventrals of abdomen.

Dorsal scales of forelimb subequal to lateral abdominal scales in size, carination and mucronation; ventral scales of same member keeled and mucronate, those of upper foreleg smaller than those of lower foreleg, and about 1/2 size of dorsal scales of same member; lamellar formula for fingers 6-11-16-17-9 (7-11-16-17-10).

Dorsal scales of hind leg and back subequal; ventral scales of hind limb smooth, those of tibia almost as large as dorsals of same member, rounded at tips; ventral scales of femur about 1/2 to 1/3 as large as dorsals of same member, mucronate; scales on posterior surface of femur 1/3 to 1/4 as large as preanals, smooth except in a small median area; no postfemoral dermal pocket; lamellar formula for toes 8-11-16-22-12 (8-11-17-22-13); postanals not noticeably enlarged; ventral caudals keeled almost to anus.

*Color.*—An indistinct slate-colored band passing from posterior margin



of eye above arm to groin and onto tail, very indistinctly broken into spots on sides of body; a narrow light line, slightly tinged with pink, from upper edge of lateral nuchal fold to shoulder; above lateral dark line a narrow, very indistinct lighter line of a greenish cast, passing from region above ear to base of tail; between these lines is a broad, dull brown band, with a series of V-shaped black marks in the middle, their apices caudad; these marks more distinct posteriorly and light bordered, apparently fusing into a median dark band anteriorly, disappearing on neck; head brown, with a slight reddish tinge; legs rather distinctly banded; two small, round, orange-colored spots on posterior surface of femur; ventral surfaces white, with suffusion of slate on sides of abdomen, anteroventral surface of femur and on ventral surface of tail.

*Variation.*—The paratype varies in scalation and coloration but little from the holotype. The gular region is irregularly barred.

MEASUREMENTS AND SCALE COUNTS OF *Sceloporus carinatus*.

Number.....	4866	58053
Snout to vent.....	55.0	46.0
Snout to occiput.....	12.0	10.2
Snout to ear.....	15.0	12.3
Tail.....	.....	.....
Hind Leg.....	40.0	37.0
Tibia.....	12.0	10.5
4th toe.....	16.2	15.7
5th toe.....	5.2	5.3
Lamellae 4th toe.....	22-22	22-23
Femoral pores.....	11-11	11-12
Dorsals.....	38	44
Dorsals to head length.....	10	9.5
Scales around body.....	42	49
Ventrals.....	44	50

*Remarks.*—This species is apparently most closely related to *Sceloporus squamosus*, from which it differs by having a larger number of femoral pores, dorsal scales smaller, postanal scales not distinctly enlarged in males and ten longitudinal rows of dorsal scales on neck and back (eight in *squamosus*). *S. siniferus* differs from this species by having a smaller number of femoral pores, two canthal scales, dorsal scales in 8 longitudinal rows, and less distinctly mucronate ventral scales. *S. chrysostictus* differs from this species in having a different coloration, more numerous femoral pores, more rows of dorsal scales across rump, tail not constricted near base, scales on posterior surface of femur much larger, canthal not so large when single, interorbital region not strongly ridged, and labimentals not so narrow. *Sceloporus cochranæ* differs in having lateral nuchal scales much smaller than and strongly differentiated from dorsal nuchal scales, postanals distinctly enlarged, and two canthal scales.

The type was discovered running about in high grass near a narrow path on the side of a low mountain four or five miles south of Tuxtla Gutierrez.

**Sceloporus lineolateralis** sp. n.

*Holotype*.—EHT & HMS No. 4323, male, collected 6 miles northeast of Pedriceña, Durango, August 27, 1932, by Edward H. Taylor and Hobart M. Smith. *Paratypes*.—25, including 19 topotypes (EHT & HMS Nos. 4321, 4322, 4324–4326, 4322–4340, 4342, 4343, 4363, 4372 a and b); and six collected 14 miles northeast of Pedriceña, Durango, August 29, 1932 (EHT & HMS Nos. 4471–4476). All collected by Edward H. Taylor and Hobart M. Smith.

*Diagnosis*.—A species of moderate size belonging to the *torquatus* group; dorsal head scales smooth; lateral scales about half as large as median dorsals, but not strongly differentiated from them; ventral scales about one third as large as laterals; longitudinal rows of dorsals converging toward median line; 38 to 45 scales from occiput to base of tail; length of tibia about equal to length of shielded part of head; length of fourth toe about equal to distance between snout and posterior margin of ear; hind limb reaches to ear; 14 to 20 femoral pores, not extending onto preanal region; enlarged supraoculars in a single row; two canthals; a narrow, uninterrupted black collar on neck, arising from shoulder, with a light, sometimes medially interrupted, posterior border; sides of belly in males china blue, very slightly darker medially; gular region very pale blue.

*Description of type*.—Dorsal head scales smooth; a single row of enlarged supraoculars, bordered medially by a single row of small scales, and separated from the superciliaries by one complete and another incomplete row of scales; seven superciliaries, the last overlapping the preceding two (the sixth superciliary is entirely overlapped by the fifth); one large, heavily keeled subocular, followed posteriorly by a series of seven scales which curves upward about the orbit, contacting the parietal; lower two postocular scales strongly keeled; the series of scales between supraoculars and frontals continued downward between postoculars and margin of orbit, terminating at the second postocular (from the subocular); preocular scale strongly keeled, in contact with second canthal and with the rows of scales above supralabials; loreal larger than subnasal, smaller than preocular, in contact with both canthals; two rows of low, elongate scales above supralabials, the lower row continuing around snout, passing above rostral, the other terminating anteriorly below the subnasal; two canthals, the second with but a very small portion entering the superciliary series; rostral low, about three times as broad as high; interparietal at least twice as large as parietal, separated from frontal by a pair of frontoparietals in contact medially; a single large parietal on each side; frontal divided transversely, the anterior section about one-half larger than posterior; two prefrontals, broadly in contact on median line, larger than anterior section of frontal; three frontonasals, the median about as large as either prefrontal; the lateral frontonasals somewhat smaller, in contact with both loreals; three irregular pairs of internasals, the posterior pair the largest and in contact with the frontonasals, the anterior pair smallest and in contact with the row of scales behind rostral; a single small scale separates the posterior internasals from anterior loreal, but does not enter series about nasal; latter broadly in contact with subnasal, narrowly in contact

with row of scales above rostral, and surrounded above by four small scales.

Four supra- and five infralabials to a point below the middle of the eye; mental pentagonal, its labial border about two-thirds that of rostral; mental followed by a series of four or five enlarged scales on each side, the anterior in contact with its fellow on the median ventral line; this series of scales separated from infralabials anteriorly by a single row of elongate scales (except anterior, which is narrowly in contact with anterior infralabial), posteriorly by two rows, beginning below the middle of the third infralabial; scales on dorsal and lateral surfaces of head (including temporal region) more or less pitted; scales in temporal region keeled, mucronate in area near ear; four or five rows of scales on neck behind occiput nearly smooth, not or but weakly mucronate; anterior margin of ear with four smooth, pointed scales, the upper largest and larger than preceding scales; lateral neck fold low, relatively shallow, a weak fold from its upper margin to lower margin of ear; the scales surmounting this fold no larger than those adjacent, much smaller than those in the lateral gular region; median anterior gulars smaller than posterior median gulars; lateral gulars in region near angle of jaws much larger than median gulars; scale rows on neck parallel, abruptly differentiated from the scale rows arising near the insertion of the foreleg and passing obliquely upward onto back; median dorsals weakly keeled, mucronate, usually with not over one lateral mucrone, except on neck, where there may be as many as two; median dorsals about twice as large as laterals, gradually differentiated from them; laterals three or four times as large as median ventrals midway between fore and hind limbs; laterals more strongly keeled and mucronate than dorsals, with as many as three lateral mucrones; scales in axilla very small, smooth, rounded; scales following axilla gradually increasing in size and becoming more strongly mucronate, but smooth for about one-third the distance from axilla to groin.

Dorsal scales of upper and lower foreleg keeled and mucronate, the former somewhat smaller than dorsals on upper foreleg; dorsal scales on hand and toes smooth or very weakly keeled, the former slightly mucronate, some of the latter bi- or tricuspid; one dorsal, two lateral and one ventral row of scales around fingers and toes, all continuous to tip except the two laterals, which terminate behind the last scale of the other series; ventral scales of upper and lower foreleg smooth, the latter about twice as large as former; scales of palm and sole weakly keeled and mucronate; ventral lamellae with three or five mucrones, about equal in size; lamellar formula for fingers 9-13-16-16-14 (9-13-16-15-14).

Dorsals of tibia and femur strongly keeled, mucronate, about the size of median laterals; anterior ventrals of femur and ventrals on tibia subequal in size; ventrals on femur decreasing in size toward femoral pores; lamellar formula for toes 7-12-19-21-18 (8-12-18-?-17); breast scales much larger than median ventral abdominal scales; median ventrals increasing in size laterally, merging with laterals; anterior preanal scales about equal in size to those anterior to series of femoral pores; a pair of enlarged postanals; dorsal scale rows converging on base of tail; scales behind femoral pores,

except one or two rows immediately adjacent to femoral pores, keeled, with three mucrones, of about the same size as those preceding the pore series; dorsal scale rows of tail somewhat larger than median dorsals on body, more strongly keeled and mucronate.

Back, dorsal surface of limbs, and temporal region of head glaucous to pale blue; sides of body tinged with gray; a narrow black collar two or three scale rows wide on neck, arising almost straight from shoulders and not continued onto ventral surfaces; anterior and posterior borders of collar parallel, the latter with a light edge one or two scales wide; a few indistinct light spots on neck; sides of belly from axilla to groin china blue, lighter toward axilla, darker posteriorly; a small black area in groin; median edges of lateral blue areas very slightly darker, with no less than five rows of cream colored scales separating them; gular region and breast very pale blue, the breast suffused with gray; ventral surfaces of limbs and tail cream.

*Variation.*—Enlarged supraoculars invariably in a single series; in three specimens two incomplete as well as one complete row of small scales between supraoculars and superciliaries, latter usually six in number; the row of postoculars from the posterior border of the subocular to the temporal is irregular, but always two rather strongly keeled scales follow the subocular; the series of scales intercalated between the supraoculars and frontal is continued around the posterior border of the orbit in all specimens; the loreal contacts both canthals in all but one specimen (one side only); the preocular invariably touches the second canthal, but in ten specimens the lower portion is broken off to form an extra scute separating the remainder of the preocular from the rows of scales above supralabials; these latter rows of scales irregular, sometimes but a single scale separating medially the subocular from the supralabials; in all but one specimen one of the rows (apparently the upper one as a rule) is continuous around the snout above the rostral; in this one specimen the median scale above the rostral is apparently fused with the latter, the anterior pair of internasals thus contacting the rostral; nineteen specimens have the frontoparietals separated, the frontal and interparietal in contact; the prefrontals and frontonasals are as in the type in all specimens; the internasals and scales about the nasals, however, are too irregular for description of variation, although very frequently (perhaps normally) they are as in the type; character of scales on body and limbs uniform throughout.

The coloration of the males is practically identical with that of the type. A light line, barely visible in the type, passes from the upper labials directly through the ear to the black nuchal collar, passing above the lateral cervical fold; this line is more distinct in the young males, and is bordered above by a narrow black line arising on the posterior margin of the orbit and passing through the extreme upper edge of the ear and thence to the black collar. This line is variable and is most distinct in the young. In ventral coloration there is but little variation. The smallest male (44 mm. snout to vent) has very different lateral abdominal areas of blue, but the gular region and breast are white. In a male 54 mm. from snout to vent the gular region is as in the type, but with small scattered white flecks. The breast and median abdominal regions become grayish with increased size.

The females are markedly different from the males in coloration of the back. A light (whitish) line passes from above the insertion of the foreleg along the side of the body to the groin; above this is an irregular black line formed by the fusion of large black spots, which project upward from the black line; the latter arises from the upper margin of the insertion of the foreleg, separated from the black neck collar by the light posterior border of the latter; below the lateral light line is a narrow, indistinct and incomplete black line; on each side of the back is a row of large black spots, about six on each side; the ventral surfaces of the body, with the exception of the region anterior to the gular fold, is grayish.

Of the other described species of the *torquatus* group, only *jarrovi*, *torquatus*, *ferraripezezi*, *bulleri*, *serrifer* and *guentheri* have the supraoculars large, in a single row. *Guentheri* may be distinguished by having a much longer fourth toe. *Serrifer*, *torquatus* and *ferraripezezi* have much larger dorsal scales, with the lateral dorsals larger than the median dorsals. *Jarrovi* differs not only in having the dorsal scale rows parallel, but in having the lateral scales larger, much shorter hind legs, different coloration, etc. *Bulleri* has shorter hind legs, larger scales on the body, a broad neck band and much different ventral coloration.

It is of interest that in at least five of these species (*jarrovi*, *torquatus*, *ferraripezezi*, *serrifer*, and *lineolateralis*) the normal or very frequently occurring condition is for the frontal to contact the interparietal. This condition may occur in *guentheri* (not stated in descriptions), but in most of the forms with two rows of supraoculars, it occurs rarely (frequently in *dugesi*).

In body proportions, the narrow nuchal collar, the shape of the tail, and in various relationships of the head scales, *lineolateralis* suggests *formosus*. The nine species of this group (*formosus* Wiegmann, *irazuensis* Günther, *lunaei* Bocourt, *malachiticus* Cope, *salvini* Günther, *schmidti* Jones, *smaragdinus* Bocourt, *taeniocnemis* Cope, and *viviparus* Cope) which have been described are not, however, comparable by description to the species here described, nor has direct comparison with many specimens of the *formosus* group from many localities in Central America and Mexico shown any close relationship of these species with *lineolateralis*.

*Remarks.*—In some respects *lineolateralis* resembles *jarrovi*, a species which is closely associated geographically. It is possible that Boulenger's (1897) and Günther's (1890) specimens from Ciudad, Durango, are actually of *lineolateralis* and not of *jarrovi*.

#### EXPLANATION OF PLATES.

##### PLATE II.

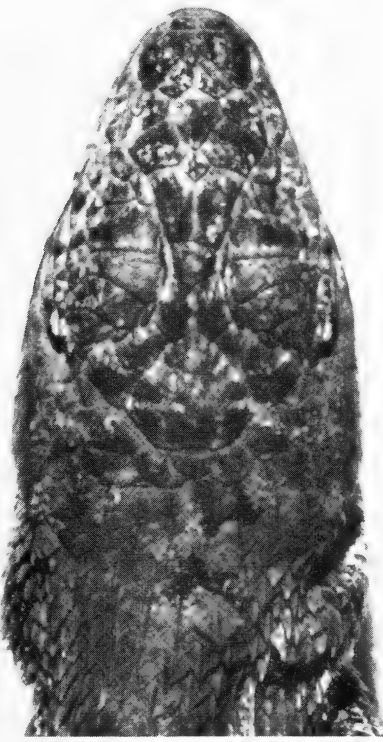
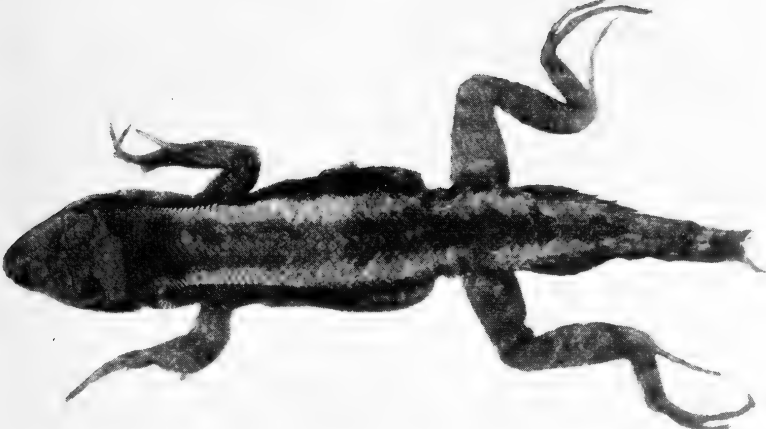
Fig. 1. *Sceloporus cochranæ*. Snout to vent measurement, 43 mm.  
Figs. 2 and 3. Head plates of *Sceloporus carinatus*. No. 4866. Snout to occiput measurement, 12 mm.

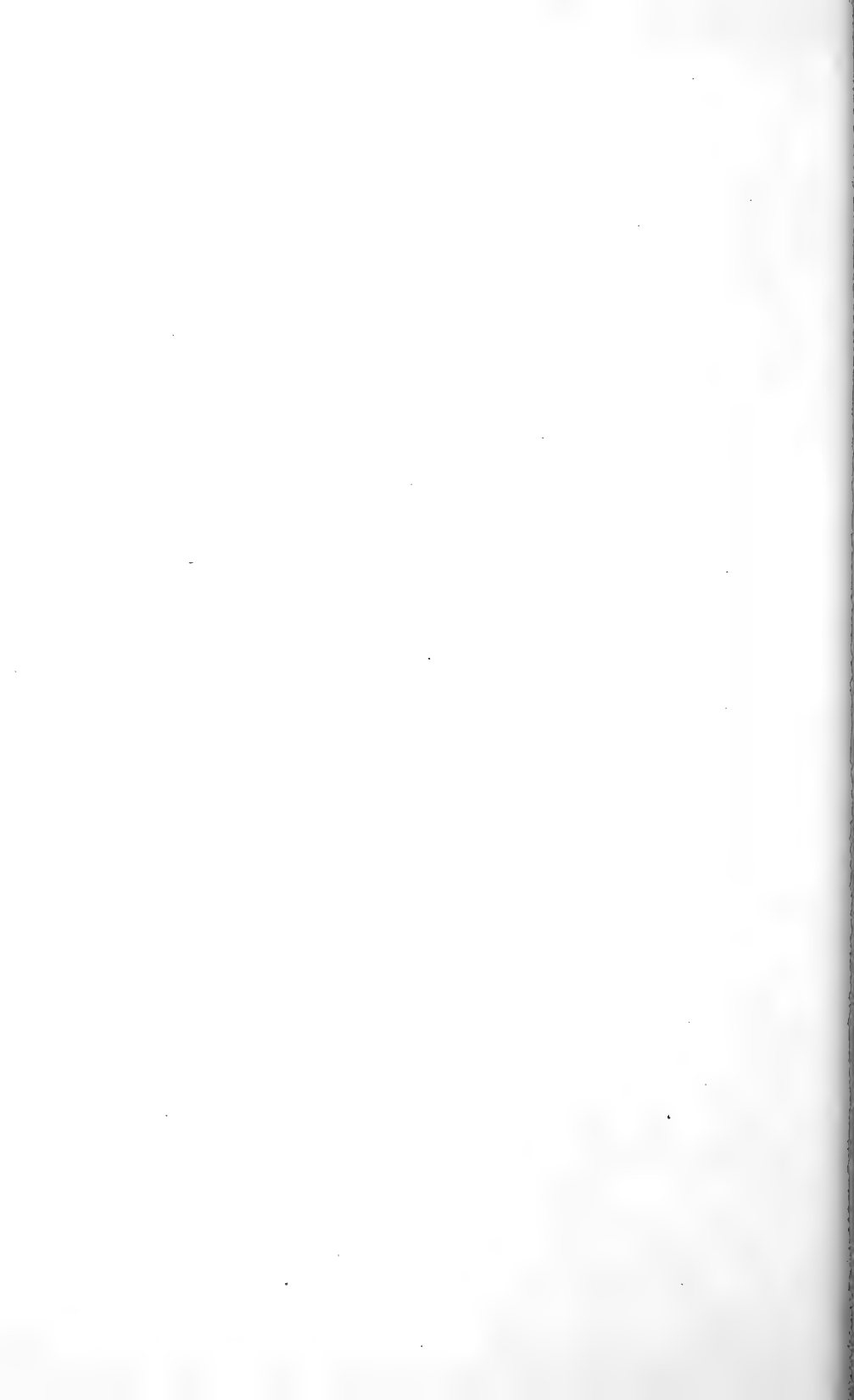
##### PLATE III.

Figs. 1 and 2. Head plates of *Sceloporus cochranæ*. Snout to occiput measurement, 9.7 mm.

MEASUREMENTS AND SCALE COUNTS OF *Sceloporus lineolateralis* sp. n.

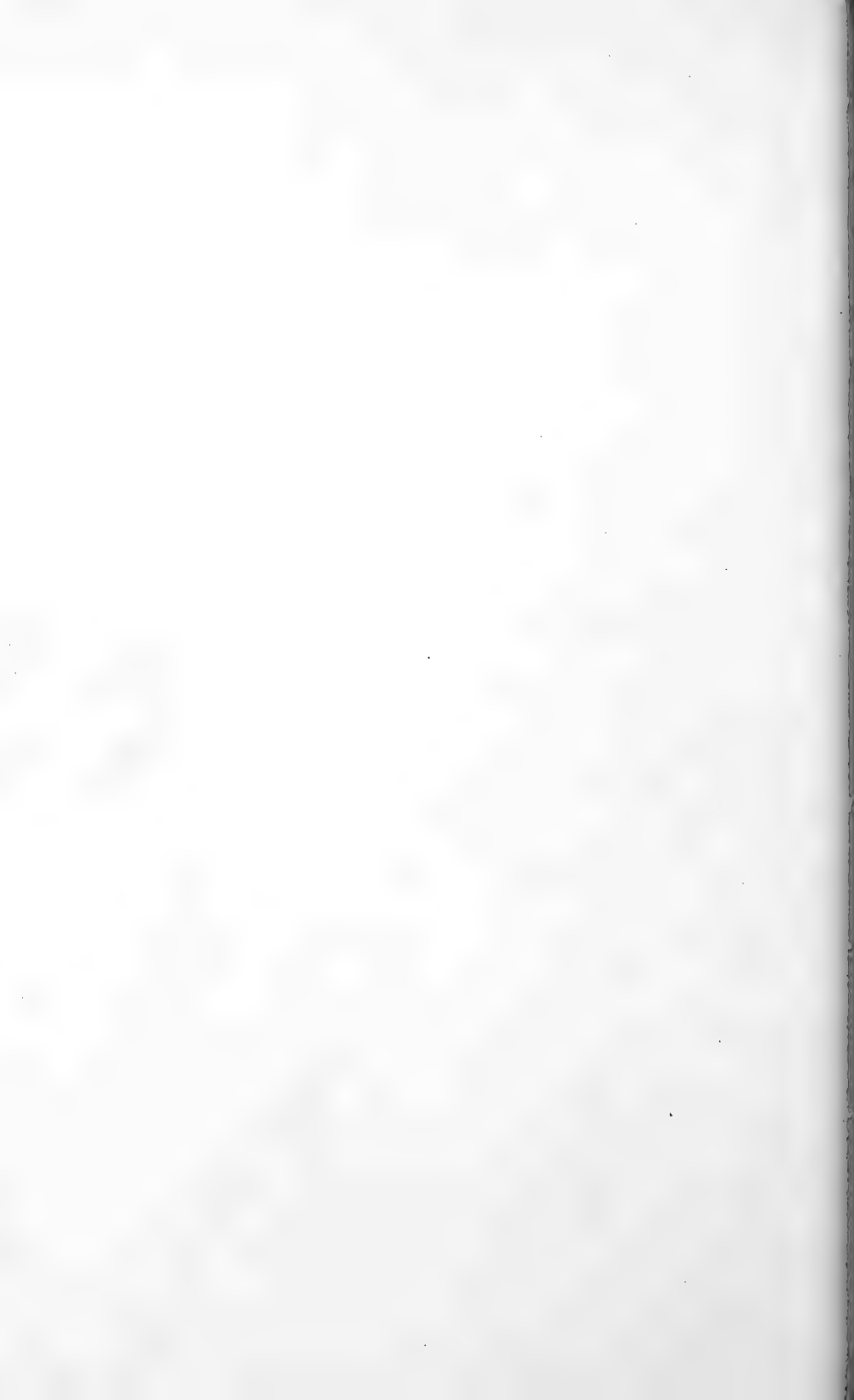
Number.....	4363	4323	4332	4338	4325	4339	4333	4321	4322	4473	4474	4337	4340	4326	4324
Snout to vent.....	73.0	72.0	71.0	69.5	69.5	67.0	65.0	63.5	63.5	60.5+	58.5	55.0	53.0	51.0	49.0
Tail.....		91. +	89. +	reg. +	reg.	reg.	111.0	reg.		111.5		83.5+			86.0
Snout to occiput.....	14.0	15.0	14.7	14.0	14.5	14.5	13.5	13.5	13.0	13.0	12.0	11.5	11.0	12.0	11.5
Snout to ear.....	17.5	19.5	19.0	18.0	19.0	18.5	15.5	17.0	16.5	16.5	15.0	14.0	13.5	14.5	13.8
Hind leg.....	48.5	51.0	49.5	48.0	50.0	48.5	46.0	46.0	44.9	48.5	42.0	40.0	45.0	39.5	36.0
Tibia.....	13.5	15.0	14.0	14.0	15.5	13.5	14.5	13.5	12.0	14.0	12.0	12.0	11.0	12.7	10.5
4th toe.....	17.0	19.0	18.5	17.0	19.5	18.5	17.5	16.5	16.7	18.0	16.5	15.5	14.5	15.9	13.0
5th toe.....	9.0	11.0	10.0	9.2	10.5	9.5	9.1	9.0	9.2	9.0	9.1	8.7	7.5	8.5	7.3
Lamellae 4th toe.....	19.0	21.0	20.0	20.0	20.0	21.0	19.0	19.0	19.0	20.0	21.0	21.0	19.0	19.0	21.0
Femoral pores.....	17-18	19-19	19-19	16-16	18-19	18-19	20-?	14-15	17-17	20-20	17-18	19-20	18-?	18-18	19-?
Dorsals.....	41.0	40.0	38.0	43.0	41.0	38.0	43.0	40.0	42.0	45.0	40.0	44.0	43.0	41.0	45.0
Ventrals.....	61.0	65.0	60.0	61.0	67.0	65.0	62.0	60.0	59.0	58.0	62.0	65.0	62.0	58.0	64.0
Scales around body..	46.0	52.0	49.0	47.0	49.0	56.0	53.0	46.0	53.0	52.0	50.0	49.0	48.0	53.0	54.0
Scales to head length	8.0	9.0	8.0	8.0	9.0	8.5	9.0	8.0	9.0	9.0	8.0	10.0	8.5	10.0	11.5
Ratio hind leg to snout-vent.....	66.4	70.8	69.7	69.0	71.9	72.3	70.7	73.4	70.7	71.7	72.7	72.7	84.9	77.4	69.6
Ratio 4th toe to snout-vent.....	23.2	26.3	26.0	24.1	28.0	27.6	26.9	24.4	26.2	28.2	28.1	28.1	27.3	31.1	28.5
Sex.....	♀	♂	♂	♀	♂	♂	♀	♀	♀	♀	♀	♂	♀	♂	♂











PROCEEDINGS  
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A NEW CHARACID FISH OF THE GENUS *HYPHES-*  
*OBRYCON* FROM THE PERUVIAN AMAZON.

BY GEORGE S. MYERS.<sup>1</sup>

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The gorgeous little fish described below was received from Mr. William T. Innes of Philadelphia with a request for its identification.

***Hyphessobrycon innesi*, new species.**

*Holotype*.—U. S. N. M. 102109, an adult female 22.65 mm. standard length. It formed part of an importation obtained by a French collector of aquarium fishes in the Peruvian Amazon; it was received by Mr. Innes directly from the importer in Paris for identification, together with information making it seem likely that the locality was near Iquitos.

A very small species similar to *H. catableptus* (Durbin), differing in the much larger eye, the narrower interorbital, the absence of a naked margin below the great suborbital, the fewer maxillary teeth, the shorter lateral line, the greater body depth and the slightly different relative positions of the fins.

Dorsal 11. Anal with a very short first ray, a second half the height of the fin, and 19 principal rays. Scales lateral 32 or 33, transverse from dorsal origin to pelvics 9, predorsal 10. Preventral scales normal. Lateral line on 3 scales. Body scales largest on belly. Rakers on lower limb of first gill arch about 10 or 11. Head 3.77 in standard length, depth 2.83. Eye 2.04 in head, caudal fin 1.09, least depth peduncle 2.60. Interorbital 1.35 in orbit. Snout much shorter than eye. Occipital process very short, not half eye, bordered by 2.5 scales. Mouth very small and narrow. Great suborbital completely covering cheek except for narrow naked border along vertical limb of preopercle. Maxillary about as long as interorbital. Each premaxillary with an inner series of 5 and an outer series of 3 or 4 tricuspid teeth. Maxillary with two tricuspid teeth followed by one conical tooth, all at upper end. Lower jaw with single series of tricuspid teeth graduated to smaller (conical?) ones at rear. All tricuspid teeth rather narrow with middle cusp high. Caudal naked. Anal sheath reduced to 2 or 3 scales not extending on fin, whose margin is concave. Origin of

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

dorsal equidistant from caudal base and snout tip, slightly behind pelvics. Anal origin under base of last dorsal ray. Pectorals reach  $\frac{2}{3}$  distance from their bases to pelvics, which just reach anal. Back above midline of sides very dark, small areas in centers of upper scales light. Lower part of sides very pale, this light area extending back over all the peduncle save its upper border. Lower border of peduncle at caudal faintly dark. No caudal spot. Humeral spot large, very faint, its upper half involved in dark color of back. Fins plain. In life perhaps the most brilliant characin known. A brilliant metallic line, varying from emerald to caerulean blue, from upper part of eye to upper surface of peduncle. Belly bright golden yellow. Entire peduncle and lower sides behind pelvics intense vermilion.

I take particular pleasure in naming this fish for my friend Mr. William T. Innes.

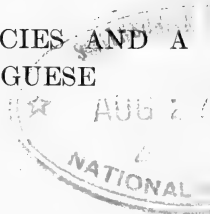
PROCEEDINGS  
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A NEW CYPRINID GENUS AND SPECIES AND A  
NEW CHARACIN FROM PORTUGUESE  
EAST AFRICA.

BY ALBERT W. HERRE,  
*Stanford University, California.*

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On April 30th, 1934, I was able to spend a few hours ashore at Beira, Portuguese East Africa. A car was hired and a man engaged to take me to some fresh water stream. The Beira terrain is exceedingly flat; it was therefore necessary to drive a considerable distance to reach strictly fresh water streams. Finally a vast savanna was reached where huge boiling springs, rapidly flowing ditches, and sheets of water cover practically the entire area for thirty or more kilometers. Across this an automobile road extends to the far distant hills. Fishes swarmed everywhere, mainly Cyprinids and Characins; the species are few but some occur in great schools. The fishes of this region are very imperfectly known, little having been done since Peters explored the rivers of Mozambique about 90 years ago.

The small collection made not only yielded several rare forms, but also a new genus and species of Cyprinidae and a new characin.

**BEIRABARBUS** Herre, new genus.

Related to *Cyclocheilichthys* Bleeker, from which it is separated by having the postlabial groove interrupted in the middle, and by the weak, smooth dorsal spine. Mouth small, inferior; scales radiately striated; lateral line complete, running in the middle of the tail, sensory tubes simple. Entire head covered with many parallel sensory ridges. Dorsal origin before ventral origin, with 2 or 3 spines and 8 branched rays; ventral with 5 rays. Pharyngeal teeth pointed, 4.3-3.4 or 3.2-2.3. Gill opening somewhat restricted.

Type *Beirabarbub palustris* Herre, new species.

**Beirabarus palustris** Herre, new species.

Dorsal III or II-8; anal III-5; scales in lateral line 26 plus 1, transverse  $3\frac{1}{2}$  above,  $3\frac{1}{2}$  below; predorsal 8; around caudal peduncle, 12; gill rakers 2 plus 3 or 2, plus 4 or 5 tubercles.

The depth is 3 to 3.15, head 3.5 to 4, caudal 3.25 to 3.4 times in standard length. The compressed oblong body is strongly elevated behind the head in adults; belly thick, broadly rounded, the ventral profile convex; the head is small, the snout bluntly rounded. Eye 3.33 to 4, snout 3.1 to 3.4, interorbital 2.66 to 3 times in head. Rostral barbel minute, maxillary barbel more than twice in eye, about equal to diameter of pupil. Angle of maxillary concealed by the broad preorbital. Origin of dorsal much nearer tip of snout than caudal, opposite 9th scale of lateral line; ventral origin beneath second or third dorsal spine. Dorsal height equals head; anal height 1.5 to 1.75 in head; least height of caudal peduncle 1.5 in its own length and 1.88 to 2 times in head. The ventral equals the pectoral, 5.2 to 5.8 in length. Caudal broad, deeply forked, lobes pointed. Posterior nostril large, very close to eye; anterior nostril with a tubulate flap; mouth extending beneath posterior nostril. Scales with 4 or 5 basal and 5 or 6 apical radii and 1 to several partial radii; circuli fine, 50 to 60.

Juvenile specimens are much slenderer, but otherwise hardly differ.

In life the general color is reddish olive brown, with violet, bluish red, and purplish iridescence; a black lateral stripe extends from tip of snout to caudal base.

Color in alcohol dark reddish brown, each scale on upper two-thirds of body with a blackish vertical bar or lunula, which may completely cover it; a black stripe from snout tip to caudal base; top of the head blackish brown; fins all clear, or the rays more or less dusky.

Described from the type, 60 mm. long, and many paratypes 19 to 60 mm. in length. 225 specimens were taken from the vast swampy savanna about twelve kilometers from Beira, Portuguese East Africa, where this little fish occurs in large schools.

## Family CHARACINIDAE.

**Petersius barnardi** Herre, new species.

Dorsal II-6; anal II-16-18; lateral line incomplete, 9 or 10 tubulated scales; longitudinal series of scales, 28 or 29 plus 2; transverse, 9; predorsal 12 (very rarely 14); gill rakers 4 to 6 plus 16 or 18.

Depth 3.78 to 3.4, head 3.75 to 3.8, caudal 3, pectoral 4.85, ventral 6.2 in length; eye 3, snout 4.5, maxillary 3 to 3.1, interorbital 3.6, least depth of caudal peduncle 3 times in head. The body is strongly compressed, the upper profile slightly convex, ventral profile much more arched; the lower jaw projects slightly beyond snout; mouth oblique, the maxillary nearly vertical, covering the hind part of the mouth and extending beneath front margin of eye; teeth tricuspid; upper jaw with 12 in outer row, 4 or 6 in inner row, alternating with outer row; 6 teeth in lower jaw. Dorsal height 1.5, anal height 2.25 to 2.5 in head; origin of dorsal behind vertical from ventral base, midway between caudal base and anterior portion or front

margin of eye; adipose fin very small, its length 1.5 in eye; caudal peduncle depth  $1\frac{1}{3}$  in its own length.

Color in life olive brown with silvery and reddish iridescence, becoming dusky along the back and pale or buff ventrally; a black stripe from upper angle of gill opening to caudal base, much broader on posterior half; a black bar, broadest anteriorly above anal base.

Color in alcohol light reddish brown, dusky along the back, the sides and opercle more or less thickly strewn with black dots; a black stripe from upper angle of opercle to caudal base, broadest in the middle and posteriorly, narrower on caudal peduncle; a black bar above anal base, broadest anteriorly; top of head dull brown or black; dorsal, anal, and caudal rays usually covered with black specks, but they may be on all fin rays or all fins may be clear.

Described from the type 34 mm. long, and 84 paratypes 14 to 34 mm. in length. Taken from roadside ditches about 12 kilometers from Beira, Portuguese East Africa, in company with *Beirabarbuis palustris*.

Named in honor of Dr. K. H. Barnard, whose publications are invaluable to the student of South and East African fishes.





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A NEW POCKET GOPHER FROM KERN COUNTY,  
CALIFORNIA.

BY JOSEPH GRINNELL AND JOHN ERIC HILL,  
*Museum of Vertebrate Zoology, University of California.*

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At the extreme southern end of the Sierra Nevada, in south-central California, lying between the gap comprised in the canyon of the Kern River and Walker Pass at the north, and Tehachapi Pass at the south, is a mountain mass of which Piute Mountain, 8440 feet altitude, is the highest point. Material at hand indicates that the population of pocket gophers inhabiting the higher parts of that mountain mass has responded appreciably to the factors in part, probably, involved in altitudinal isolation. This differentiated population may be called

***Thomomys bottae piutensis*, new subspecies.**

PIUTE MOUNTAIN POCKET GOPHER.

*Type*.—Adult female, skin and skull; no. 60051, Mus. Vert. Zool.; French Gulch, Piute Mountains, altitude 6700 feet, 2½ miles northwest Claraville, Kern County, California; collected by David S. MacKaye (orig. no. 259), October 23, 1933.

*Diagnosis*.—A moderately small, dull colored pocket gopher; smaller and grayer than *T. b. alpinus* or *T. b. pascalis*; darker, less brightly ochraceous-buff, than *T. b. perpes*. Coloration (summer pelage, worn): Upper parts Cinnamon-Buff (in some specimens more nearly Buffy Brown) obscured with blackish; head and face the same with admixture of Chaetura Drab; ear patch large, Blackish Slate; feet, tail (or at least terminal half of it), and insides of cheek pouches, white. Under parts whitish (bases of hairs Deep Neutral Gray) tinted more or less faintly with Light Ochraceous-Buff. Winter pelage (fresh, in molting individuals) much darker in general effect than summer pelage, because of reduced widths of subterminal light bands; top of head in some examples almost black; under parts lighter than in summer pelage. (Color terms used here, capitalized, from Ridgway,

Color Standards, 1912.) Skull notably slender; rostrum slender; nasals moderately long; zygomatic arches not widely spreading nor squarish, anterolateral angle produced, sides of zygomata excavate, posterolateral angle not produced; brain-case narrow; occiput rounded and without marked rugosities; temporal ridges light except in very old males; tympanic and mastoid bullae small but well rounded. Incisors of moderate size, slightly procumbent, more so than in *perpes*, *T. b. awahnee* or *alpinus*. Males only a little larger than females, but skull somewhat more massive, with muscle attachments more pronounced.

*Measurements.*—Of type, female: Weight 100 grams; total length 210 millimeters, tail 65, hind foot 28, ear from crown 7. Skull: basilar length 29.8, length nasals 12.0, zygomatic breadth 21.8, width rostrum 7.0, interorbital width 6.3, mastoid width 18.0, alveolar length upper molar series 7.4, width incisor 2.0.

*Comparisons.*—Compared with the skull of *alpinus*, that of *piutensis* is smaller, with: decidedly narrower rostrum, and narrower interorbital region and brain-case; less widely spreading zygomata; more rounded occiput; less strongly in-curved incisors; and smaller molars. *Piutensis* is of about same size as *awahnee*, but with: sides of zygomata stouter, more excavate; anterolateral angle of zygomata produced, while posterolateral angle not distinct from postzygomatic crest; zygomata not converging anteriorly; incisors less sharply in-curved. Rostrum slenderer than in *perpes*; interorbital region and brain-case narrower; hamulus of lacrimal smaller; anterolateral angle of zygomata more produced, and sides more excavate; tympanic bullae smaller, less inflated; interpterygoid region narrower; molars decidedly smaller. Compared with *pascalis*, skull much less angular and massive; zygomata weaker; occiput not sharply demarked from dorsum of skull, more rounded and less rugose; rostrum weaker; tympanic bullae much smaller.

*Distribution.*—Specimens have been examined from the following localities in Kern County, California: Piute Mountain, 11; Walker Basin, 16 (more or less atypical); Kelso Valley, 6 (not typical).

*Remarks.*—Bailey, in his monograph (North American Fauna No. 39, 1915, p. 65), identified specimens of pocket gopher from the Piute Mountains as *Thomomys alpinus awahnee*, but the ones in the collection here are sufficiently distinct from both *alpinus* proper and *awahnee* to be separately designated. The specimens from the lower, western part of Walker Basin appear to be intergrading toward *pascalis*, and the entire Walker Basin population is variable. Gophers from Kelso Valley, lying to the eastward of the Piute Mountains and toward the Mohave Desert, show characters approaching those of *perpes*, and suggest the possibility of intergradation between that race and *piutensis*. The series from the Piute Mountains proper is, however, fairly uniformly in accordance with the description given above.

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## NOTES ON AMERICAN WATER-STRIDERS.

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

This paper contains notes on seven species of American water-striders, four of which are described as new to science. The writers are indebted to Mr. B. L. Ribeiro of Brazil for collecting the specimens from Brazil. The types are in the collection of the authors.

***Microvelia pudoris*, n. sp.**

Very similar to *M. summersi* D. & H. in color, but much more slender. Antennae dark brown; segment I stout, enlarged towards apex; II much more slender and shortest; III most slender and slightly longer than II; IV shorter than II and III united, tapering from beyond middle to apex. Head brown, moderately convex above, with a longitudinal median impressed dark line. Eyes large, dark, coarsely faceted. Pronotum (winged form) brown, with a transverse spot in front and the posterior margin of triangular portion, flavous; humeri prominent, impressed within. Heme-lytra brown, the nervures not prominent. Rostrum testaceous, extending beyond anterior coxae. Body beneath dark brown. Legs slender, rather short, yellowish-brown. Last venter in male broadly roundly excavated, the genital segments very small and mostly concealed in the abdomen.

Length, 1.32 mm.; width, .60 mm.

*Holotype* (male), *allotype* (female), and 4 *paratypes*, all winged, Grenada, B. W. I., collected by H. E. Summers.

Very similar in color to *M. venustatis* D. & H. but much more slender and with a much longer apical antennal segment.

***Microvelia sarpta*, n. sp.**

*Apterous*: Elongate, narrow, flattened, yellowish-brown. Head sloping from midline to either side, with a short median streak and three elongate spots on each side, brown. Antennae dark brown, long, slender; segment I paler at base, considerably stouter than II, slightly curved, nearly one and a half times as long as II; III and IV very slender; III nearly as long as I and II conjoined and one-fourth shorter than IV. Pronotum long,

obliquely narrowed on each side and excavated behind; transversely impressed a little behind the anterior margin, the impression interrupted at the middle by a triangular keel, distinctly punctate. Mesonotum and metanotum about equal in length, together a little longer than pronotum. Intermediate legs with the femora very strongly incrassate and blackish. Venter flat, yellowish-white, with a large blackish spot at the base, the last segment very long, as long as the preceding two, truncate behind. First genital segment beneath very deeply roundly excavated behind, the second segment long, with a strong finger-like projection on each side. Genital segments above dark brown, hairy, first segment much broader, rounded on each side, the second segment narrow, digitiform.

Length, 2.2 mm.; width, 0.62 mm.

*Holotype*, apterous male, collected in a small lake, Butantan, Sao Paulo, Brazil, Aug. 18, 1935.

The long terminal antennal segment, the enormously swollen femora of middle legs, and the peculiar genital segments separate this species at once from other *Microvelia*.

*Xiphovelia diffidentis* (D. & H.).

Many wingless males and females, Santos, Sao Paulo, Brazil, taken from river flowing into the ocean, Aug., 1935. The species and the related *turmalis* (D. & H.) from Honduras appertain to the genus *Xiphovelia* Lundblad. This is the first record of this genus in the Western Hemisphere.

*Rhagovelia varipes* Champion.

*Rhagovelia varipes* Champion, *Biologia Centralia-America*, Rhynchota, II, 1898, pp. 133, Pl. VIII, fig. 22.

*Rhagovelia beameri* Gould, *Univ. Kans. Science Bull.*, Vol. 20, 1931, p. 18.

*Rhagovelia varipes* Gould, *ibid.*, p. 46.

The type specimen, belonging to the Vienna Museum bearing the date, "Bilimek, Mexico. 1871. B.C.A. Rhyn. II. *Rhagovelia varipes* Ch. ♂. Type, Sp. figured," has been loaned to us for study through the courtesy of Dr. Max Beier. This type does not differ from paratypes of *R. beameri* Gould. The writers have long series of specimens taken from the streams of Arizona, New Mexico, and Mexico. The type agrees very well with Champion's description except in the matter of the length of the tarsal segments of the intermediate legs, the last segment being faintly longer than the preceding.

*Rhagovelia becki*, n. sp.

*Apterous male*: Long, slender, black, with a bluish luster, the margins of connexiva and basal portion of first antennal segment yellowish-brown. Eyes reddish-brown. Antennae long, slender; formula, 55 : 33 : 24 : 23. Rostrum stout, reaching to apex of front coxae. All acetabula and trochanters and both anterior and hind coxae yellowish-brown, the intermediate coxae blackish. Front trochanter armed beneath a little before the apex with a conspicuous spine-like spur, hind trochanter with a few

black spines. Intermediate legs in proportion—femora, tibia, tarsal II and tarsal III = 110 : 80 : 45 : 47. Anterior tibia not strongly widened distally. Hind femora moderately incrassate, reaching to base of first genital segment, armed within with a long curved black spine a little before the middle, thence to apex with a row of 8 or 9 progressively shorter spines, also with a row of minute spines from base to middle and a second row from there to apex. Hind tibiae nearly straight, with stout spines within and a strong spur at apex.

Pronotum faintly longer than broad, with a low median keel, very coarsely punctate, the hind margin rather sharply rounded. Connexiva nearly vertical. Venter tapering posteriorly, the last segment broadly flattened behind, with a ridge along each side of the flattened portion, the hind margin spinose.

First genital segment strongly constricted beneath near the base, there ridged along median line; above very long, cylindrical. Second segment from above shorter, tapering to apex.

*Apterous female:* Antennae about as in male. Pronotum a little broader than in male, very similar in shape, beset within the hind border with very long, dark, semierect seta-like hairs. Connexiva more sharply reflexed and more widely margined with yellowish-brown than in male, narrowing posteriorly, each produced behind into a long, pointed, hairy process. Abdomen above greatly narrowed on last four segments, the hind margin of last segment with two irregular tufts of long hairs. First genital segment above with a tuft of long dark hairs on each side. Anterior trochanters unarmed. Intermediate femora slightly flattened. Last venter longer than preceding, shiny. Hind femora scarcely more incrassate than intermediate, armed within before apical third with a long spine, from there to apex with a few short spines.

Length, 5.11 mm.; width, 1.3 mm.

*Holotype:* apterous male, and *allotype*, apterous female, Sabinas Hidalgo, N. Leon, Mexico, June 17, 1934, collected by Dr. D. E. Beck. *Paratypes*, 3 males taken with types and 24 males and females, Reagan Wells, Texas, March 6, 1936, collected by M. J. James.

The elongate form, characters of the pronotum, male genital segment and last segment of abdomen and connexiva of female serve to separate this species from all known *Rhagovelia*. The male claspers are short and of the general type of *distincta* Champion.

#### **Halobatopsis spiniventris, n. sp.**

Moderately large elongate-ovate, prominently marked. Head above black; with an irregular yellowish line on each side, these widening anteriorly and contiguous in front, joined at base with a short transverse line. Eyes large, dark. Rostrum becoming black distally, reaching considerably beyond apex of front trochanters. Antennae long, brownish-black; segment I stoutest, slightly enlarged distally, moderately curved near base, almost twice as long as II; II about one-third shorter than III; IV subequal in length to III.

Pronotum short, nearly twice as broad as long, indistinctly emarginate

at the middle behind, with conspicuous, somewhat anchor-shape yellowish marking. Mesonotum longitudinally impressed on each side, blackish with a broad yellow stripe on each side of median line extending from near the anterior margin almost to the base and then curved outward so as to form a J-shaped figure; a broad yellow stripe with silvery sheen on each side. Metanotum with a small yellowish spot on each side of middle. Abdomen black, with a more or less bluish luster; an irregular longitudinal spot at the base, a transverse spot on last tergite, yellowish. Connexivum with a large yellowish spot on each segment, the margins black. Body beneath yellowish. Legs long, black; the anterior femora with a basal streak and a spot at the apex, yellowish.

*Male:* Last segments of venter about as long as the three preceding. First genital segment beneath deeply roundly excavated behind, impressed within, with a very long brownish-black shiny blunt spine projecting posteriorly beneath the second genital segment; second segment tumid, blackish. First genital segment above roundly notched at the middle, yellowish, the hind margin dark. Anterior femora stout, rather strongly curved.

*Female:* Connexiva reflexed, the outer margin curved, with a patch of long hairs on the fifth segment. Hind femora beneath with a few long hairs along the basal portion. Front femora curved but not quite as stout as in male.

Length: 3.65–4.05 mm.; width 1.38–1.95 mm.

*Holotype* (apterous male), *allotype* (apterous female) and *paratypes* (apterous male and female) Guarajo, Sao Paulo, Brazil.

The very long spine on the first genital segment of the male distinguishes this species at once from any related form. In general aspect the female resembles members of the genus *Trepobates*.

*Rheumatobates crassifemur esakii* Shroeder.

*Winged form:* Velvety black, in front with a large transverse flavous spot, somewhat plumbeous on each side of this spot, behind margined with yellowish, narrowed in front, the front lobe faintly impressed and rather sharply defined; hind lobe tumid, distinctly impressed within the humeri, broadly rounded and margined with yellowish-brown behind. Hemilytra much longer than abdomen, smoky, the basal portion in front of transverse suture whitish and with strong, dark fuscous veins; a distinct white transverse line marking the point of fracture and another similar colored median longitudinal line extending from this line to apex.

Numerous wingless and winged males and females, collected in a small lake, Jundiahy, Sao Paulo, Brazil, Aug. 25, 1935.

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## SIX NEW PLANTS FROM OREGON.

BY MORTON E. PECK.

Within the past few years there have come to the herbarium of Willamette University specimens apparently representing a number of undescribed species of Oregon plants. Six of these are considered in this paper. Except as indicated the types are in the herbarium of Willamette University.

***Allium cascadense*, sp. nov.**

Bulbo ovoideo 8-12 mm. alto divisione propagante, laminis exterioribus cineraceis interioribus albis minute obscureque reticulatis ordinibus macularum in longitudinem dispositis; foliis 2 scapum multo superantibus paullum vel nihil falcatis 2 mm. vel minus latis; scapo 4-6 cm. alto paullum compresso ancipe non alato circiter 1 mm. lato; bracteis 2 ovatis abrupte brevi-acuminatis circiter 8 mm. longis 9-nerviis; umbella 10-20-floris, pedicelis 4-8 mm. longis; segmentis perianthii 6-7 mm. longis lanceolatis vel lanceolato-ovatis paullum acuminatis pallide roseis, nervo medio conspicue saturate rubro, vix ad basin saccatis staminibus multo brevioribus quam perianthium; ovario humile 3-cristato ad basin styli, cristis paullum duplicibus.

Type *Mrs. Lilla Leach* 4486, Jefferson Park, Linn Co., Oregon, Alt. 1700 m., Aug. 9, 1933, now in the herbarium of Mrs. Leach.

An obscure little species, most closely related to *A. Lemmoni* Wats., but much smaller in every way with narrower leaves and relatively shorter stamens.

***Allium roguense*, sp. nov.**

Bulbo fere globoso 10-12 mm. alto, laminis exterioribus fibratis fissilibus fibris persistentibus; foliis 2 scapo brevioribus 1 mm. latis; scapo 1.5-2 dm. alto tenuissimo terete; bractea solitaria latere uno fere ad basin aperto vel utrinque profunde fisso longo-caudato-acuminato; umbella circiter 10-floris, pedicellis 8-12 mm. longis; perianthio 1 cm. longo roseo, segmentis oblongo-lanceolatis vix acutis involvescentibus ad basin saccatis; filamentis brevioribus dimidio quam perianthium; ovario sine cristis.

Type *Mrs. Lilla Leach* 4346, along Rogue River, Curry Co., Oregon, June 24, 1933, now in the collection of Mrs. Leach.

The bulb characters of this species are very distinctive. No other species with the outer coats strongly fibrous is known west of the Rocky Mts. except *A. Geyeri* Wats., to which this is only remotely related otherwise.

***Potentilla anomalofolia*, sp. nov.**

Caulibus caespitosis e basi ligno crasso 3-5 dm. altis erectis vel ascendentibus sparsim appresso-capillaceis; foliis radicalibus late ovatis vel oblongis 5-10 cm. longis supra fere glabris subtus sparsim capillaceis, plerumque bipinnatis 1-3 jugis foliolorum inferiorum in petiolulis longis, iterumque partitis vel divisis segmentis superioribus profunde partitis vel divisis partibus 5-11, segmentis omnibus ultimis profunde fissis lobis linearibus acutis petiolis, plerumque multo longioribus quam laminae, stipulis 2-3 cm. longis, 2-4-dentatis, foliis paucis maturis plerumque digitatis, foliis caulinis 2-3 multo minoribus; inflorescentia magna ramis elongatis saepe plus quam dimidium totius altitudinis, pedicelis longis filiformibus; lobis calycis anguste triangulari-ovatis acutis in fructu 4-5 mm. longis; petalis orbiculari-obcordatis 6-7 mm. longis flavescentibus; stylis filiformi-subulatis multo longioribus achenis.

Type *M. E. Peck* 16819, in a damp meadow 3 miles north of Klamath Agency, Klamath Co., Oregon, July 10, 1933.

A remarkable species, in leaf characters quite unlike anything else known to us. One might suspect it of being a hybrid had any possible parent forms been found in the neighborhood. Apparently good seeds occur but not in abundance. Many specimens were found scattered over several acres of ground.

***Astragalus tyghensis*, sp. nov.**

Herba tota dense albo-villosa capillis longis paullum appressis; caulibus confertis erectis vel decumbentibus 2-3 dm. altis simplicibus vel paullum ramosis crassis valde striatis; foliis 8-12 cm. longis, stipulis triangulari-lanceolatis longo-acuminatis 5-6 mm. longis; foliolis 15-21 8-12 mm. longis anguste vel late ellipticis vel elliptico-oblongis vel obovatis apice rotundis vel eis foliorum superiorum acutis vel mucronatis; pedunculis crassis plerumque folia superantibus; floribus spicatis, spicis primum brevibus densis postremo elongatis; floribus 10-25 librato patentibus; calyce dense longo-villoso cylindrato 7-9 mm. longo, dentibus lineari-subulatis tubum aequantibus; corolla pallide flavescente 8-10 mm. longa, vexillo alisque exterius villosis, vexillo late obovato apice rotundato non retuso alas non superante, carina paulo brevior obtusa; legumine albo-villoso oblique ovato paullum compresso dorso leviter sulcato 5-7 mm. longo, rostro subulato rigido, stipite brevissimo tenue, seminibus plerumque duobus.

Type *M. E. Peck* 17367, dry slope near Tygh Valley, Wasco Co., Oregon, May 29, 1933. *J. W. Thompson* 4956, near Maupin, Wasco Co., is the same.

*A. tyghensis* belongs to the section EUASTRAGALUS, and is most closely



related to *A. Spaldingii* Gray, from which it may be distinguished by its more dense white indument, stouter stems, broader leaflets and minor floral characters.

***Astragalus Applegatii*, sp. nov.**

Caulibus caespitosis tenuibus patentibus vel procumbentibus simplicibus vel exigue ramosis glabris vel superne parce strigosis 2.5–4 dm. altis; foliis adscendentibus 5–8 cm. longis, petiolis et rachidibus tenuissimis, stipulis libris triangularibus 2 mm. longis, foliolis 9–13 remotioribus linearibus vel lineari-oblongis, apice mucronatis vel truncatis vel retusis 1–2 cm. longis supra glabris infra sparse strigosis; pedunculis cum racemis folia aequantibus usque ad altero tanto longiores patentibus tenuibus; racemis sparsis 5–7 cm. longis, floribus nutantibus, pedicelis 1 mm. longis; calyce campanulato nigro-strigoso 3 mm. longo, dentibus anguste triangularibus brevioribus dimidio quam tubus; corolla 6–7 mm. longo pallide lavendulacea, vexillo lato valde sursum curvato alas multo superante; leguminibus librate patentibus sine stipite 8–13 mm. longis, stipite 4–5 mm. longo, anguste oblongis paullum compressis ad apicem abrupte acutis fere rectis, valvis tenue cartilagineis minute strigosis purpureo-maculatis.

Type *M. E. Peck* 16784, moist roadside near Keno, Klamath Co., Oregon, July 10, 1931. *M. E. Peck* 15119, damp meadow near Klamath Falls, Oregon, June 22, 1927, is the same.

The new species belongs to the section HOMALOBUS of this large and difficult genus. It seems readily distinguishable by its very slender stems and small pods from its nearest relatives. Its habitat, moist meadows, is peculiar in this genus. It is named for Mr. Elmer I. Applegate of the Dudley Herbarium, Stanford University, for many years an active student of the flora of southern Oregon.

***Leptodactylon Hazelae*, sp. nov.**

Frutex pusillus tenuis copiose e basi ramosus patens vel ferre prostratus glandulari-pubescentis 1–2 dm. altus; foliis alternis plurimis diu persistentibus rigidis nitentibus, 5–7 partitis segmentis tenuissime lineari-subulatis rectis aculeatis 7–12 mm. longis; floribus solitariis in verticibus ramorum; calyce 10–11 mm. longo, lobis inaequalibus multo brevioribus quam tubus; corolla 2–2.5 cm. longa, tubo purpurascente 14–16 mm. longo, faucibus anguste infundibuliformibus, lobis subflavo-albis anguste obovatis paullum erosis; antheris 1 mm. longis quam filamentae longioribus; stylo brevioris dimidio quam tubus corollae.

Type collected by *Miss Hazel Barton* on a dry rocky wall of Snake River Canyon near the mouth of Battle Creek, Wallowa Co., May, 1934.

A handsome species, most nearly related to *L. pungens* (Torr.) Nutt., but much more delicate and otherwise very distinct, having the general aspect of some of the woody-stemmed species of *Phlox*. It is named for its intrepid collector, Miss Hazel Barton, formerly of Wallowa Co.



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A NEW FLOWER-PECKER FROM PALAWAN ISLAND,  
PHILIPPINES.

BY J. H. RILEY,<sup>1</sup>  
*United States National Museum.*

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A number of years ago the United States National Museum received four specimens of a *Piprisoma* that had been collected in Palawan by the Menage Expedition. These were put aside by the author for further study and then neglected. They had been originally identified as *Piprisoma modestum* by the collector and are indeed close to that species. I can not find that this species has ever been credited to the Philippines. The four bird skins evidently represent an un-named species, which may be known as:

***Piprisoma diversum*, sp. nov.**

*Type*.—Male, U. S. National Museum, number 315,811, Puerto Princesa, Palawan, Philippine Islands, December 10, 1891. Collected by D. C. Worcester and F. S. Bourns.

Similar to *Piprisoma modestum modestum*, but brighter above (near citrine Ridgway rather than dark citrine); bill broader at the base and the lower mandible more swollen; white on the inner web of the outer tail feathers at the tip much reduced. Wing 66; tail 34; culmen 8; width of bill at base 7.

*Remarks*.—The above four males have been compared with three (two males and one female) specimens of *Piprisoma modestum modestum* from Trang, Peninsular Siam, one female of *Piprisoma agile agile* from Assam, one female of *Piprisoma agile everetti* from Borneo, and seven specimens of *Piprisoma aeruginosum* from various islands of its Philippine range. Both specimens of the two forms of *Piprisoma agile* represented in my series have no supra-loral light line from the bill to the eye. In *Piprisoma modestum*, *Piprisoma aeruginosum*, and *Piprisoma diversum* there is a light supra-loral streak from the bill to the eye, though faint in *modestum*. In

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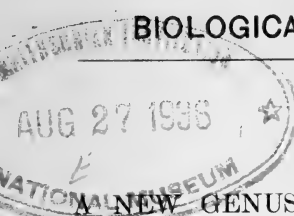
the swollen bill and the reduced white on the outer tail feathers *Piprisoma diversum* resembles *Piprisoma aeruginosum*, but the latter is brownish olive above and more heavily streaked below.

The four males from Palawan measure: wing 63-66 (65); tail 33-35 (34); culmen 8-9 (8.2); width of bill at base 7-7.5 (7.1); the two males and one female from Trang: wing 55-63 (59.2); tail 25.5-32 (29); culmen 8.5-9 (8.7); width of bill at base 6 (in all three).

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## A NEW GENUS OF GYMNOTID EELS FROM THE PERUVIAN AMAZON.

BY GEORGE S. MYERS.<sup>1</sup>

In a large collection of fishes from the Rio Ampiyacu and the vicinity of Pevas, recently made for the United States National Museum by Mr. William G. Scherer, I find a single specimen which appears to represent an unusual new genus of Gymnotid eels.

**ÆDEMOGNATHUS**, new genus.Genotype.—*Ædemognathus exodon*, new species.

This genus is similar to *Porotergus* in most respects. It has large fontanels, a caudal fin, a dorsal filament, teeth in both jaws, a short blunt snout, eyes covered with skin, a naked back, and large oblique scales along the middle of the sides. The two known species of *Porotergus* (Ellis, *Mem. Carnegie Mus.*, vol. 6, no. 3, 1913, p. 152) both have the teeth small and few, and apparently confined to the normal place on each jaw. *Ædemognathus*, on the other hand, has the dentigerous portion of the premaxillaries greatly expanded and bulbous, most of it not opposable to the lower jaw, and the upper portion of it rising above the profile of the snout. The whole of this bulbous area is studded with many strong, slightly curved, conical teeth, placed irregularly and not very closely together. Most of the teeth therefore project forward, outward, or upward, and are entirely outside the mouth. The dentigerous portion of the lower jaw is also bulbous and enlarged, but not nearly so much so as that of the upper. The lower teeth are similar to the upper ones in shape, and are numerous and arranged irregularly, but none is outside the mouth and all point in the normal direction. Gape rather short, not reaching to below eye.

**Ædemognathus exodon**, new species.

*Holotype*.—U. S. N. M. 102040, a specimen 202 mm. in total length, collected in the Rio Ampiyacu, Eastern Peru, December 14, 1935, by Wm. G. Scherer.

Body extremely compressed. Depth of head at occiput nearly equal to its length (without premaxillary expansion). Anus directly below the

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

very tiny eye. Profile of head sloping down greatly from occiput to snout, posteriorly gently curved to origin of filament. Ventral profile nearly straight behind anal origin. Snout heavy and truncate; without the bulbous dentition it is much like that of *Porotergus gimbeli*. Gape rather straight, but maxillary inclined at about 45 degrees from horizontal. Mouth not quite reaching to below eye. Lower jaw very deep and heavy.

Pectorals very large, nearly as long as head (less premaxillaries), with rays 16 in number, the first one short and spine-like, the last one very short. Anal fin high, the rays half way between head and dorsal filament equal to two-thirds greatest body depth. Dorsal filament long but inconspicuous when in its trough along back. Caudal fin doubtless present, but the type has had the end of the tail injured and it is therefore impossible to describe the caudal or be sure of the number of anal rays. Anal rays probably over 200; at least 193 still remain countable.

Scales along middle of sides large and very oblique, like those of *Porotergus gimbeli* and unlike those of *P. gymnotus*. Lateral line conspicuous and apparently complete.

*Measurements in millimeters.*—Total length 202. Greatest depth 20. Greatest thickness (temporal region) 7.5. Thickness of body behind head 5. Predorsal length (tip of snout minus premaxillary to beginning of free part of dorsal filament) 108. Length pectoral fin 19. Total length head (including premaxillary) 21. Length snout (minus premaxillary) 6. Diameter eye 2.5. Length free portion dorsal filament 60.

*Discussion.*—Many of the differences between this fish and *Porotergus gimbeli* are of the type that might be expected to be of secondary sexual importance only, but others, such as the very tiny eye, the high anal, the much greater number of anal rays, and the smaller gape, make me believe that *Æ. exodon* has nothing to do with that species. Further, no such sexual differences are known to occur in the Gymnotids.

The classification of the Gymnotid genera allied to *Apteronotus* (*Sternarchus*) is not yet entirely settled. The enlargement of the middle body scales in certain species may be of more importance than the characters heretofore used. The difference between *Porotergus gymnotus* and *P. gimbeli* in the size and obliqueness of the scales, as figured (but not described) by Ellis, is great and may be of generic value. *Ædemognathus* has large oblique scales, but it is so different from all other Gymnotids in the dentition that I feel little hesitation in regarding it as a distinct genus.

It should be called to attention that *Sternarchella sima* Starks (*Fishes of the Stanford Expedition to Brazil, Stanford Univ. Publ., Univ. Ser.*, 1913, p. 22, pl. 4; Pará) was omitted from Ellis' monograph of the Gymnotids. Further, *Tateichthys duidæ* La Monte (*Amer. Mus. Novit.*, No. 373, 1929, p. 1; vicinity Mt. Duida), of which I have examined a paratype through the courtesy of Miss La Monte, possesses the mental filaments and is a synonym of *Steatogenys elegans* (Std.). It has apparently not before been noticed in print that these extraordinary mental "filaments" of *Steatogenys* occur not only in the paired canals on the chin, but also run back in a closed tube behind the pectoral base and up to the scapular region, where they again reach the surface; both ends of each "filament" are free. The use of these organs remains a mystery.

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NEW REPTILES FROM FORMOSA AND HAINAN.

BY J. LINSLEY GRESSITT,  
*University of California, Berkeley.*

The present paper is based on material in collections made by the author on the Island of Formosa in 1932 and 1934, and on the Island of Hainan, south of the southern tip of China, in 1935. Herein are described two species, a lizard from Formosa and a snake from Hainan, which are thought to be new to science. The Formosan lizard is a member of the agamid genus *Japalura*, which genus is distributed from India to Botel-Tobago Island and the Loochoo Islands, east of Formosa, as well as occurring in Sumatra and Borneo. The other novelty is a colubrine snake of the genus *Pseudoxenodon* and is the second species of this preëminently Chinese genus to be recorded from Hainan. The type specimens are deposited in the collection of the California Academy of Sciences in San Francisco, and the paratypes are in the Museum of Vertebrate Zoölogy of the University of California in Berkeley, and in the author's collection, which is at present housed in the Museum of Vertebrate Zoölogy. The writer is indebted to Dr. J. Grinnell, Dr. J. M. Linsdale and Mr. J. R. Slevin for advice in the course of the present study.

***Japalura brevipes*, new species.**

*Diagnosis.*—Dorsal head scales large, irregularly rugose; dorsal crest feeble, composed of smaller, and less carinate, scales than those of a parallel row on either side of it; snout broad; hind legs short; color pale bluish green, with broad transverse dorsal bands and lateral spots of brown or black; lips and throat pale.

*Type.*—Adult female; No. 71998 Calif. Acad. Sci.; Bukai, near Horisha, central Formosa, alt. 1,200 meters, June 15, 1934. Three paratypes: two adult females (one in Mus. Vert. Zoöl.) and a juvenile, with the same

data; a juvenile specimen from Sakahen, eastern Formosa, alt. 1,100 meters, July 13, 1934. All the specimens were collected by the author on shrubbery in the canyon-side jungles.

*Description* (from the series).—Head somewhat oval, its sides gradually rounded; canthus rostralis sinuous; snout broad and blunt at apex; rostral low, hardly higher in middle than near each side, edged above by five or seven small scales; nasal fairly large, barely touching first supralabial, containing the small round nostril in its swollen center; dorsal head scales mostly large, irregularly rugose, fairly smooth, or briefly peaked in the middle and radially carinate; scales on occipital, frontal and either side of middle of parietal regions, largest; a thick spine behind supraciliary ridge, a longer one at each side of back of head, behind anterior end of nuchal crest; several less prominent tubercles on temporal and tympanic regions; tympanum hidden; supra- and infra-labials 8 or 9; scales of underside of head very weakly keeled anteriorly, a lateral row of fairly smooth, enlarged scales, extending posteriorly from mental at an angle with infralabials; some enlarged spinous scales below posterior corner of mouth and on side of throat. Nuchal crest feeble, composed of 6 or 7 laterally compressed spinous scales; dorsal crest poorly developed, composed of small and feebly carinate scales, which on posterior half of body are hardly larger than smallest scales of back; a parallel row of alternately enlarged, carinate scales on each side of dorsal crest, extending whole length of body, enlarged scales composing them mostly larger and more strongly carinate than those of dorsal crest; back crossed by four irregular transverse rows of isolated enlarged scales; sides with some irregular longitudinal or suboblique rows of enlarged scales; remainder of dorsal scales small and very weakly carinate; scales of ventral surface subacute and quite strongly carinate. Hind limb stretched forward generally not reaching to hind angle of mouth; toes short, fourth barely longer than third, second and fifth reaching to about same point.

Head light brown to black above, crossed by two or three incomplete transverse bands of pale green; supraciliaries marked with five black lines radiating from eye; an irregular black stripe extending from nasal to above tympanic region; ventral surface and sides of head and body largely pale greenish blue to white; dorsal surface of body crossed by five large, oblong or oval, transverse brown or black areas, fourth broadest; sides of neck and body with some irregular spots; hind legs and tail banded above with reddish brown or black.

*Dimensions of type*.—Snout to vent, 71 mm.; vent to tip of tail, 140; snout to center of eye, 12; width of head at supraciliaries, 11.5; fore limb, 31; hind limb, 47.

*Comparisons*.—This species differs from *J. splendida* Barbour and Dunn, of West China, in having the throat scales smaller and less strongly carinate, the enlarged scales of sides less acute, the hind legs shorter, the dorsum lacking the pair of longitudinal yellow stripes, the head-bars wider and less distinct, and the sides of the body with areas of dark scales surrounded by pale surface, instead of being dark, and spotted with individual light scales. *J. brevipes* differs from *J. swinhonis* Guenther, of Formosa, in



having much shorter legs, a blunter snout, the dorsal head scales larger and not strongly keeled medially, the dorsal crest much less developed and in lacking the straight dorso-lateral white stripe and the dark markings on lips and throat. It also differs from *J. yunnanensis* Anderson in lacking the black line from the eye to the corner of the mouth, and in having the nuchal and dorsal crests much less developed.

*Remarks.*—In the author's collection are three additional specimens, one an adult female, measuring 78 mm. from snout to vent and containing five elongate-oval eggs 15–16 mm. long, from Jujiro, near Arisan, south-central Formosa, alt. 1,475 meters, June 8, 1932; the other two being sub-mature females from Sakahen, Formosa, alt. 1,100 meters, July 13, 1934. These specimens differ from the type and paratypes in having the dorsal crest of much larger, and more strongly carinated, scales; the dorsal head scales smoother, green-centered and edged with black; an even, instead of an odd, number of scales touching the rostral; the infralabials smooth, instead of feebly carinate; the supraoculars green, lacking dark lines radiating from the eye; and the dorsal transverse markings vague, and not edged with light along the side. The coloration of the three specimens is almost entirely green or bluish green, with some of the scales partly black or edged with black. However, the coloration in *Japalura* is quite variable. As an example, a living adult specimen of *J. polygonata* (Hallowell) brought to the writer at Nago, Okinawa, Loochoo Islands, was pure black, but when taken from the cyanide jar a short time later was pure green, and after being placed in alcohol it was largely yellowish-green with the typical black markings, the green by now having faded considerably. Though the above three specimens differ rather strikingly in some respects from *brevipes*, the writer hesitates to ascribe subspecific standing, or otherwise separate them, without further material, although the former appeared to be of terrestrial, rather than arboreal, habits.

The specimen said to have been collected by Tada at "Taipa" (Taihoku), Formosa (Tokyo Sci. Coll. Mus. no. 22), which was first referred to *Japalura swinhonis* by Stejneger (Journ. Sci. Coll. Tokyo. 12, Pt. 2 : 218 (1898)), and later discussed by him in his "Herpetology of Japan" (U. S. Nat. Mus. Bull. 58 : 185 (1907)), will doubtlessly prove to be a specimen of *brevipes*. It is unfortunate that the exact locality is unknown, as the label was probably wrong, but it may have come from the mountains not far south of Taihoku. It will be seen that all my material came from above elevations of 1100 meters. *J. swinhonis* is abundant on the western flanks of the mountains from the northern, to the southern tip of the island, but I have never taken it above an altitude of about 750 meters. The stomachs of *J. brevipes* contained remains of beetles, myriapods and spiders. The type and adult paratypes contained partly developed ova.

#### ***Pseudoxenodon popei*, new species.**

*Diagnosis.*—A *Pseudoxenodon* of predominantly reddish color, marked along dorsum with bars of red and black; caudal stripes wanting. Differs from *Ps. karlschmidti* in having supralabials almost entirely yellow, some of anterior ventral black, prefrontals shorter, and ventrals much fewer.

*Type*.—Adult female; No. 71997; Calif. Acad. Sci.; Loi Mother Mountain, alt. 1,450 meters, central part of Hainan Island, China (lat. 19° N., long. 109° 40' E.); July 26, 1935; collected by the author.

*Description of type*.—Rostral broader than deep, barely visible from above; internasals broader than long, two-thirds as long, and one-half as broad, as prefrontals; prefrontals nearly twice as broad as long, extending down on sides to level of center of eye; frontal as long as its distance from snout, four-fifths as broad as long, nearly twice as broad anteriorly as posteriorly, its sides slightly convex; supraoculars one-third longer than, and three-fourths as broad as, frontal; parietals one-half again as long as, and one-third again as broad as, frontal, more than twice as broad in front as behind. Loreal fused with postnasal on both sides; preoculars 1-1, each twice as high as wide; eye twice as deep as its distance from mouth and nearly four-fifths as long as its distance from snout; postoculars 3-3, the uppermost larger than the two lower ones, which are subequal; anterior temporals 2-2, lower one twice as large as upper; posterior temporals 3-2. Supralabials 8-8, fourth and fifth entering eye, sixth largest on one side and seventh largest on other; mental small, only slightly broader than long, infralabials 10-9, fifth on left side minute, first four in contact with anterior chin shields on each side; anterior chin shields parallel sided, shorter and broader than posterior shields, which latter are separated basally and strongly divergent. Scales strongly oblique, arranged in 19 rows from a short distance behind head to just in front of middle, 17 at middle and 15 in front of vent; all scale rows except first keeled at midbody. Ventrals 135; anal divided; subcaudals 53; total length 590 mm.; tail 115 mm., or .194 of total length.

Color brown above, reddish at sides, more extensively so anteriorly; dorsum crossed by about 33 small oblong red bars, 8 of which are on tail, each about five scales broad, one or two scale-lengths long, and edged at either side with a square black spot; tail lacking stripes; head dull brown above, a narrow pale stripe curving anteriorly from each side of neck, terminating indefinitely, and nearly converging with its fellow behind parietals; labials yellow, only upper part of hind margin of fourth and fifth narrowly dark; rostral and loreal entirely, and preocular largely, yellow; underside of head entirely yellowish-white; sides of neck red. Underside pale, anterior third with about 20 largely black ventrals, arranged in groups of one to three; ventrals after first several with dark mottling at lateral edges; posteriorly, ventrals finely dotted with grayish-black at sides, more densely so, and over their entire surface, near vent; subcaudals largely mottled with gray, except for their pale margins, some of them narrowly edged with white externally.

*Comparisons*.—This species, though agreeing with *Ps. karlshmidtii* Pope in its dorsal head pattern, is probably more closely allied with *Ps. bambusicola* Vogt, from which, however, it differs in having the top of the head almost entirely dark, the hind margins of the supralabials largely yellow, the dorsal bars much fewer, some of the anterior ventrals entirely black, and the ventrals fewer in the female. The ventrals are fewer than in females of any other Chinese species in the genus; furthermore, the snout

is shorter in relation to the length of the eye, the labials are less marked with black, and the posterior chin shields are longer in proportion to the anterior, and more divergent, than in most of the other species. The black bands on the anterior portion of the underside are not persistent, as tested when the scales are removed.

*Remarks.*—The type was collected in a deep forest where the undergrowth was sparse, near the summit of Loi Mother Mountain (Loi Mai Lia or Lai Mo Leng), the third highest mountain on Hainan Island. The snake, when prevented from escaping, flattened itself, opened its mouth as if to strike, and vibrated the tip of its tail.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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NATURAL HISTORY OF PLUMMERS ISLAND,  
MARYLAND.<sup>1</sup>

V. FUNGI.

BY JOHN A. STEVENSON AND EDNA M. ERMOLD.

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This preliminary list of the fungi of Plummers Island and vicinity, Montgomery County, Maryland, includes 221 species, which may be considered representative of the fungus flora of the Island in so far as the larger forms are concerned. It is realized, however, that the mycological possibilities of the area have by no means been exhausted, and further intensive collecting will provide material for a much more extensive list. No attempts have been made to collect soil or aquatic fungi or other minute forms. No previous accounts of the fungi of Plummers Island have been published, although P. L. Ricker has maintained for many years a card index of species that have come to his attention. Species known only from the mainland property of the Washington Biologists' Field Club are marked with an asterisk, and those known only from Ricker's index with a dagger. Species so marked are presumably represented by specimens in Mr. Ricker's herbarium which was deposited some years ago with the University of Wisconsin at Madison. All other species included in the list are represented by one or more specimens preserved in the Mycological Collections of the Bureau of Plant Industry or the fungus herbarium of the United States National Museum. For the sake of uniformity the nomenclature of the "Flora of the District of Columbia and Vicinity" by Hitchcock and Standley has been

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<sup>1</sup>The following numbers of this series have been published previously: I (Introduction) Proc. Biol. Soc. Wash. 48 : 115-117. 1935; II (Flowering plants and ferns), l. c. 118-134; III (Mosses), l. c. 135-137; IV (Birds), l. c. 159-167.

followed for the hosts, with one or two exceptions. Thanks are due to C. L. Shear, V. K. Charles, W. W. Diehl, and E. K. Cash for assistance in making determinations in certain groups, and in checking portions of the manuscript.

## ERYSIPHACEAE.

\**Erysiphe cichoracearum* DC. On living leaves of *Hydrophyllum canadense* L.

## SPHAERIACEAE.

*Botryosphaeria ribis* Gross. & Dug. On dead and dying twigs of *Quercus* sp.

*Chaetomium globosum* Kze. On dead twigs of *Asimina triloba* Dunal.

*Daldinia concentrica* (Bolt.) Ces. & deNot. Common on dead wood.

†*Daldinia vernicosa* (Schw.) Ces. & deNot. On dead wood.

†*Eutypa ludibunda* Sacc. On dead wood.

*Eutypa spinosa* (Pers.) Tul. On dead twigs of *Acer* sp.

\**Eutypella fraxinicola* (C. & P.) Sacc. On dead branches of *Fraxinus* sp.

*Gnomonia veneta* (Sacc. & Speg.) Kleb. (*Gloeosporium nervisequum* (Fckl.) Sacc.) The anthracnose fungus is common here as elsewhere in the District area on *Platanus occidentalis* L.

*Guignardia bidwellii* (Ell.) Viala & Ravaz. On dead parts of *Vitis vulpina* L.

†*Hypoxyylon annulatum* (Schw.) Mont. On dead wood.

*Hypoxyylon callostroma* (Schw.) Berk. On dead wood of *Benzoin aestivale* (L.) Nees.

\**Hypoxyylon fuscum* (Pers.) Fr. On dead wood.

*Hypoxyylon rubiginosum* (Pers.) Fr. On dead wood of *Acer negundo* L.

*Hypoxyylon serpens* (Pers.) Fr. On dead wood.

*Lasiosphaeria ovina* (Pers.) Ces. & deNot. On rotten limbs.

*Mycosphaerella colorata* (Pk.) Earle. On leaves of *Kalmia latifolia* L.

*Nummularia clypeus* (Schw.) Cke. On dead wood.

†*Nummularia microplaca* (B. & C.) Cke. On dead wood of *Sassafras officinale* Nees & Eberm.

†*Ophiobolus acuminatus* (Sow.) Duby. On dead stems of *Verbesina occidentalis* (L.) Walt.

*Rosellinia aquila* (Fr.) deNot. On dead wood of *Platanus occidentalis* L.

*Rosellinia subiculata* (Schw.) Sacc. On rotten log.

*Schizoparme straminea* Shear. On dead leaves of *Benzoin aestivale* (L.) Nees.

*Ustulina vulgaris* Tul. On dead wood.

*Valsaria insitiva* Ces. & deNot. On dead twigs of *Carya* sp. and *Morus ruba* L.

*Xylaria polymorpha* (Pers.) Grev. On dead wood of *Acer* sp. and other broad-leaved species.

## HYPOCREACEAE.

*Balsania hypoxyylon* (Pk.) Atk. On living plants of *Danthonia spicata* (L.) Beauv.

*Hypocrea sulphurea* (Schw.) Sacc. On rotten wood.

*Nectria atro-fusca* Schw. On dead twigs of *Staphylea trifolia* L. A rare species otherwise known only from the type and a collection in the Ellis herbarium.

*Peckiella lateritia* (Fr.) Maire. On rotten Agaric.

DOTHIDIACEAE.

†*Phyllachora graminis* (Pers.) Fckl. On living leaves of *Brachyelytrum erectum* (Schreb.) Beauv. and *Panicum* sp.

*Phyllachora lespedezae* (Schw.) Sacc. On living leaves of *Lespedeza hirta* (L.) Hornem. and *L. repens* (L.) Bart.

*Dothidea sambuci* Pers. On dead twigs of *Asimina triloba* Dunal.

HYSTERIACEAE.

*Hysterographium mori* (Schw.) Rehm. On dead wood.

*Hysterographium viticolum* (Cke. & Pk.) Rehm. On dead stems of *Vitis* sp.

TRYBLIDIACEAE.

*Tryblidium cucurbitarium* (Cke.) Rehm. On bark of *Juniperus virginiana* L.

*Tryblidium insculptum* Cke. On dead twigs of *Carya ovata* (L.) K. Koch. A very rare species.

DERMATEACEAE.

*Dermatea chionanthi* Ell. & Ev. On dead branches of *Chionanthus virginica* L.

*Urnula craterium* (Schw.) Fr. On rotten wood buried in the soil.

BULGARIACEAE.

*Coryne sarcoides* (Jacq.) Tul. On dead twigs of *Betula* sp.

*Coryne sarcoides urnalis* (Nyl.) Karst. On rotten wood.

*Orbilina leucostigma* Fr. On dead wood.

*Orbilina luteo-rubella* (Nyl.) Karst. On dead wood.

*Sarcosoma carolinianum* Durand. On rotten wood.

MOLLISACEAE.

*Mollisia cinerea* (Batsch) Karst. On rotten wood.

*Tapesia fusca* (Pers.) Fckl. On dead wood.

HELOTIACEAE.

*Helotium citrinum* (Hedw.) Fr. Common on rotten wood.

†*Lachnum ciliare* (Schrad.) Rehm. (*Trichopeziza capitata* (Pk.) Sacc.) On dead wood of *Quercus alba* L.

*Pezizella lythri* (Desm.) Shear & Dodge. On dead leaves and twigs of *Carya* sp., *Rhus glabra*, etc.

*Phialea scutula* (Pers.) Gill. On dead herbaceous stems.

*Sclerotinia* sp. An interesting but immature specimen on seeds of *Chionanthus virginica* L.

PEZIZACEAE.

*Lachnea scutellata* (L.) Gill. On dead wood.

*Lachnea setosa* (Nees) Gill. On dead wood.

*Sarcoscypha coccinea* (Jacq.) Sacc. On dead wood of *Salix* sp. and other trees.

HELVELLACEAE.

*Morchella esculenta* (L.) Pers. On soil.

EXOASCACEAE.

*Taphrina caerulescens* (Desm. & Mont.) Tul. On living leaves of *Quercus maxima* (Marsh.) Ashe.

PUCCINIACEAE.

- Aecidium tithymali* Arth. O, I. On living leaves of *Tithymalus commutatus* (Engelm.) K. & G.
- †*Gymnosporangium juniperi-virginianae* Schw. III. Forming galls on living twigs of *Juniperus virginiana* L.
- Puccinia asteris* Duby. III. On living leaves of *Aster cordifolius* L.
- †*Puccinia argentata* (Schulz) Wint. II, III. On living leaves of *Impatiens biflora* Walt.
- †*Puccinia bolleyana* Sacc. II, III. On living leaves of *Carex frankii* Kunth. The aecial stage on *Sambucus canadensis* L., common elsewhere in the District area, doubtless occurs here also.
- †*Puccinia cyperi* Arth. II, III. On leaves of *Cyperus strigosus* L.
- Puccinia extensicola solidaginis* (Schw.) Arth. O, I. On living leaves of *Solidago flexicaulis* L.
- Puccinia heucherae* (Schw.) Diet. III. On living leaves of *Saxifraga virginiana* Michx.
- Puccinia mariae-wilsoni* G. W. Clint. O, I, III. On living leaves of *Claytonia virginica* L.
- Puccinia pimpinellae* (Str.) Mart. II, III. On living leaves of *Osmorhiza longistylis* (Torr.) DC.
- Puccinia podophylli* Schw. I, III. On living leaves of *Podophyllum peltatum* L.
- Puccinia polygoni-amphibii persicariae* (Str.) Arth. O, I. On living leaves of *Geranium maculatum* L.
- Puccinia rubigo-vera agropyrina* (Erikss.) Arth. O, I. (*Aecidium cimicifugatum* Schw.) On living leaves of *Cimicifuga racemosa* (L.) Nutt.
- Puccinia rubigo-vera impatientis* (Arth.) Mains. O, I. (*P. impatientis* Arth.) On living leaves of *Impatiens biflora* Walt. and *I. pallida* Nutt.
- Puccinia schedonnardi* Kellerm. & Sw. O, I, II, III. On living leaves of *Hibiscus moscheutos* L. and *Muhlenbergia mexicana* (L.) Trin.
- Puccinia verbesinae* Schw. II, III. On living leaves of *Verbesina occidentalis* (L.) Walt.
- Puccinia violae* (Schum.) DC. I. On living leaves of *Viola eriocarpa* Schwein.
- Uromyces caladii* (Schw.) Farl. O, I, III. On living leaves of *Arisaema dracontium* (L.) Schott and *A. triphyllum* (L.) Torr.
- Uromyces lespedezae-procumbentis* (Schw.) Curt. II, III. On living leaves of *Lepedeza procumbens* Michx.



*Uromyces polygoni* (Pers.) Fekl. II. On living leaves of *Polygonum* sp.

†*Uromyces proëminens* (DC) Pass. III. On living leaves of *Chamaesyce preslii* (Guss.) Arth.

MELAMPSORACEAE.

*Melampsora abieti-capraearum* Tub. II. On living leaves of *Salix nigra* Marsh.

*Coleosporium solidaginis* (Schw.) Thuem. II, III. On living leaves of *Aster* spp. and *Solidago* spp.

*Cronartium quercuum* (Berk.) Miyabe. II, III. On living leaves of *Quercus maxima* (Marsh.) Ashe.

*Hyalopsora polypodii* (Pers.) Magn. II. On living fronds of *Cystopteris fragilis* (L.) Bernh.

†*Pucciniastrum agrimoniae* (Schw.) Tranz. II, III. On living leaves of *Agrimonia gryposepala* Wallr.

USTILAGINACEAE.

*Cintractia caricis* (Pers.) Magn. In ovaries of *Carex varia* Muhl.

†*Ustilago heufleri* Fekl. Linear pustules on living leaves of *Erythronium americanum* Ker.

*Ustilago striaeformis* (West.) Niessl. On living leaves of *Festuca obtusa* Spreng.

TILLETIACEAE.

*Entyloma compositarum* Farl. On living leaves of *Senecio aureus* L.

*Entyloma saniculae* Pk. On living leaves of *Sanicula marylandica* L.

AURICULARIACEAE.

†*Auricularia auricula-judae* (L.) Schroet. On rotten wood.

*Pilacre faginea* (Fr.) B. & Br. On dead wood.

TREMELLACEAE.

†*Eridia albida* (Huds.) Bref. On rotten wood.

*Tremella frondosa* Fr. On rotten logs.

†*Tremella mycetophila* Pk. On sporophores of *Collybia dryophila* Bull.

DACRYOMYCETACEAE.

†*Guepinia spathularia* (Schw.) Fr. On dead wood.

THELEPHORACEAE.

†*Aleurodiscus acerinus* (Pers.) v. Hoehn. & Litsch. On dead branches of *Acer* sp.

*Craterellus cantharellus* (Schw.) Fr. On soil.

†*Craterellus cornucopioides* (L.) Pers. On soil.

†*Cyphella capula* Holm. A doubtful record, since Burt reports the species only from S. Carolina and New York.

†*Cytidia salicina* (Fr.) Burt. (*Corticium salicinum* Fr.) On dead wood of *Alnus* sp. A doubtful record, the species being otherwise known only on *Salix* and not further south than Pennsylvania.

†*Hymenochaete tabacina* (Sow.) Lev. On dead branches.

- †*Peniophora cinerea* (Fr.) Cke. On dead twigs.  
 †*Peniophora gigantea* (Fr.) Mass. On dead wood.  
 \**Sebacina incrustans* (Pers.) Tul. Growing up around the base of various living woody and herbaceous plants.  
*Stereum albo-badium* (Schw.) Fr. On dead branches of *Quercus* sp.  
*Stereum fasciatum* Schw. Common on rotten logs.  
 \**Stereum frustulosum* (Pers.) Fr. Causes a pocket rot of logs of *Quercus* spp.  
 †*Stereum hirsutum* (Willd.) Fr. On rotten limbs of *Betula* and other broad-leaved trees.  
 †*Stereum lobatum* Fr. On dead wood. Perhaps better referred to *S. fasciatum* Schw.  
 †*Stereum ochraceo-flavum* Schw. On dead twigs and branches.  
*Stereum purpureum* Pers. On dead wood.  
*Stereum rameale* Schw. Very common on dead wood of many woody plants.  
 †*Stereum rugosum* Pers. On dead wood. A doubtful report, the species not being reported by Burt from this region.  
*Stereum sericeum* Schw. On dead twigs and branches of *Cephalanthus occidentalis* L., *Fagus grandifolia* Ehrh. and other woody plants.  
 †*Thelephora terrestris* (Ehrh.) Fr. On soil.

## CLAVARIACEAE.

*Clavaria pallida* Schaeff. On soil. It is not clear, in the light of recent monographs of *Clavaria*, just what species is involved here. Other *Clavaria* collections are not specifically determinable due to lack of descriptive collection notes on color, odor, etc.

## HYDNACEAE.

- Hydnum imbricatum* L. On soil.  
 †*Hydnum repandum* L. On soil.  
*Hydnum velutinum* Fr. On soil.  
 †*Irpex cinnamomeus* Fr. (*Hydnochaete olivaceum* (Schw.) Banker). On dead branches of various broad-leaved trees.

## POLYPORACEAE.

- Boletus bicolor* Pk. On soil.  
*Boletus castaneus* (Bull.) Fr. On soil.  
 †*Boletus crassipes* Pk. On soil.  
*Boletus felleus* (Bull.) Fr. On soil.  
*Boletus griseus* Frost. On soil.  
 †*Boletus morgani* Pk. On soil.  
 †*Boletus scaber* Fr. On soil.  
*Daedalea confragosa* (Bolt.) Fr. On dead wood of *Salix* sp. and other broad-leaved trees.  
*Daedalea unicolor* (Bull.) Fr. On dead wood.  
 †*Favolus alveolaris* (DC.) Quel. On dead wood of *Fagus grandifolia* Ehrh. and other trees.

- †*Fomes applanatus* (Pers.) Gill. On dead wood of *Salix* sp. and other trees.
- †*Fomes igniarius* (L.) Gill var. *laevigatus* Fr. On dead wood.  
*Fomes lobatus* (Schw.) Cke. On dead wood.  
*Fomes rimosus* (Berk.) Cke. On dead and dying trees and logs of *Robinia pseudoacacia* L.
- Lenzites betulina* (L.) Fr. On dead wood.
- Polyporus adustus* (Willd.) Fr. On dead wood of *Acer rubrum* L.
- Polyporus arcularius* (Batsch) Fr. On dead wood.
- †*Polyporus cinnabarinus* (Jacq.) Fr. On dead wood.
- Polyporus conchifer* (Schw.) Fr. On dead branches of *Ulmus americana* L.
- Polyporus dichrous* Fr. Common on dead wood.
- Polyporus gilvus* (Schw.) Fr. Common on dead wood.
- Polyporus hirsutus* (Wulf.) Fr. Common on dead wood of *Acer rubrum* L. and other trees.
- †*Polyporus parvamenus* Fr. On dead wood.
- Polyporus perennis* (L.) Fr. On soil.
- Polyporus picipes* Fr. On rotten log.
- †*Polyporus resinus* (Schrad.) Fr. On dead wood of *Acer* sp.
- †*Polyporus robinophilus* (Murr.) Lloyd. On dead wood of *Celtis occidentalis* L. A doubtful host report, *Robinia pseudoacacia* L. being the usual host.
- Polyporus tulipiferus* (Schw.) Overh. Common on dead wood of *Liriodendron tulipifera* L. and other woody plants. Listed by Ricker as *Irpez sinuosus* Fr.
- Polyporus versicolor* (L.) Fr. Common on dead wood of *Liriodendron tulipifera* L. and other woody plants.
- †*Poria laminata* Murr. On dead wood.
- Poria medulla panis* (Pers.) Cke. On dead wood of *Acer rubrum* L.
- Strobilomyces strobilaceus* Berk. On soil.

AGARICACEAE.

- †*Agaricus silvicola* Vitt. On soil.
- †*Amanita ravenelii* B. & C. On soil. This species not recognized by recent workers and *A. strobiliformis* Vitt. is probably the species concerned.
- Amanita strobiliformis* Vitt. On soil.
- †*Amanita verna* Bull. On soil.
- Amanitopsis volvata* Pk. On soil.
- †*Cantharellus cibarius* Fr. On soil.
- †*Cantharellus cinnabarinus* Schw. On soil.
- Claudopus nidulans* (Pers.) Pk. On soil.
- Clitocybe ochropurpurea* Berk. On soil.
- †*Collybia dryophila* Bull. On soil.
- †*Coprinus micaceus* (Bull.) Fr. On soil.
- Cortinarius* sp. On soil.
- †*Crepidotus dorsalis* Pk. On rotten wood.
- †*Hypoholoma sublateritium* Schaeff. On rotten wood.

- Lactarius hygrophoroides* B. & C. On soil.  
*Lactarius piperatus* (L.) Pers. On soil.  
 †*Lactarius torminosus* (Schaeff.) Pers. On soil.  
 †*Lactarius volemus* Fr. On soil.  
 †*Lepiota procera* (Scop.) Fr. On soil.  
*Marasmius felix* Morg. On soil.  
 †*Marasmius graminum* (Lib.) Berk. On dead culms and leaves of *Poa sylvestris* A. Gray.  
*Marasmius siccus* (Schw.) Fr. On rotten leaves.  
*Marasmius tomentosipes* Pk. On rotten wood.  
*Panaeolus* sp. (near *P. retirugis* Fr.) On soil.  
*Panus rudis* Fr. On rotten wood.  
*Panus stipticus* (Bull.) Fr. On dead wood of *Fagus grandifolia* Ehrh., and other trees.  
*Panus strigosus* B. & C. On dead wood of *Quercus* sp.  
 †*Paxillus rhodoxanthus* (Schw.) Atk. On soil.  
*Pleurotus ostreatus* (Jacq.) Fr. On rotten wood.  
*Pleurotus sapindus* Kalch. On rotten wood.  
 †*Russula furcata* (Pers.) Fr. On soil.  
*Schizophyllum commune* Fr. Common on dead wood of many shrubs and trees.  
*Stropharia elegans* Murr. On soil.

## PHALLACEAE.

- †*Mutinus ravenelii* (B. & C.) E. Fischer. On soil. Reported as *M. caninus* (Huds.) Fr., a European species.

## LYCOPERDACEAE.

- Calvatia rubro-flava* (Cragin) Lloyd. On soil.  
*Geaster saccatus* Fr. On soil.  
*Lycoperdon atropurpureum* Vitt. On soil.  
*Lycoperdon marginatum* Vitt. On soil.  
*Lycoperdon pyriforme* Schaeff. On rotten log.  
 †*Scleroderma aurantium* (Vaill.) Pers. On soil.

## NIDULARIACEAE.

- †*Crucibulum vulgare* Fr. On dead sticks.  
*Cyathus striatus* Willd. On rotten wood.

## PHOMACEAE.

- Hendersonia desmazieri* Mont. On dead branches of *Platanus occidentalis* L.  
*Phyllosticta cruenta* (Fr.) Kickx. On living leaves of *Smilacina racemosa* (L.) Desf.  
*Phyllosticta vagans* Pk. On living leaves of *Smilacina racemosa* (L.) Desf.  
 †*Septoria nolitangere* Thuem. On living leaves of *Impatiens pallida* Nutt.  
*Septoria smilacinae* Ell. & Mart. On living leaves of *Smilacina racemosa* (L.) Desf.

*Septoria trillii* Pk. Common on living leaves of *Trillium sessile* L.  
*Sphaeropsis asiminae* Ell. & Ev. On dead twigs of *Asimina triloba* Dunal.

MELANCONIACEAE.

*Colletotrichum trillii* Tehon. On living leaves of *Trillium sessile* L.  
*Cylindrosporium circinans* Wint. On living leaves of *Sanguinaria canadensis* L.  
*Myosporium sanguineum* Fekl. On dead twigs of *Betula* sp.  
†*Naemospora crocea* (Bon.) Sacc. On dead wood of *Quercus maxima* (Marsh.) Ashe.  
*Vermicularia herbarum* Westd. On dead herbaceous stems.  
*Vermicularia peckii* Sacc. On leaves of *Trillium sessile* L.

MONILIACEAE.

*Botrytis cinerea* Pers. On dead leaves.  
*Monilia aureo-fulva* Cke. & Ell. On rotten wood.  
†*Oidium erysiphoides* Fr. On living leaves of *Lamium amplexicaule* L.  
†*Trichothecium roseum* (Pers.) Lk. On dead parts of *Vitis aestivalis* Michx.  
*Verticillium rezianum* Sacc. On *Stemonitis* sp. and other Myxomycetes.

DEMATIACEAE.

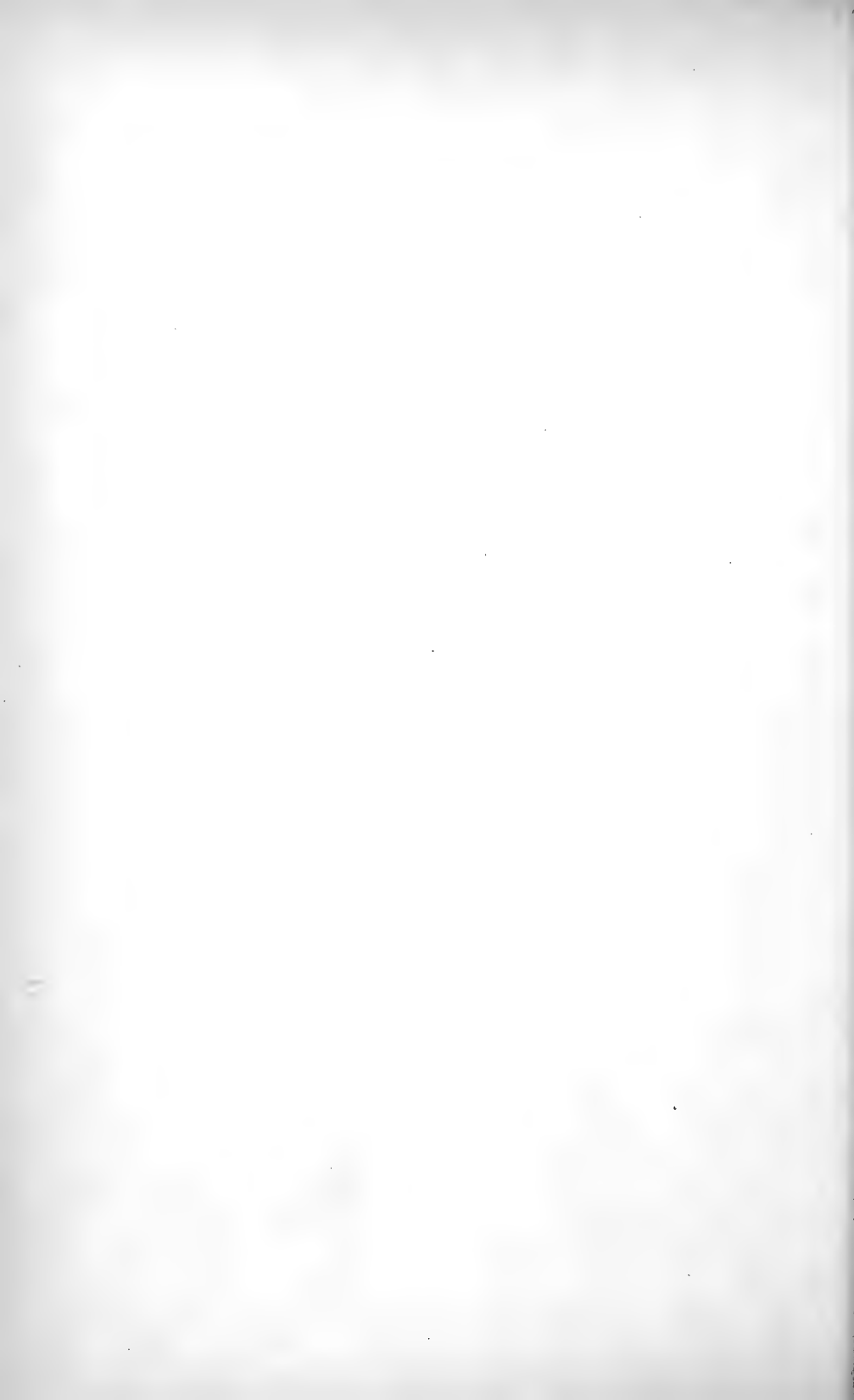
*Alternaria saponariae* Pk. On dead leaves of *Saponaria officinalis* L.  
*Cercospora cercidicola* Ell. On living leaves of *Cercis canadensis* L.  
*Cercospora kalmiae* Ell. & Ev. On living leaves of *Kalmia latifolia* L.  
†*Cladosporium herbarum* (Pers.) Lk. On dead leaves and stems of *Brassica* sp.  
†*Gyroceras celtidis* (Bev.) Mont. & Ces. On leaves of *Celtis occidentalis* L.  
†*Polythrincium trifolii* (Kze.) Fr. On living leaves of *Trifolium repens* L.  
*Sporodesmium concinnum* Berk. On dead wood.

TUBERCULARIACEAE.

*Bactridium flavum* Kze. & Schm. On rotten wood.  
*Coccospora aurantiaca* Wallr. On rotten wood.  
*Tuberculina persicina* (Ditm.) Sacc. Parasitic on aecia of *Puccinia rubigo-vera agropyrina* (Erikss.) Arth. on *Cimicifuga racemosa* (L.) Nutt.

STILBACEAE.

*Stilbum echinatum* Ell. & Ev. On *Arcyria* sp.



PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF THREE NEW RED SQUIRRELS  
(*TAMIASCIURUS*) FROM NORTH AMERICA.

BY ARTHUR H. HOWELL,  
*Biological Survey, U. S. Department of Agriculture.*

In a study of the North American chickarees, or red squirrels, now in progress, I have been greatly aided by the loan of large series of specimens from Canada belonging to a number of the larger museums in this country and Canada. Of especial interest and importance are a very complete series from central British Columbia in the Museum of Vertebrate Zoology taken recently by T. T. and E. B. McCabe and a series from northern British Columbia in the American Museum of Natural History, taken by the late M. P. Anderson in 1902 and by George G. Goodwin within the last two years.

With this abundant material, together with that contained in the U. S. National Museum collections, it has been possible to distinguish three new races, one having an extensive range in the Athabaska-Mackenzie Valley, another occupying a large part of British Columbia, and a third inhabiting the region around Cook Inlet, Alaska.

***Tamiasciurus hudsonicus preblei*, subsp. nov.<sup>1</sup>**

MACKENZIE CHICKAREE.

*Type*.—Collected at Fort Simpson, Mackenzie, February 29, 1904, by Edward A. Preble; ♀ adult, skin and skull, no. 133862, U. S. Nat. Mus. (Biological Survey collection); original number, 5141.

*Range*.—Chiefly the Athabaska-Mackenzie Valley in Canada and the greater part of central Alaska; south to the North Saskatchewan River, Saskatchewan.

*Subspecific characters*.—Similar to *T. h. hudsonicus* but larger; upper parts in winter pelage paler and more suffused with warm buff; head and

<sup>1</sup> Named for Edward A. Preble, who collected most of the material on which this race is based.

tail paler; summer pelage paler and more buffy (less brownish). Skull similar to that of *hudsonicus*, possibly averaging larger.

*Color.*—*Winter pelage:* Head and face mixed fuscous and light buff, the nose clear buff; sides of head and face light neutral gray; median dorsal area cinnamon-rufous or tawny; sides of body a mixture of warm buff and fuscous; lateral line deep neutral gray, usually faintly indicated and often obsolete; tail above, tawny or kaiser brown, bordered with black and edged with warm buff; tail beneath, light neutral gray, mixed with warm buff; feet mixed neutral gray and light buff; under parts white, vermiculated with fuscous, the grayish under fur more or less conspicuous. *Summer pelage:* Head and face mixed neutral gray and light buff; under parts and sides uniform tawny olive, mixed with fuscous; lateral line fuscous-black; tail above, tawny or sayal brown, edged with light buff; under parts white, washed with pale pinkish buff.

*Measurements.*—Average of 10 adult males from the Mackenzie Valley: Total length, 331.8 mm. (310–350); tail vertebrae, 137.8 (125–148); hind foot, 50.5 (49–51). Average of 10 adult females from same region: Total length, 331 (296–340); tail vertebrae, 132 (124–142); hind foot, 49.2 (48–51). *Skull:* Average of 10 adult males from Fort Simpson and Fort Norman: Greatest length, 47.5 (46.1–49.4); zygomatic breadth, 27.3 (26.2–28.6); cranial breadth, 20.7 (19.9–21.5); interorbital breadth, 14.2 (13.3–15.2); least postorbital breadth, 14.5 (14–14.9); length of nasals, 14.4 (13.2–15.8); maxillary toothrow, 8.1 (7.6–8.6). Average of 10 adult females from the same localities: Greatest length, 46.6 (45.8–48.1); zygomatic breadth, 27 (26.2–28.1); cranial breadth, 20.7 (20.2–21.1); interorbital breadth, 14.4 (13.5–15.3); least postorbital breadth, 14.6 (13.9–15.4); length of nasals, 14.2 (13.4–15); maxillary toothrow, 8 (7.7–8.5).

*Remarks.*—Before naming a new form of this group from Canada, it seems desirable to determine as nearly as possible the type locality of *Sciurus hudsonicus*. This is generally stated to be Hudson Strait, because of Erxleben's designation "*ad fretum Hudsonis*." So far as known, however, no squirrels occur on or near Hudson Strait. Erxleben's name was based entirely on Pennant's "Hudson Bay Squirrel" (Synopsis Quadrupeds, 1771).

In the year following Pennant's description there appeared an article by Forster in the Philosophical Transactions (1772, pp. 370–381), giving an account of a collection of mammals received by the Royal Society of London from a "Mr. Graham, a gentleman belonging to the settlement on Severn River." In this paper is listed the "common squirrel," under the name *Sciurus vulgaris*, citing also Pennant's "Synopsis," page 279, no. 206. This collection, so far as known, was the first to be received from the Hudson Bay region, and it seems practically certain that Pennant based his description on one or more specimens in that collection. Since the species does not occur at Hudson Strait, I hereby fix the type locality at the mouth of Severn River, Hudson Bay.

No specimens from this locality are at present available, but for purposes of comparison, a series from Oxford House and Norway House, Manitoba, is assumed to be approximately representative of the typical race. The



race here described differs markedly from *hudsonicus*, as shown by extensive series in both winter and summer pelage from numerous localities in the Athabaska-Mackenzie Valley and Alaska.

***Tamiasciurus hudsonicus columbiensis*, subsp. nov.**

BRITISH COLUMBIA CHICKAREE.

*Type*.—Collected on Raspberry Creek (about 30 miles southeast of Telegraph Creek), northern British Columbia, October 8, 1902, by M. P. Anderson; ♂ adult, skin and skull, no. 19891, American Mus. Nat. Hist.; original number, 858.

*Range*.—Northern and central British Columbia and southern Yukon, from vicinity of Lake Lebarge, Yukon, south to Chilcotin River, B. C., and eastward to the Canadian National Park, Alberta.

*External characters*.—Similar to *T. h. streator*, but paler, both in winter and summer pelage; tail with less black and red averaging paler; hind foot smaller.

Compared with *preblei*: Size about the same but tail averaging shorter; upperparts in winter pelage darker, more olivaceous, and less suffused with buff; feet tawny rather than gray; tail darker, with darker edgings. Compared with *picatus*: Winter pelage paler and more olivaceous (less reddish); tail paler red; summer pelage paler. Compared with *petulans*: Red of upper parts paler; sides more olivaceous (less buffy); tail distinctly paler.

*Cranial characters*.—Skull closely similar to that of *T. h. picatus*; similar to that of *preblei*, but averaging smaller; averaging longer than in *petulans*, but narrower across zygomatica; distinctly smaller than in *streator*.

*Color*.—*Winter pelage*: Median dorsal area hazel, shaded with pinkish buff; sides buffy olive, shaded with pinkish buff; top of head fuscous black, shaded with buff; sides of nose cinnamon buff; feet ochraceous tawny, shaded with fuscous; tail above, tawny, edged with black and tipped with ochraceous buff or cinnamon buff; tail beneath, a mixture of ochraceous tawny, cinnamon buff and smoke gray; under parts white, sometimes shaded with pale buff, and vermiculated with fuscous. *Summer pelage*: Upper parts and sides buffy brown or olive brown, the head slightly darker; feet ochraceous tawny; tail above, tawny or hazel, edged with black and tipped with pale buff; tail beneath, as in winter; under parts white, frequently washed with pale pinkish buff.

*Measurements*.—Average of 20 adults from Telegraph Creek, British Columbia: Total length, 321.7 mm. (306–332); tail vertebrae, 127.3 (120–138); hind foot, 49.3 (47–51). *Skull*: Average of 20 adults (13 males, 7 females) from same locality: Greatest length, 46.9 (45.2–48); zygomatic breadth, 27 (26.1–28); cranial breadth, 20.9 (20.2–21.3); interorbital breadth, 14.2 (13.4–16); least postorbital breadth, 14.8 (14.1–15.8); length of nasals, 14.5 (13.5–15.5); maxillary toothrow, 8.1 (7.8–8.6).

*Specimens examined*.—About 300 specimens of this race have been examined in this study, including 70 from Telegraph Creek, 84 from the Barkerville region (Indianpoint Lake, Cottonwood, etc.) and smaller

series from Atlin, Dease River, Fort Nelson, Fort Graham, Hazelton, Graham River, Moose River, Yellowhead Pass, Lake La Hache, and Chilcotin River.

***Tamiasciurus hudsonicus kenaiensis* subsp. nov.**

COOK INLET CHICKAREE.

*Type*.—Collected at Hope, Cook Inlet, Alaska, September 6, 1900, by W. H. Osgood; ♂ adult, skin and skull, no. 107603, U. S. Nat. Mus. (Biological Survey collection); original number, 1360.

*Range*.—Kenai Peninsula and base of Alaska Peninsula, Alaska.

*External characters*.—Similar in summer pelage to *T. hudsonicus petulans*, but red of tail paler and more heavily mixed with black; feet darker (less buffy); hairs of dorsal area tipped with ochraceous rather than tawny; nose and face more blackish (less tawny); in winter pelage the dorsal area and tail are of a much paler red and the red is more restricted to a median band, the sides entirely without red.

Similar in summer pelage to *preblei* but upper parts slightly darker and more olivaceous (less buffy); head darker; feet shaded with fuscous; tail much more blackish; similar also in winter pelage, but red of upper parts averaging darker, less extensive, and less shaded with buff.

Similar in summer pelage to *columbiensis*, but head and tail more blackish, feet darker and less tawny; in winter pelage dorsal area paler, sides more grayish (less olivaceous), and feet darker (less tawny).

*Cranial characters*.—Skull closely similar to that of *columbiensis*; averaging smaller than that of *preblei*.

*Color*.—*Summer pelage*: Top of head and face fuscous-black, shaded with ochraceous buff; tip of nose pinkish buff or warm buff; ears fuscous, shaded with tawny; general tone of upper parts near Saccardo's umber, the hairs tipped with clay color; feet ochraceous-tawny or cinnamon-buff, usually heavily shaded with fuscous; tail above, a mixture of tawny or cinnamon-buff and black; tail beneath, usually without tawny and sometimes showing much smoke gray (from the bases of the hairs); under parts soiled white, washed with pale pinkish buff. *Winter pelage*: Median dorsal area from crown to rump tawny, shaded with pinkish buff; front of face mixed pinkish-buff and fuscous; sides of face smoke gray; sides of body mixed smoke gray and pinkish buff; feet hair-brown, slightly shaded with pinkish buff; tail above, tawny or ochraceous-tawny, bordered with black and cinnamon-buff; tail beneath, much as in summer; under parts white, vermiculated with fuscous.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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A NEW PUMA FROM TEXAS.

BY E. A. GOLDMAN.

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On the rolling plains of southern Texas, including much of Webb county, semi-desert scrub timber, interspersed with grasslands, combines conditions which are very favorable for white-tailed deer. The area, with a good deer population, is regarded as one of the more important game ranges of the Southwest. Pumas, more generally known as mountain lions, have also remained numerous, owing to the abundance of their favorite prey. In connection with predatory-animal control operations sixteen additional museum specimens, skins with skulls, have been obtained. Study of these along with material previously available has resulted in the segregation of a regional subspecies.

The new geographic race is named for Stanley P. Young, under whose direction the specimens were collected.

***Felis concolor youngi***, subsp. nov.

TEXAS PUMA.

*Type*.—From Bruni Ranch, near Bruni, southeastern Webb County, Texas. No. 251419, ♂ young adult, skin and skull, U. S. National Museum (Biological Survey collection), collected by Ira Wood, October 6, 1934. X-catalogue number 27354.

*Distribution*.—Central and southern Texas and northeastern Mexico, intergrading on the west with *Felis concolor azteca*.

*General characters*.—Closely allied to *Felis concolor azteca* of the Sierra Madre of Chihuahua, but usually larger, and upper parts lighter, more suffused with gray, less distinctly tawny; black on tip of tail usually more restricted; cranial details, especially heavier dentition, distinctive. Similar in general to *Felis concolor coryi* of Florida, but much paler, and skull differing notably in form of nasals. Distinguished from *Felis concolor hipplestes* of the Rocky Mountains in Wyoming by smaller size, paler color, and cranial features.

*Color*.—*Type* (October pelage): Top of head, neck, and median dorsal

area between tawny and ochraceous tawny (Ridgway, 1912), suffused with buffy gray, slightly darkened by black-tipped hairs along posterior part of back; sides of neck, shoulders, and flanks near cinnamon buff, paling to pinkish buff on feet; upper lips, except usual blackish areas at base of vibrissae, chin, and throat nearly pure white; under surface of neck pinkish buff; chest, inner sides of limbs, and median line of abdomen dull white, the darker basal color showing through; inguinal region nearly pure white, interrupted by two narrow, rather indistinct, transverse, crescentic markings opening forward; face in general brownish gray, the whitish supra-orbital spots distinct; ears blackish externally, with grayish median spots, thinly clothed with white hairs internally; tail similar to posterior part of back above, becoming grayish below to near black tip, the black nearly pure extending forward about one inch on upper side. Other specimens from the type locality and general region vary from grayer to more tawny above than the type.

*Skull*.—Closely resembling that of *azteca*, but larger and heavier; zygomata relatively less widely spreading; dentition heavier, the size difference most apparent in the canines and carnassials. Similar in size to that of *coryi*, but frontal region less highly arched; nasals much more depressed, usually narrower; dentition similarly heavy. Compared with that of *hippolestes* the skull is usually smaller, with relatively narrower zygomata and heavier dentition.

*Measurements*.—*Type*: Total length, 2,134 mm. *Skull (type)*: Greatest length, 220; zygomatic breadth, 141.8; interorbital breadth, 42.6; least width between outer walls of interpterygoid fossa, 29.4; alveolar length of upper canine-premolar series, 68.1; length of crown of upper carnassial, 24.3; antero-posterior diameter of upper canine at alveolus, 16.5. An adult female from Encinal, La Salle County: Greatest length, 191; zygomatic breadth, 123.3; interorbital breadth, 37.9; least width between outer walls of interpterygoid fossa, 27.7; alveolar length of upper canine-premolar series, 57.8; length of crown of upper carnassial, 20.3; antero-posterior diameter of upper canine at alveolus, 12.8.

*Remarks*.—Intermediate in geographic position, *F. c. youngi* tends to combine some of the characters of typical *F. c. azteca* of the mountains along the backbone of the continent in Chihuahua and southwestern New Mexico, and of *F. c. coryi* which formerly inhabited the Gulf coast region from Louisiana to Florida. Among cranial details the nasals, unlike those of *coryi*, are depressed much as in *azteca*. In heavy dentition *youngi* agrees closely with *coryi*; in usually grayer coloration a departure from both *azteca* and *coryi* is exhibited.

*Specimens examined*.—Total number, 29, as follows: Texas: Allamore, 1; Boquillas, 1 (skull only); Brownsville, 1 (skull only); Bruni Ranch, Webb County (type locality), 2; Carrizo Springs (35 miles south), 1; Carr's Ranch, Davis Mountains, 2 (skulls only), Catarina, 1; Comstock, 1 (skull only); Comstock (9 miles south), 1; Crockett County, 1 (skull only); Dillely (15 miles east), 2; Eagle Pass, 1 (skull only); Encinal, 4; Laredo (20 miles east), 1; San Antonio, 1 (skull only); Pearsall (26 miles south), 1; Sheffield, 1; Soledad Ranch, Webb County, 2; Webb County (without definite locality), 2. Tamaulipas: Matamaros, 2.

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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A NEW INTERMEDIATE HOST OF THE ASIATIC  
BLOOD FLUKE, SCHISTOSOMA JAPONICUM.

BY PAUL BARTSCH.<sup>1</sup>

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Since the publication of my paper "Molluscan Intermediate Hosts of the Asiatic Blood Fluke, *Schistosoma japonicum*, and species confused with them"<sup>2</sup> many mollusks have been sent to us from China for determination, among which is the new species here described.

***Katayama tangi***, new species.

Shell elongate-conic, thin, semitransparent, reddish brown, with the red intensified on the varix behind the aperture and within the aperture whose peristome is not much darker colored than the lip. Nuclear whorls strongly rounded, minutely granulose under high magnification. Postnuclear whorls well rounded, marked by rather strong closely spaced incremental lines which almost attain the strength of threads on the last whorl. A very heavy varix is present immediately behind the outer lip which extends up on the columella and renders this decidedly tumid. Suture well constricted. Periphery well rounded. Base somewhat inflated, well rounded, narrowly umbilicated and marked like the spire. Aperture broadly obliquely ovate; peristome slightly reflected. Operculum with 3.2 whorls. The radula is typically *Katayamid*, i. e., the rachidian tooth has the formula  $\frac{1-1-1}{3---3}$ ; the lateral tooth has 6 denticles of which the third from the inside is much larger and longer than the rest; the inner marginal has 9 denticles and the outer 5.

This species was collected by Dr. Chung Chang Tang of the Fukien Science Institute, Foochow, China, for whom I take pleasure in naming it, at Futsing, in Fukien Province, China. The type (U. S. N. M. no. 428776) yields the following measurements: number of whorls 7; length 6.4 mm.; diameter 3.1 mm. This and 99 additional specimens from the same station (U. S. N. M. no. 428777) yield the following table of measurements:

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

<sup>2</sup> Smithsonian Miscellaneous Collections, Vol. 95, No. 5, May 11, 1936, pp. 1-60, pl. 1-8.

<i>No. of whorls</i>	<i>Height in mm.</i>	<i>Diameter in mm.</i>	<i>No. of whorls</i>	<i>Height in mm.</i>	<i>Diameter in mm.</i>
7 a	6.4	3.1	7 b	5.2	2.5
5	6.5	3.4	5.5	7.0	3.2
5	6.7	3.1	5	6.2	3.2
5.5	7.1	3.0	5.5	6.6	3.3
5	6.1	3.1	5	5.7	2.7
5	6.9	3.4	7 b	6.8	3.2
4.5	5.4	2.8	6	6.2	2.9
5.5	6.0	2.8	5.5	6.1	2.9
5.5	6.9	3.2	5.5	7.1	3.2
8 b	7.4	3.1	6	6.7	3.2
5	5.9	3.1	6	6.5	3.2
5	6.8	3.2	6	6.3	2.9
6	6.1	2.9	7 b	6.5	3.0
5.5	6.5	3.3	5.5	6.5	3.3
5.5	5.8	2.6	6.5	6.4	3.0
6	6.1	3.0	6.5	6.2	3.0
6	7.0	3.1	5.5	6.7	3.2
6	7.2	3.3	6	7.2	3.4
6	7.4	3.3	6.5	7.2	3.2
5.5	7.6	3.4	5	6.5	3.3
4.5	7.0	3.4	5	6.5	3.2
4.5	5.4	2.9	5	6.3	3.0
5	6.1	3.2	7 b	6.4	3.0
7.5b	7.5	3.3	5.5	7.2	3.3
5	6.1	3.1	5.5	5.7	2.8
6.5b	6.1	3.0	5.5	6.7	3.5
5	6.7	3.3	5.5	6.2	3.0
7 b	7.1	3.1	6	6.9	3.5
6.5	7.2	3.2	7 b	6.1	2.9
5	6.6	3.3	7 b	6.4	3.0
6.5	6.2	2.8	7 b	7.1	3.4
7 b	7.1	3.2	7 b	6.7	3.5
6.5	6.3	3.0	7 b	6.2	3.0
7 b	5.9	2.8	7 b	6.9	3.1
7 b	6.7	3.2	7 b	7.1	3.4
7 b	6.5	2.9	7 b	6.0	2.9
7 b	6.1	2.9	6.5	6.4	3.1
7 b	6.5	2.9	7 b	6.1	2.9
7 b	6.0	2.9	6.5	6.7	3.0
7 b	5.9	3.1	7 b	6.5	3.1
6	6.2	3.1	6	6.1	2.8
7 b	5.7	2.7	6.5b	5.7	2.7
7 b	6.0	2.8	6.5b	5.8	2.7
8 b	7.2	3.1	7 b	6.3	2.9
7 b	6.2	2.9	7 b	6.3	3.0
6.5	5.9	2.7	6.5	5.6	2.9

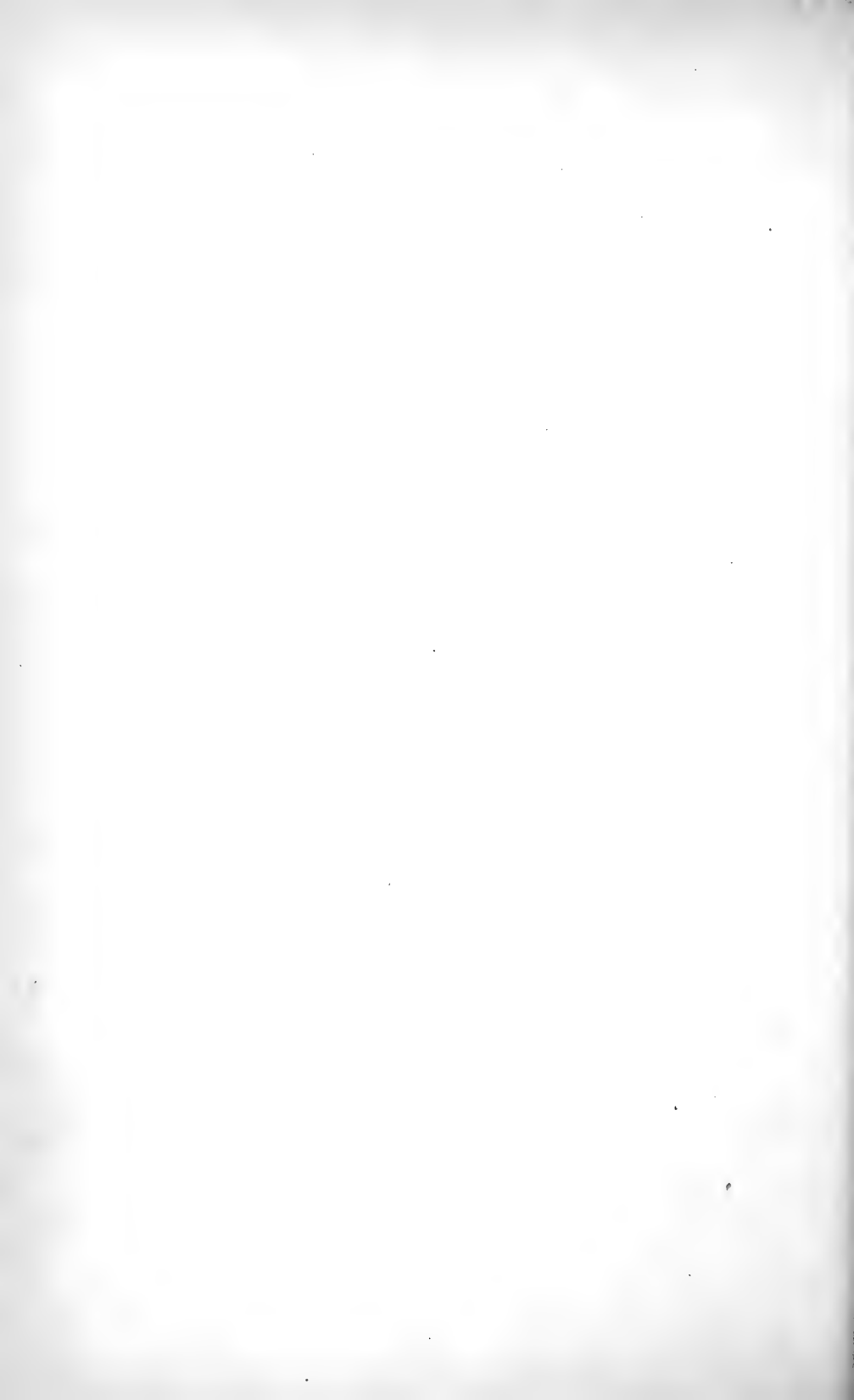
No. of whorls	Height in mm.	Diameter in mm.	No. of whorls	Height in mm.	Diameter in mm.
7 b	5.7	2.8	6.5b	6.0	2.8
6.5	6.6	3.0	6	5.6	2.8
6	6.2	3.1	7 b	5.6	2.7
7 b	6.4	3.0	6	6.1	2.8
Greatest.....			8.0	7.6	3.5
Least.....			4.5	5.2	2.5
Average.....			6.2	6.4	3.1
a type.					
b complete shell.					

The reddish color conspicuously differentiates this species from the other Chinese *Katayamas*. From *K. lii*, its nearest neighbor, it differs conspicuously in being smaller and less slender and in having a lesser number of whorls which are more inflated. The outer teeth of the radula also have a different denticular formula. For comparison we cite here the formulae of the Chinese species:

<i>K. tangi</i> .....	first marginal:	9	second marginal:	5
" <i>lii</i> .....	" "	9	" "	7
" <i>fausti</i> .....	" "	8	" "	5
" <i>cantoni</i> .....	" "	7	" "	5

Of these mollusks Dr. Tang writes:

"For several months I have been engaged in the study of schistosomiasis japonica of Fukien province. I have found the distribution of *Katayama* snails in Futsing district quite extensive, occupying the entire northern half of that district. The habitat of the snail is typical for the genus as described by several investigators in other parts of this country. They inhabit the grassy banks of secondary mountain streams, in porous humus and wet earth. They are very seldom found in water. On the latter part of February I observed them pairing, soft part sticking to soft part. Small young snails just visible to the naked eye were plentiful in May. It is very interesting to see that Futsing snails conjugate a month earlier than Chekiang snails (*K. lii*), as observed by Drs. H. C. Kan and Y. T. Yao. . . . Since the record of the endemic area of schistosomiasis and the *Katayama* snails serving as the intermediate hosts of the disease have not yet been reported for this province, I am now engaged in writing a communication of this subject to be published in the Chinese Medical Journal."





PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

## A NEW FLYING SQUIRREL FROM WEST VIRGINIA.

BY GERRIT S. MILLER, JR.<sup>1</sup>

The Catskill Mountains and a line running east and west through central Massachusetts have hitherto marked the southernmost limit of the definitely known range of the northern flying squirrel in eastern North America (See Howell, North Amer. Fauna, no. 44, p. 30, fig. 3, June 13, 1918). This limit is now carried about 400 miles to the southwest by the recent capture of two specimens in West Virginia by Watson Perrygo and Carlton Lingeback during the course of field work for the National Museum.

These specimens not only extend the known range of *Glaucomys sabrinus*; they show that this boreal rodent, like *Tamiasciurus hudsonicus*, *Peromyscus maniculatus*, *Clethrionomys gapperi*, *Microtus chrotorrhinus* and *Napaeozapus insignis*, is represented in the southern Alleghenies by a distinct local form.

***Glaucomys sabrinus fuscus*, subsp. nov.**

*Type*.—Adult female, no. 260420, U. S. National Museum. Collected at Cranberry Glades, Pocahontas County, West Virginia, altitude, 3300 feet, June 13, 1936, by Watson Perrygo and Carlton Lingeback. Original number 109.

*Diagnosis*.—Size small, as in *Glaucomys sabrinus macrotis* (Mearns) from the northeastern United States, but color about as dark as in the large *Glaucomys sabrinus griseifrons* Howell from Prince of Wales Island, Alaska; dorsum of manus and pes fuscous, and cheeks clear gray; these parts not, respectively, hair brown and buffy gray as in *Glaucomys sabrinus macrotis*.

*Color*.—Upperparts a rich brown resulting from the blending of the subapical bands (about 3 mm.) of cinnamon buff (more nearly pinkish cinnamon along median dorsal area) with the short dark tips of the hairs;

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

undercolor deep neutral gray becoming dusky neutral gray just below the subapical bands; edge of flying membranes dusky neutral gray (about deep neutral gray in *macrotis*); hands and feet fuscous above, soiled white at sides below; underparts buffy white with a clear buffy wash along median region (more noticeable than usual in *macrotis*); crown and muzzle essentially like back; cheeks behind level of eyes a clear, slightly grizzled gray (somewhat paler than Ridgway's "pale smoke gray") with none of the light buff cast that is characteristic of the corresponding region in *Glaucomys sabrinus macrotis*; tail essentially as in *macrotis* but more darkly and extensively clouded on distal third.

*Skull and teeth.*—The skull and teeth do not differ appreciably from those of *Glaucomys sabrinus macrotis*.

*Measurements.*—External measurements of type (teeth moderately worn) and a male with slightly worn teeth; head and body, 150 (159); tail, 112 (111); hind foot, 37 (39); greatest length of skull, 37.0 (36.4); condylobasal length, 34 (33.6); zygomatic breadth, 22.8 (22.6); interorbital constriction, 6.8 (6.6); mandible, 22.0 (22.0); maxillary toothrow (alveoli) 7.0 (7.0); mandibular toothrow (alveoli) 7.0 (7.0).

*Specimens examined.*—Two, the type, from Cranberry Glades, Pocahontas County, and a young adult male from near Cheatbridge, Randolph County, altitude, 3900 feet.

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GENERAL NOTES.

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THE STATUS OF *DELPHINUS BAIRDII* DALL.

In 1873 Dall separated the common dolphin of the Californian coast as a species distinct from *Delphinus delphis* of the Atlantic. For the Pacific animal he proposed the name *Delphinus bairdii*; type locality, Cape (now Point) Arguello, Santa Barbara County, California (Proc. Calif. Acad. Sci., vol. 5, p. 12. January 29, 1873). Sixteen years later True concluded that: "From the evidence now obtainable I am unable to distinguish between *D. delphis* and *D. bairdii*, and must, therefore regard the latter as identical with the former" (A Review of the family Delphinidae, Bull. U. S. Nat. Mus., no. 36, pp. 53-54, 1889). In discussing this question True did not mention the "extremely attenuated beak" that Dall regarded as a distinguishing feature of the Californian dolphin. Each of True's Californian skulls (Nos. 15403 and 22305), however, had a considerable part of the rostral extremity broken off. Since 1889 the name *Delphinus bairdii* Dall has remained in the synonymy of *D. delphis* Linnaeus.

There are now in the U. S. National Museum two essentially perfect skulls of *Delphinus* from California (No. 20162, Carmel, and 49800, San Diego) and one from the Gulf side of Lower California (No. 260235, Escondido Bay; recently presented by Mr. W. Chas. Swett). All three of these, together with one from Korea (No. 22881), when compared with eight skulls of the Atlantic common dolphin (two from near Woods Hole, Mass., two from near New York, one from Virginia and three from near Cape Hatteras, North Carolina), clearly show one of the features that Dall regarded as diagnostic of the Pacific animal. Like True, I am unable to find constant differences between any particular linear dimension in the western skulls and the corresponding part in the specimens from the Atlantic, or to see anything unusual in the development of the lateral palatal grooves. But the peculiar slenderness of the rostrum in the Pacific dolphin is a feature that becomes obvious to the eye as soon as perfect skulls are compared. Measurements show that it holds good without exception among the specimens examined. The ratio of rostral length (measured from the maxillary notch) to the greatest diameter of the skull across the zygomatic processes of the squamosals ranges from 1.39+ to 1.53+ in the skulls from the Atlantic, and from 1.69+ to 1.74+ in those from the Pacific (1.71+ in the type specimen as measured by Dall).

In view of the seeming constancy of its unusually slender cranial beak the dolphin to which Dall gave the name *Delphinus bairdii* should be again recognized as a distinct member of the North American fauna. Whether or not Dall's name was the first to be applied to the animal is a question that is, at present, impossible to decide.

—Gerrit S. Miller, Jr.

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NEW OR OTHERWISE NOTEWORTHY NORTHWEST-  
ERN PLANTS<sup>1</sup>—II: TWO NEW SPECIES FROM  
THE GRAND CANYON OF THE SNAKE RIVER.<sup>2</sup>

BY LINCOLN CONSTANCE AND REED C. ROLLINS.

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The spectacular more-than-a-mile-deep Hell's Canyon of the Snake River has been, for a decade, the mecca of annual excursions from the State College of Washington.

The precipitous basaltic or granitic walls have proved an effective barrier to the migration outwards of species which have become established within these potent obstacles to any egress. It is not surprising, then, that much of the Snake Canyon exhibits a flora with a strongly endemic flavor. The 1936 expedition revealed the new species described herein, and it is to be expected that subsequent collecting will bring others to light.

***Arabis crucisetosa*, sp. nov.**

Perennial; caudex simple or branched, clothed with leaf-bases of former seasons; stems several to numerous, rarely single, simple or sometimes branched above, slender, glabrous or often sparsely stellate-pubescent below, 1-4 dm. high; basal leaves numerous, spatulate to obovate, obtuse, petiolate, entire or remotely dentate, harshly stellate-pubescent with cross-shaped hairs or rarely almost glabrous, dark green above, paler or sometimes purplish below, 2-6 cm. long, 6-15 mm. wide, petiole nearly equalling the blade in length; cauline sessile, neither sagittate nor clasping, entire or rarely few-toothed, linear-oblong, obtuse, 1-3 cm. long, 2-6 mm. wide; stellate-pubescent or often glabrous on the faces but with stellate marginal hairs; sepals oblong, yellowish, rarely purple-tipped, scariolate-margined, glabrous, 3-5 mm. long; petals ligulate, white, 5-10 mm. long; pedicels slender, glabrous, spreading, 1-2 cm. long; pods erect, glabrous, straight or nearly so, 1-nerved below, 2-4 cm. long, 1-1.5 mm. wide;

<sup>1</sup> Constance L., and Dillon, L. A., *New or Noteworthy Northwestern Plants—I. Madroña*, vol. 3, no. 4, pp. 170-173, 1935.

<sup>2</sup> Contribution from the Botany Department of the State College of Washington, No. 65.

tipped with a stout capitate style; seeds (immature) ellipsoidal, wingless (?), uniseriate.

Planta perennis; caudex simplex vel ramosus; caulibus saepe numerosis, glabris vel basi sparsim stellato-pubescentibus, 1-4 dm. altis; foliis radicalibus spatulatis vel obovatis, obtusis, petiolatis, integris, 2-6 cm. longis, 5-15 mm. latis, stellato-pubescentibus cum setis cruciformibus; foliis caulinis sessilibus, nec sagittatis nec amplectentibus, integris, lineariblongis, obtusis, margine stellato-pubescentibus, 1-3 cm. longis, 2-6 mm. latis; petalibus ligulatis, albis, 5-10 mm. longis; pediculis teneribus, glabris, divaricatis, 1-2 cm. longis; siliqua erecta, glabra, 1-nervata ad basim, 2-4 cm. longa, 1-1.5 mm. lata; stigmatibus robusto capitato; seminibus immaturis ellipsoidalibus, inalatis (?) 1-seriatis.

*Type locality*.—between Steep Creek and Willow Creek, Snake River Canyon, Nez Perce National Forest, Idaho County, Idaho.

*Specimens examined*.—IDAHO, Idaho Co.; between Steep Cr. & Willow Cr., May 16, 1936, *Rollins, Constance & Dillon 1107* (type); 4 miles up Sheep Cr. from Snake River, May 16, 1936, *J. Packard*; between Lightning Cr. & Middle Fork of Sheep Cr., May 16, 1936, *Beaubier, Forsberg & Hardt 74*; peak, 4 miles south of mouth of Sheep Cr., May 16, 1936, *R. L. Davidson 107*; Squaw Cr. trail, T 24 N, R 2 W, May 16, 1936, *Peters & Moore 154*; near Lightning Cr., May 16, 1936, *F. Meyer 260*.

*Arabis crucisetosa*, during anthesis, presents the same general features as *A. Nuttallii* Robins. and *A. furcata* Wats. but, as fruiting progresses, the differences between the three species are accentuated. The dense, rather harsh, stellate pubescence on the basal leaves and lower portions of the plants of *A. crucisetosa* distinguishes it markedly from the other two species, which possess only simple hairs. The short narrow pods, wingless (?) seeds, slender spreading pedicels, and, especially, the characteristic stellate pubescence, suggest an affinity for *A. Whitedii* Piper.

#### **Mirabilis MacFarlanei, sp. nov.**

Plants perennial from a stout deep-seated root; herbage finely pubescent throughout (except for upper leaf-surfaces and stem-bases) with minute simple ascending hairs; stems freely branched (swollen at nodes), few to numerous, decumbent or ascending, 6-10 dm. high and forming hemispherical clumps 6-12 dm. in diameter; petioles 1-2.5 cm. long in lower leaves, uppermost leaves nearly sessile; leaves opposite, succulent, green above and glaucescent below, entire or slightly crenulate, truncate or barely cordate at base, obtuse or rounded at apex; lower leaves orbicular or ovate-deltoid, 4-7.5 cm. long, 5-8 cm. broad, progressively smaller and narrower upwards, the uppermost narrowly ovate, 2.5-3.5 cm. long, 1.5-2 cm. broad; flowers perfect, involucrate; involucre terminal and in upper leaf axils, 4-7-flowered, unequally 5-lobed, green or purplish, slightly if at all accrescent and nearly rotate in fruit, 1.5-2.5 cm. high; bracts often twice the length of the involucre, oval, obtuse or apiculate; peduncles stout, 0.5-4 cm. long; perianth slightly oblique, bright rose-purple, broadly funnelform, 1.5-2.5 cm. long, the limb 1-3 cm. broad, slightly exceeding the tube in length; stamens 5, circinnate before and after

anthesis, filaments unequal, capillary, slightly connate at base and exerted; anthers didymous, longitudinally dehiscent; ovary subglobose; style filiform; stigma capitate, papillose; anthocarp ellipsoidal, brownish-gray, 6–8 mm. long, almost terete, marked (at least at base) with 10 low ribs, glabrous but rugose-tuberculate, constricted at base, mucilaginous when wet; seed oblong-elliptical, light brown, 3–5 mm. long.

Planta perennis, minute pubescens; caulibus ramosis, 6–10 dm. altis; foliis oppositis, integris, pedunculatis, orbiculo vel ovato-deltaoideis, truncatis vel basi cordatis, obtusis vel apice rotundis; involucri 5–7 floris, fere rotatis, 1.5–2.5 cm. altis; bracteis involucri ovalibus, saepe fere liberis; perianthis late crateriformibus, 1.5–2.5 cm. longis; staminibus exertis; anthocarpis fere teretibus, rugoso-tuberculatis, 6–8 mm. longis.

*Type locality*.—Lower Cottonwood Landing, between mouth of Somer's Creek and Pittsburg Landing, Snake River Canyon, Wallowa County, Oregon.

*Specimens examined*.—OREGON, Wallowa Co.: Lower Cottonwood Landing, May 15, 1936, Constance, Rollins, Clements & Dillon 1579 (type).

This Four-o'clock falls in the section *Quamoclidion* of *Mirabilis*, which is considered of generic rank by Standley in the North American Flora and other publications. *M. MacFarlanei* is most closely related to *M. Greenei* Wats., of the Klamath (Siskiyou) region of California and Oregon, with which it agrees in pubescence. *M. MacFarlanei* differs from *M. Greenei* in having broader leaves, obtuse at apex and rounded or cordate at base; shorter, nearly rotate involucre, with broader, often nearly free, bracts; exerted stamens; shorter perianth, and almost terete anthocarp. The peculiarly isolated occurrence of *M. MacFarlanei*, which is roughly 350 miles distant from the nearest reported occurrence of *M. Greenei*, effectually completes the separation.

This plant is named for Mr. E. B. MacFarlane, for thirty years pilot of boats on the Snake River, who was the actual discoverer of the species, and who pointed it out to the writers.

The types of the two species described in this paper are in the herbarium of the State College of Washington; the other specimens are in the possession of Mr. Rollins.





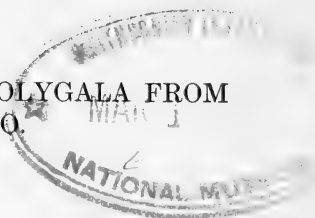
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A NEW PLANT OF THE GENUS *POLYGALA* FROM  
NORTHERN MEXICO.

BY S. F. BLAKE.

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The new *Polygala* here described is a member of the section *Monninopsis* of the subgenus *Orthopolygala*, and is distinguished at once from all the North American species of that group except *P. viridis* S. Wats. by its dense spreading puberulence. In *P. viridis* the leaves are obovate-spatulate with long-cuneate base, in the new species ovate or elliptic-ovate and sessile by a rounded base.

***Polygala oedophylla* Blake, sp. nov.**

*Perennis multicaulis parva decumbens ubique (floribus exceptis) dense patenti-puberula; folia alterna ovata parva turgida conferta subsessilia callosio-apiculata; racemi solitarii densi cylindrici acutiusculi, axi valde nodoso, bracteis deciduis; flores parvi brevissime pedicellati albidi et rubidi; alae obovatae apice rotundatae ca. 2 mm. longae; capsula suborbicularis alas paullum superans, in margine superiore sublata alata.*

Many-stemmed perennial with thick vertical root (5 mm. thick); stems decumbent, simple or branched, 4-8 cm. long, densely grayish-puberulent with short spreading hairs; leaves alternate, crowded, the lowest scale-like, reduced, the others ovate to elliptic-ovate, 3-7.5 mm. long, 1.8-3 mm. wide, acutely or obtusely callous-pointed, rounded at the sessile base, pale green, usually reddish on margin toward tip, fleshy, thick, usually somewhat concave above, often wrinkled when dry, nerveless or sometimes with the costa evident beneath, densely spreading-puberulous on both sides; racemes solitary at tips of stems and branches, becoming apparently lateral, sessile or very shortly peduncled, 5-9 mm. long, 4-4.5 mm. thick, short-pointed and subcomose at apex, the nodose, densely puberulent, curved axis becoming 1.5-3 cm. long; bracts lance-ovate, 1.5-1.8 mm. long, acutish, puberulent, reddish with very narrow whitish margins, deciduous; pedicels glabrous, 0.3 mm. long, spreading; flowers (when fresh) "purple and green"; sepals ovate, obtuse or the upper acutish, glabrous, or very sparsely ciliate toward apex, reddish-centered, whitish-margined, with thickened midnerve and a pair of weak lateral nerves,

the upper sepal 1.6–1.8 mm. long, the lower free, 1.5–1.7 mm. long; wings obovate, rounded, not distinctly clawed, with reddish center and whitish margins, 1-nerved and with a pair of weaker simple or forked lateral veins, 1.8–2.2 mm. long, 1.2 mm. wide; upper petals oblong-obovate, rounded, equaling the keel, 2-nerved, the nerves once or twice forked; keel 1.7 mm. long, the crest on each side of a single linear lobe and a sometimes emarginate lamella; stigma strongly thickened toward tip, the stigmatic lobes very short and obscurely barbellate; stamens 8, the sheath glabrous, the anthers shorter than to about equaling the free portion of the filaments; capsule suborbicular, 2–2.2 mm. long, 1.8 mm. wide, with both cells fertile and dehiscent, the upper rather broadly winged (wing 0.5–0.7 mm. wide at apex), with 2 or 3 oblique cross veins on body, the lower wingless; seed in upper cell oblong-ellipsoid, 1.4 mm. long, black, puberulous, the aril 0.8 mm. long, appressed, the 2 lobes obliquely obovate, obtusely notched at apex, the seed in lower cell similar, 1.1 mm. long, exarillate.

MEXICO: In arroyo, Pablillo, south of Galeana, Sierra Madre Oriental, Nuevo Leon, alt. 1900–2000 m., 26 June 1934, *F. W. Pennell* 16969 (type, herb. Acad. Nat. Sci. Phila.; fragm., U. S. Nat. Herb.).

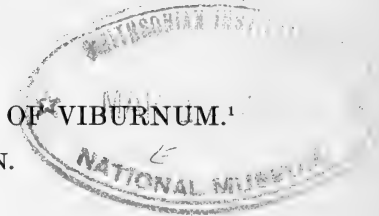
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SOME GUATEMALAN SPECIES OF *VIBURNUM*.<sup>1</sup>

BY C. V. MORTON.

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In my recent paper on the Mexican and Central American species of *Viburnum*,<sup>2</sup> five species are recorded from Guatemala, namely: *Viburnum Hartwegi* Benth, *V. guatemalense* Gandog., *V. disjunctum* Morton, *V. discolor* Benth., and *V. optatum* Morton, all endemic, with the exception of *V. guatemalense*. I have recently received for study from the Arnold Arboretum a number of specimens, collected in various parts of Guatemala by Dr. Alexander F. Skutch, which have added considerably to our knowledge of the species of that region.

***Viburnum discolor* Benth. forma *integrum* Morton, f. nov.**

A *V. discolori* typico foliis integris recedit.

Type in the U. S. National Herbarium, no. 1,642,531, collected in bushy ravine near Quezaltenango, Dept. Quezaltenango, Guatemala, alt. 2500 meters, July 24, 1934, by A. F. Skutch (no. 819).

***Viburnum discolor* Benth. var. *subcordatum* Morton, var. nov.**

A var typico foliis majoribus basi subcordatis, usque ad 9.7 cm. longis et 5.8 cm. latis, integris, tomento ramulorum et inflorescentiarum molliore recedit.

Type in the herbarium of the Arnold Arboretum, collected at Chichavac, Dept. Chimaltenango, Guatemala, alt. 2500 meters, Dec. 9, 1933, by A. F. Skutch (no. 755).

***Viburnum guatemalense* Gandog.**

New localities: Second-growth woodland on Volcán Zunil, Dept. of Quezaltenango, Guatemala, alt. 1700 meters, Aug. 1, 1934, *Skutch* 896. Palmar, Dept. Quezaltenango, Guatemala, alt. 1300 meters, Oct. 13, 1934, *Skutch* 1441.

This species evidently varies greatly in size, for no. 1441 is indicated by Dr. Skutch as a shrub 10 feet high and no. 896 as a tree 40 feet high.

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

<sup>2</sup>Contr. U. S. Nat. Herb. 26: 339-366. 1933.

**Viburnum mendax** Morton, sp. nov.

Sect. *Disjuncta*. Frutex 5.4 m. altus; rami teretes, vetustiores glabri, rubescentes, juniores dense ferrugineo-pubescentes, pilis stellatis, multiradiatis, breviter stipitatis; petioli usque ad 1.3 cm. longi, tomento ei ramulorum simili; lamina foliorum ovata vel late elliptica, maxima 14 cm. longa et 6.3 cm. lata, apice breviter acuminata, basi obtusa vel rotundata, papyracea, integra, supra viridis, primo sparse pubescens, pilis minutis hyalinis simplicibus vel pauci-radiatis, demum glabrescens, subtus stellato-puberula, pilis numerosis fuscis multiradiatis subsessilibus persistentibus, 4-6 nervia, nervis supra impressis subtus elevatis; inflorescentia magna, terminalis, usque ad 10 cm. lata, pedunculata, pedunculo 1-4.5 cm. longo, tomento ei ramulorum simili, apice bracteis parvis caducis praedito: calycis tubus subcylindricus, 1-1.3 mm. longus, eglanduliferus sed subviscidus, pilis satis sparsis simplicibus vel pauciradiatis instructis; calycis lobi ca. 0.5 mm. longi, erecti, obtusi, ciliati, externe parce pubescentes; corolla alba, campanulata, ca. 3 mm. longa (tubo ca. 1 mm. longo, lobis ca. 2 mm. longis, margine glanduliferis), externe pilos paucos fere semper simplices gerens; filamenta glabra, gracilia; antherae oblongae, exsertae, purpureae; stylus crassus, glaber; fructus subglobosus, ca. 3.5 mm. diametro, stylo persistente coronatus, endocarpio valde intruso, loculo spurio magno.

Type in the Arnold Arboretum, collected at Nebaj, Dept. Quiché, Guatemala, alt. 2000 meters, Dec. 10, 1934, by A. F. Skutch (no. 1885). An additional specimen was collected by Dr. Skutch (no. 1065) at Solomá, Dept. Huehuetanango, Guatemala, alt. 2500 meters, Aug. 22, 1934.

At first glance this species suggests *Viburnum discolor*. Actually it is more closely related to *Viburnum disjunctum* Morton, which has the entire surface of the calyx tube covered with a dense tomentum of white multiradiate hairs. In the present species the calyx tube is green and viscid, the relatively few, scattered hairs being simple or few-rayed. Even at maturity the upper surfaces of the leaves of *V. disjunctum* are hairy with numerous multiradiate hairs, whereas in *V. mendax* the hairs are fewer, mostly deciduous, and usually simple or with only a few rays.

**Viburnum blandum** var. **vulcanicum** Morton, var. nov.

Frutex 4.5 m. altus; rami subteretes, rubri, glabri; petioli usque ad 9 mm. longi, glabri, supra canaliculati; lamina foliorum ovata, maxima 8 cm. longa et 4.8 cm. lata, apice breviter acuminata, basi obtusa vel subrotundata, chartacea, utrinque glabra, non ciliata, dentata, utroque latere dentibus deltoideis 4-7 instructa, nervis primariis 4-6; inflorescentia omnino ei *V. blandi* typici similis.

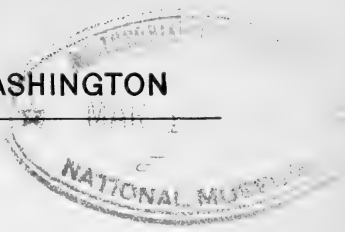
Type in the U. S. National Herbarium no. 1,642,532 collected on a forested ridge of the south slope of Volcán Atitlán, Dept. Suchitepequez, Guatemala, alt. 2250 meters, Jan. 14, 1935, by A. F. Skutch (no. 2125).

*Viburnum blandum* Morton<sup>3</sup> was founded on a single specimen collected in Chiapas by E. W. Nelson. Dr. Skutch has collected two forms on Volcán Atitlán, one of which (Skutch 2125.5) is quite typical of the species, the other, here described as var. *vulcanicum*, differing in having broader, conspicuously toothed leaves.

<sup>3</sup>Contr. U. S. Nat. Herb. 26: 352. 1933.

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SOME NEW ISSIDAE WITH NOTES ON OTHERS  
(HOMOPTERA-FULGORIDAE).<sup>1</sup>

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

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The Issidae have long been noted for their curious and bizarre forms and each new discovery only seems to add to the heterogeneity of the display. An extremely large and very curious form with two long horn-like projections has recently come to light. It will not fit into any known group and is described as a new genus as well as a new species.

**TYLANIRA** Ball, n. gen.

Resembling *Tylana* Stal (as represented by *ustulata* Uhl) and *Ulizes* Stal in general form and structure but with a much narrower and more acutely angled head which is produced into two long divergent processes extending obliquely forward and upwards, two and one half times the length of the eye. Superficially resembling *Lusanda* Stal from Ceylon but in that genus the head is broad, and the projections point obliquely downwards. Vertex one and one half times as long as its basal width, nearly that much longer than the pronotum, the disc with a deep angular trough, the two projections triangular in shape, inclined upward, the angle between them acute and extending down to expose the carina of the front. Pronotum and mesonotum as in *Tylana* except that there are three large tubercles in the lateral compartments on each side of the latter. Elytra longer and more definitely angled behind with a longer inflated bulla than in *Tylana*. Venation reticulate and similar to that in *T. ustulata*. Front one half longer and no wider than in *Tylana*, 5-carinate, the intermediate carina rounding in above and not extending onto the projections. The whole insect clothed with long stiff bristles.

Type of the genus *T. bifurca*, n. sp.

**Tylanira bifurca** Ball, n. sp.

Form of the genus, resembling *Tylana ustulata* Uhl, larger with a much

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<sup>1</sup> Types in the author's collection unless otherwise stated.

longer, narrower head and pronotum giving the insect a wedge shaped appearance anteriorly and a blunt wedge posteriorly. Length ♀ 8 mm., ♂ 7 mm.

General color lighter brown than in *ustulata* with a definite grayish cast, the cinnamon chevrons of *ustulata* reduced to pale ovals while there are two smaller spots behind connected by a broken line. Holotype ♀, allotype ♂, and a pair of paratypes, Benson, Ariz., June 7, 1930, and one female Ft. Hancock, Texas, June 9, 1930. All taken by J. O. Martin and received through the kindness of E. P. Van Duzee of the California Acad. of Sciences. Types in that museum a paratype ♀ in the author's collection.

This is the largest and most striking Issid yet recorded from the United States. It is doubtful whether *ustulata* really belongs to *Tylana*, an Indian Archipelago group. Further study may indicate that it should be transferred to this genus.

#### DICTYSSONIA Ball, n. gen.

Size and form of *Dictyobia* Uhler nearly, but with definite bullae at the outer angles of elytra and uniformly finely reticulate elytra, the major venation being almost lost in the reticulations. Superficially resembling *Ulixes* in this character but not belonging to that group. Vertex very short, the anterior margin straight and carinate as in *Dictyobia*, face broad and flat, right angled with vertex with definite median and lateral carinae, the clypeus and lower part of front retreating. Pronotum and mesonotum as in *Dictyobia*. The elytra elongate as in *Dictyobia* but more inflated with definite bullae and the posterior margins rounding together. The elytra are much longer and narrower behind than in *Neaethus* Stal and *Dictyonia* Uhl and have a much finer reticulate venation than either.

Type of the genus *Dictyssonina beameri*, n. sp.

#### *Dictyssonina beameri* Ball, n. sp.

Size of *Dictyobia permutata* Uhl but with the elytra more inflated and rounding together behind, with definite bullae. A pale brown insect peppered with white. Length ♂ 5 mm., width 3 mm.

Form and structure of the genus. Pale brown, the carinae above lighter, those on face darker, the lateral ones margined with white spots, pronotum with fine, dark punctures. Elytra very light with heavy dark reticulations which give the effect of a dark insect with white dots. Holotype ♂ and one paratype ♂ taken by the writer on Chihuahua pine in Pinery Canyon, Chiricahua Mts., Arizona, July 28, 1935, and one paratype male in Kans. Univ. collection taken in the same place by Dr. R. H. Beamer's party the year before.

Named in honor of Dr. R. H. Beamer, whose tireless energy in combing the western deserts and mountains for *Homoptera* has been a large factor in our present knowledge of these groups.

Melichar omitted the genus *Dictyonia* Uhl from his monograph and re-described it as *Dictyssa*. The type of *Dictyonia* is *obscura* Uhl, which

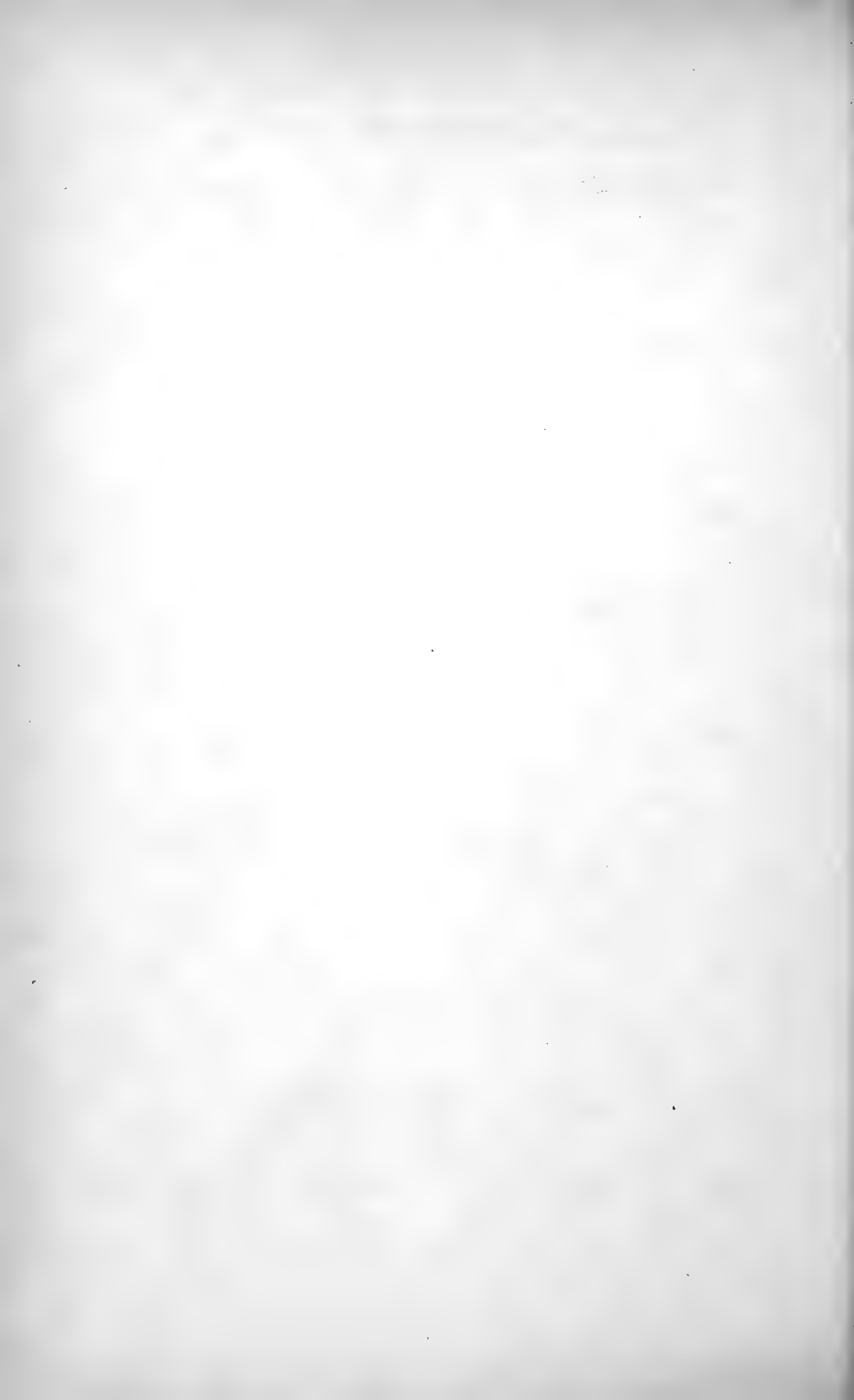
Melichar included in his monograph as *Dictyssa semivitre*a Prov. Van Duzee gives *areolata* Melichar as the logotype of *Dictyssa*. This species is closely related to *obscura* and undoubtedly congeneric, so the whole group will fall under *Dictyonia*.

***Dictyonia doeringae* Ball, n. sp.**

Resembling *ovata* Ball, darker with much longer, narrower elytra with broad median white stripes which appear oblique the way the wings are held. The white costal margin is much narrower than in *ovata* so that the cells are broader than long instead of square as in that species. The face and dorsum are darker than in *ovata*, while the ventral surface is yellow. Length ♀ 3.5 mm.

Holotype ♂, allotype ♀, and seven paratypes taken by the writer in Pine Valley, California, July 7th, 1931.

This pretty species is named in honor of Miss Kathleen Doering, who gave us a valuable monograph of the *Acanalonia* and is now working on this group.



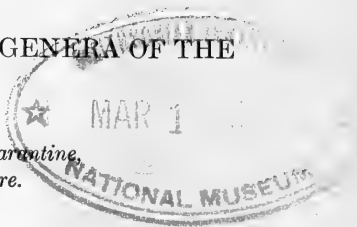


PROCEEDINGS  
OF THE  
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SYNONYMY AND SYNOPSIS OF THE GENERA OF THE  
ORDER PROTURA.

BY H. E. EWING,  
*Bureau of Entomology and Plant Quarantine,  
U. S. Department of Agriculture.*



Since Berlese published his extensive monograph on the Protura (Myrientomata) in 1909 our knowledge of the primitive hexapods of this order has been greatly extended. The literature dealing with them has increased until now there are over seventy titles. Berlese's monograph was based on ten species, all European. According to a recent catalogue of the group (Mills, 1932) forty-three species are known, coming from many parts of the world. As our knowledge of the group has increased the need of a reexamination of the type species of certain genera and of a reevaluation of the generic and specific characters has become evident.

Generic revision already has been started in the first of a series of notes on the Protura by Bagnall (1936). He states:

"In my first contribution I am able to reinstate the genus *Proturentomon* of Silvestri and to unravel a consequent somewhat complicated synonymy." The synonymy as given by this author is as follows (Bagnall, 1936, p. 212):

- "Genus *Proturentomon* Silv. 1909, p. 10.
- Syn.: *Acerentulus* auct., pp.
- Protentomon* Ewing, 1921, p. 195.
- Meroentomon* Womersley, 1927, p. 145.
- Paraentomon* Womersley, 1927, p. 145."

Unfortunately certain pertinent literature apparently was overlooked by this author, no mention being made of Tuxen's (1931) "Monographie der Proturen" or Mills' (1932) "Catalogue of the Protura."

The present writer feels that answers to some of the problems raised by Bagnall are given in the papers quoted—for example, his statement that Womersley showed that the name *Protentomon* Ewing was preoccupied. This is answered by Mills (1932, p. 126) as follows:

"The change of the generic name *Protentomon* Ewing to *Meroentomon* and the erection of the subfamily Meroentomoninae on the latter by Womersley is not tenable. The term *Protentomon* was used by Mayer (*vide* Imms' Textbook of Entomology, 2d edition, p. 3, 1929) as a name for a hypothetical, composite, non-existent, archetypic insect and not in a generic sense, and thus can not conflict with the name of Ewing's genus. The name *Protentomon* is restored in the following list and the subfamily name Protentomoninae replaces Meroentomoninae."

The point involved is covered by Opinion 2 of the International Commission on Zoological Nomenclature, the summary of which reads in part as follows:

"Names based upon hypothetical forms have, therefore, no status in nomenclature and are not in any way entitled to consideration under the Law of Priority."

In order properly to review the generic problems in the Protura, first let us go back to 1909 when Silvestri erected his genus *Proturentomon*, apparently unaware of Berlese's genus *Acerentulus* which was erected at about the same time.

*Proturentomon* Silvestri (1909).

Silvestri (1909) divided his previously established genus *Acerentomon* into two genera, proposing as new *Proturentomon* with *Acerentomon minimum* Berlese as type species. This new genus was stated to differ from *Acerentomon* (*sensu stricto*) in having the head subrotund in front instead of having it prolonged into a rostrum and in lacking the pair of pectinate laminae (pectines) on the eighth abdominal segment.

Berlese's monograph (1909) on the Protura (Myrientomata) appeared the same year, containing a good description and good figures of *Acerentomon minimum* which showed that it possesses an apically angulate rostrum and a pair of pectinate laminae on segment eight of the abdomen.

In this monograph Berlese (1909) included the type species of Silvestri's genus *Proturentomon*, *Acerentomon minimum* Berlese, in his previously established genus *Acerentulus*. Since in this monograph Berlese's very excellent drawings and description of this type species show that it does not possess the characters upon which the genus *Proturentomon* was based, but rather those of his own genus *Acerentulus*, subsequent workers have been inclined to regard *Proturentomon* as a synonym of *Acerentulus* until its recent reestablishment by Bagnall (1936).

Berlese's descriptions and copious figures of the type species of *Acerentulus* and *Proturentomon* show that the type of *Proturentomon*, *Acerentomon minimum* Berlese, differs from the type of *Acerentulus*, *Acerentomon confine* Berlese, in several basic characters:

(a) The terga of the typical abdominal segments of *Acerentomon minimum* are without transverse grooves, instead of each having two transverse grooves.

(b) The typical abdominal segments are each provided with a single transverse row of dorsal setae and an anterior submedian pair, instead of two transverse rows of dorsal setae.

(c) The tergal apodemes of the typical abdominal segments are broadly rounded near the median line and narrowly branched laterally, instead of being angulate submedially and broadly branched dorsolaterally.

(d) The rostrum is present instead of absent.

Thus *Proturentomon* is really very different from *Acerentulus* Berlese.

*Acerella* Berlese (1909).

Berlese divided his genus *Acerentulus* into two subgenera, proposing as new *Acerella* based on *Acerentulus tiarneus* Berlese. This subgenus has a rather doubtful status. Its type species needs redescription. Berlese placed *Acerentulus tiarneus* in a new subgenus because the dorsal abdominal apodemes are but slightly incurved, while in all the other species of *Acerentulus* then known to him these apodemes are strongly incurved. Using this character alone it would be impossible to-day to determine which of the known species of *Acerentulus* should be allocated to *Acerella*.

It appears to the present writer more significant that the dorsal apodemes of *Acerentulus tiarneus* do not branch than that they are only slightly incurved. Also it is noted that Berlese does not figure the pectines on abdominal segment VIII. If these pectines are really absent in this species, this fact should do much toward reestablishing *Acerella* either as a subgenus or as a genus.

*Protapteron* Schepotieff (1909).

Schepotieff (1909) established the genus *Protapteron*, founded on a proturan, *P. indicum* Schepotieff, from India, that was reported to be remarkable in certain respects for a member of this order. It was described and figured as having long, many-segmented antennae.

Fortunately Rimsky-Korsakow (1911) reexamined a type of *P. indicum* and reported it to be a species typical of *Eosentomon*. This discovery of Rimsky-Korsakow, together with the discovery of evident misinterpretations by Schepotieff, have caused most workers to accept the synonymy of *Protapteron* with *Eosentomon*. Despite all this Womersley (1932) still recognizes Börner's family Protapteridae, based on *Protapteron*, in his classification of the Protura.

Womersley (1928) had previously expressed the view that Schepotieff probably had two species before him at the time he described his *indicum*, and that the specimen examined by Rimsky-Korsakow did not represent the species actually described by Schepotieff. That any one could confuse a proturan which has no antennae with one that has long, many-segmented antennae does not appear reasonable.

But Schepotieff's description and figures of *P. indicum* give evidence of poor preparation of material and misinterpretation of structures. This statement is here made only in the light of an abundance of morphological work done by various other investigators since Schepotieff's paper was published. It is to be noted that Schepotieff does not represent the pseudoculi on his *Protapteron indicum*, structures rather conspicuous and invariably present dorsolaterally on the Proturan head; that he describes as a

one-segmented appendage on abdominal segment IV the projecting posterolateral corner of the sternal plate (a structure easily mistaken for a one-segmented vestigial appendage in the Protura), that the openings of the abdominal glands between abdominal segments VIII and IX (secretions of which can easily be forced to the exterior) are described as the genital openings, that the maxillae are not properly figured or described as representative of Protura, yet characters are given that identify them as Proturan maxillae.

Until type material is found that will substantiate the very unusual claims for *P. indicum*, we must accept the finding of Rimsky-Korsakow. He alone has reexamined a type of the supposedly anomalous species.

*Protentomon* Ewing (1921).

As pointed out by Mills (1932, p. 126) *Protentomon* is not preoccupied as claimed by Womersley (1927a, p. 141). The reexamination of the generic characters of its type, *Protentomon transitans* Ewing, as has been noted in this paper, proves the genus to be distinct.

Berlese (1909) called attention to the particular form of the front tarsi and their specialized sensory setae in *Acerentomon minimum*. A reexamination of tarsus I of *Protentomon transitans* reveals the presence of a dorsal sensory seta. However, the tarsal claw apparently is accompanied by a ventral vestigial claw as in species belonging to other genera.

The type of *Protentomon* differs from the type of *Proturentomon* in the characters given in the appended key to the genera.

*Acerentuloides* Ewing (1921).

Womersley (1927b) has expressed the belief that the genus *Acerentuloides* is based on immature specimens. A reexamination of the holotype of the type species, *A. bicolor* Ewing, shows it to be, as originally stated (Ewing 1921), a female. It has twelve abdominal segments and a well-formed genital armature. This species is a common one at Takoma Park, Maryland, where the writer has lived for many years.

*Microentomon* Ewing (1921).

Womersley (1927b) states in regard to *Microentomon minutum* Ewing, the designated type species of *Microentomon*, that "it is quite impossible to accept Ewing's species as the genotype owing to his type being immature." Again this authority insists on not following the rules of nomenclature. The reasons for selecting this species as type of the writer's genus *Microentomon* were explained when the genus was established (Ewing, 1921) as follows: "The species is probably very common, but is not usually observed because of its minute size and habits. Three mounted specimens are at hand, all of which lack the complete number of segments and the genital papilla hence are not mature. The generic characters of these specimens agree exactly with those of the single female found by Berlese. Because of its common occurrence it appears desirable to make this species the type of the genus, notwithstanding the fact that the mature

form has not yet been taken. I have frequently observed live specimens of the species and studied them alive in the laboratory."

The characters of *Microentomon* are worthy of further consideration. Berlese (1909) apparently assumed that the vestigial abdominal appendages of *Microentomon perpusillus* (Berlese) were: I, 2-segmented; II, 1-segmented; III, 1-segmented. On reexamination of the type species of *Microentomon* the writer finds that apparently they are thus segmented. Also it is observed that the front tarsi are without sensory setae.

The genus *Microentomon* should be included in the subfamily Protentominae and this group should be raised to full family rank as is done in the following key.

In the characters of the terga as well as those of the vestigial abdominal appendages and the pectines members of this new family approach in varying degrees the family Eosentomidae. They constitute in a way a connecting link between the two original families of Protura, the Eosentomidae and the Acerentomidae.

#### *Meroentomon* Womersley (1927).

As has been shown at the beginning of this paper, *Meroentomon* was proposed in error to take the place of *Protentomon* Ewing. The latter generic name is not preoccupied according to Opinion 2 of the International Commission on Zoological Nomenclature. *Meroentomon* therefore becomes a synonym of *Protentomon*.

#### *Paraentomon* Womersley (1927).

Womersley (1927a) erected the genus *Paraentomon* with *P. clevedonense* Womersley as the type. This genus he differentiated from *Protentomon* Ewing (the name of which he erroneously claimed to be preoccupied) by the presence of abdominal tergal apodemes, the presence of an anterior pair of submedian fine setae on certain abdominal segments (VIII and VI-I), and the presence of a pair of modified pectines on abdominal segment VIII.

Bagnall (1936, p. 211) rejects Womersley's genus *Paraentomon* largely on his belief that the type species of *Protentomon*, *P. transitans* Ewing, possesses the anterior pairs of submedian fine setae and that the absence of the pectines on abdominal segment VIII was due to the type specimen being immature.

In order to determine properly the characters of *Protentomon transitans* which are in dispute, the writer has reexamined the type specimen in the U. S. National Museum, using an oil-immersion lens. The results follow:

1. The specimen is undoubtedly mature, having twelve well-formed abdominal segments and a conspicuous genital armature.

2. As suspected by Bagnall, the anterior pairs of submedian fine setae are present, being visible on abdominal segments III, V, VI, and VII. There is also a probability of the existence of pairs of certain very fine setae that could not be detected on certain other segments.

3. Vestigial pectines are present on abdominal segment VIII.

4. The rostrum is absent.

When Bagnall (1936) reestablished the genus *Proturentomon* Silvestri (1909), he claimed that *Paraentomon* Womersley (1927a) was established on a species, *P. clevedonense* (1927a), which is only a synonym of the type species of *Proturentomon*. He further believes that Berlese (1909) did not properly examine the abdominal appendages of *Acerentomon minimum*, the type species of *Proturentomon*, and that this species should not have been included in a group in which the first alone of the appendages is two-segmented. Whether or not *Paraentomon clevedonense* Womersley is a synonym of *Acerentomon minimum* Berlese, it appears evident that the two species must be considered congeneric and *Paraentomon* a synonym of *Proturentomon*.

An annotated list of all the genera proposed in the Order Protura follows:

- Acerentomon* Silvestri (1907). Valid. Oldest genus.  
*Eosentomon* Berlese (1908). Only genus proposed in the family Eosentomidae. Valid.  
*Acerentulus* Berlese (Dec. 1908). Valid.  
*Proturentomon* Silvestri (Jan. 1909). Long considered as a synonym of *Acerentulus* Berlese. Reinstated by Bagnall (1936). Valid.  
*Acerella* Berlese (1909). Proposed as a subgenus of *Acerentulus*. Not recognized since except as a synonym of *Acerentulus*. Characters of type species need restudying before true status can be determined.  
*Protapteron* Schepotieff (1909). Based apparently on fictitious characters. Synonym of *Eosentomon*.  
*Protentomon* Ewing (1921). Claimed in error by Womersley to be preoccupied. Valid.  
*Acerentulooides* Ewing (1921). Valid.  
*Microentomon* Ewing (1921). Not accepted by Womersley because type species was described from nymphs. Is valid under the rules.  
*Meroentomon* Womersley (1927). Synonym of *Protentomon* Ewing, for which it was proposed in error as a new name.  
*Paraentomon* Womersley (1927). Claimed by Bagnall to be based on a species which is only a synonym of the type species of the older and previously suppressed genus *Proturentomon* Silvestri. Equals *Proturentomon* Silvestri.

There is here appended a key to the valid genera and higher groups of the Order Protura.

KEY TO THE GENERA AND HIGHER GROUPS OF PROTURA.

- A. Tracheae present, opening through two pairs of spiracles, one on mesothorax and one on metathorax; all vestigial abdominal appendages 2-segmented; segment VIII of abdomen without pectines.....*EOSENTOMIDAE* Berlese  
 Contains but a single genus.....*Eosentomon* Berlese  
 AA. Tracheae and spiracles absent; vestigial abdominal appendage III, 1-segmented; segment VIII of abdomen usually with a pair of pectines.

- B. Abdominal terga without transverse grooves and laterotergites; typical abdominal segments with but a single transverse row of dorsal setae; pectines of abdominal segment VIII reduced or absent.....  
 PROTENTOMIDAE, new family
- C. Vestigial abdominal appendage II, 2-segmented; segment VIII of abdomen with pectines; front tarsi with sensory setae.
- D. Dorsal abdominal apodemes absent; rostrum absent....  
*Protentomon* Ewing
- DD. Dorsal abdominal apodemes present; rostrum present..  
*Proturentomon* Silvestri
- CC. Vestigial abdominal appendage II, 1-segmented; segment VIII of abdomen without pectines; front tarsi without sensory setae .....*Microentomon* Ewing
- BB. Typical abdominal terga, each with 1 or 2 transverse grooves and a pair of laterotergites; typical abdominal segments with two complete transverse rows of dorsal setae; pectines on abdominal segment VIII not reduced.....  
 ACERENTOMIDAE Berlese
- C. Labrum (rostrum) long, narrow, very acute.....  
*Acerentomon* Silvestri
- CC. Labrum very short or absent.
- D. Tergal plates of thorax and abdomen well sclerotized; dorsal abdominal apodemes present ..*Acerentulus* Berlese
- DD. Tergal plates of thorax and abdominal segment I hyaline, non-sclerotized; dorsal abdominal apodemes absent.....*Acerentuloides* Ewing

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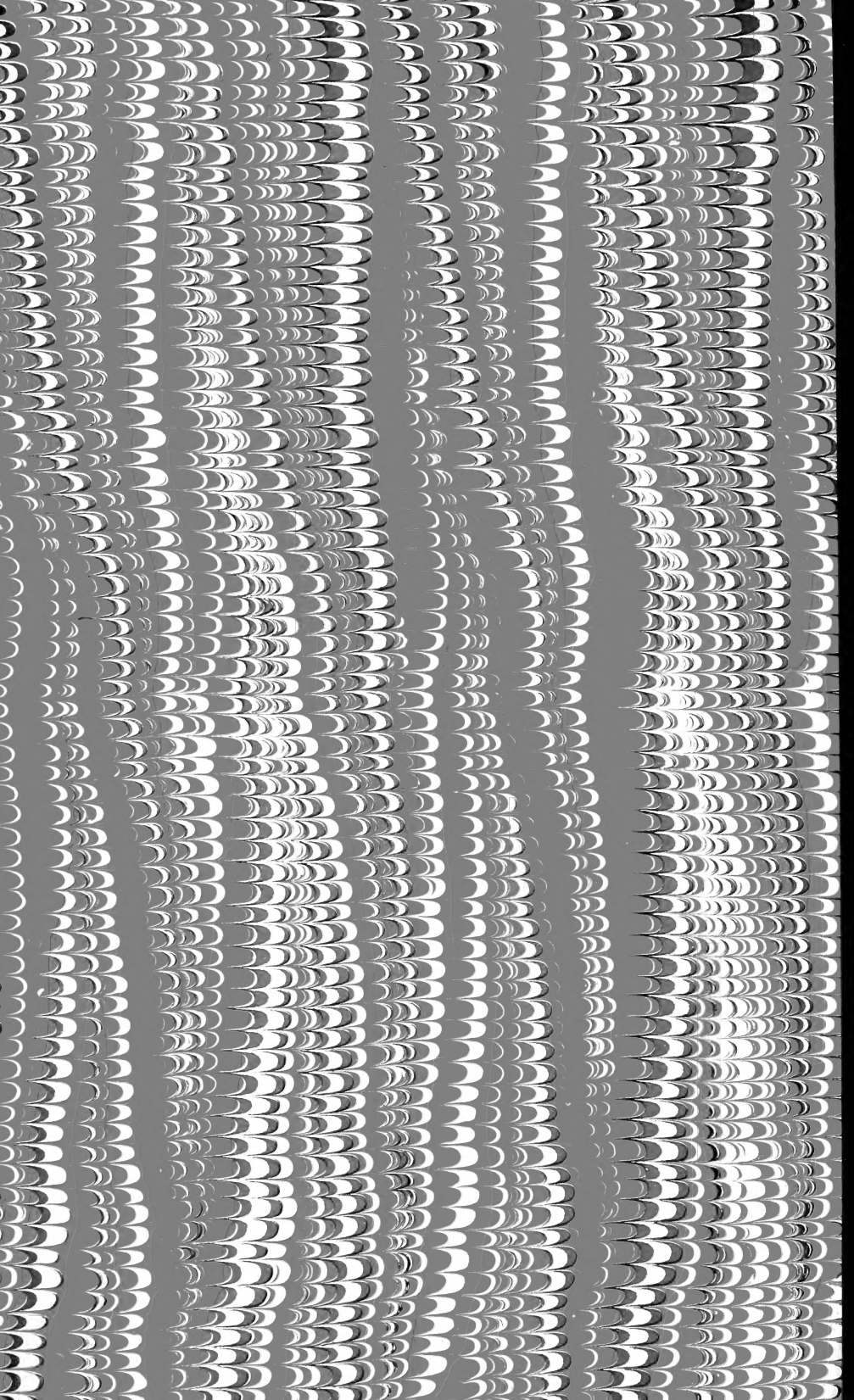




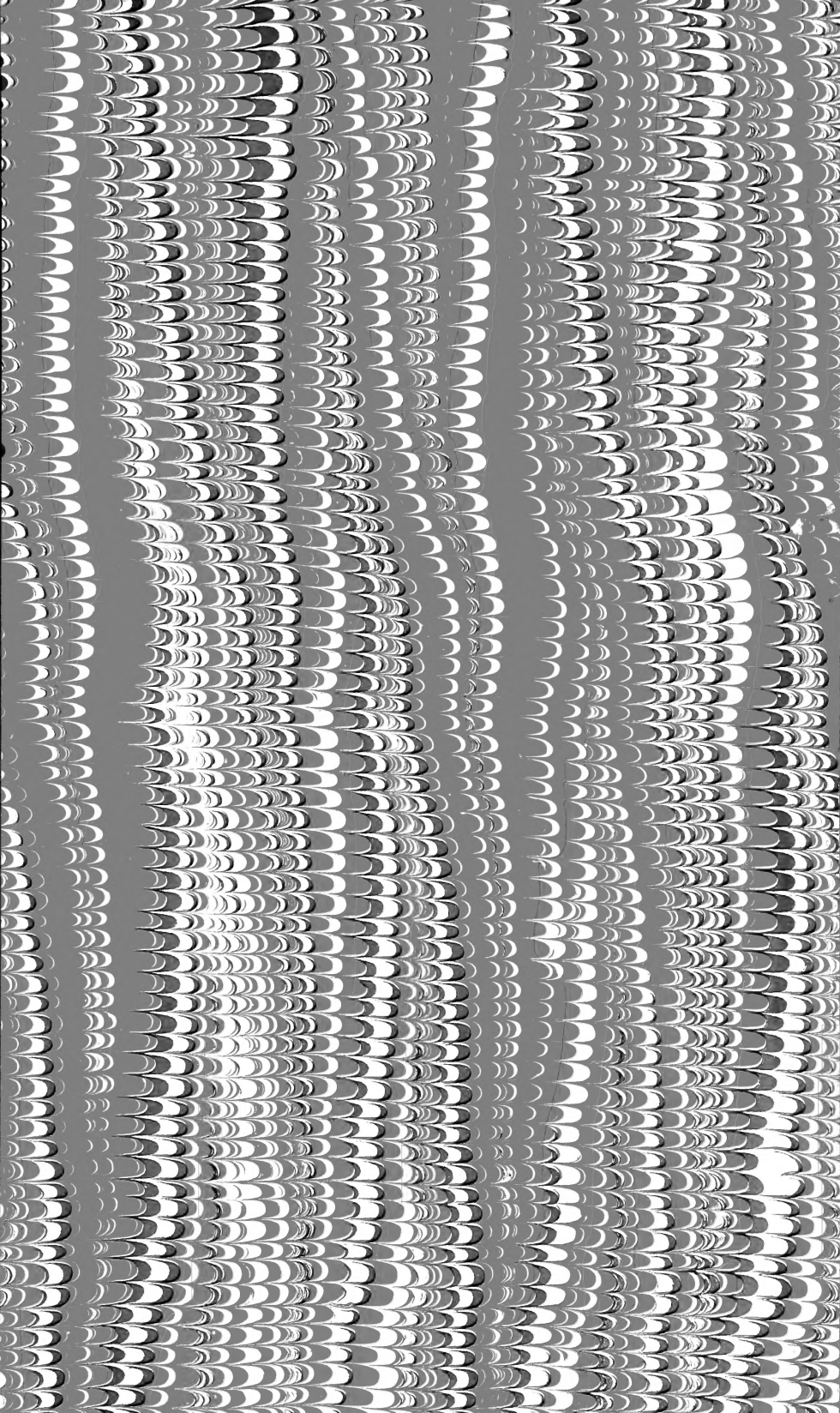












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