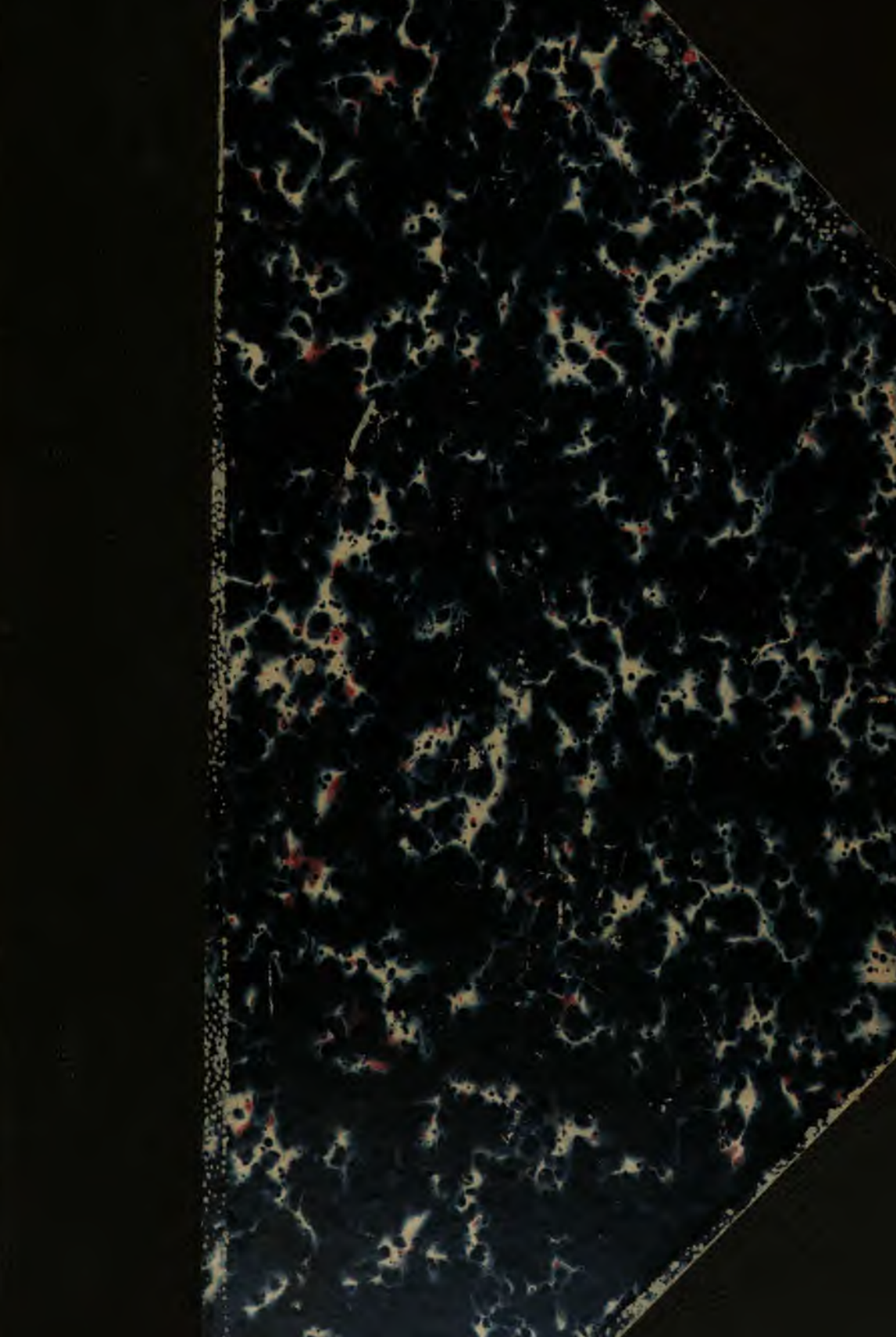

PROCEEDINGS

OF THE

Biological Society of Washington

VOLUME 30
1917

WASHINGTON
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For 1917

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F. H. Knowlton, 1905, 1906
L. Stejneger, 1907, 1908
T. S. Palmer, 1909, 1910
David White, 1911
E. W. Nelson, 1912, 1913
Paul Bartsch, 1914, 1915

* Deceased.

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PLATES.

The Committee on Publications declares that each paper of this volume was distributed on the date indicated on its initial page. The Index, title page, and minutes of meetings for 1917 (pp. i–xv; 199–203) were issued on February 21, 1918.

Vol. 30, pp. ix-xv

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets in the Assembly Hall of the Cosmos Club on alternate Saturdays at 8 P. M.

January 13, 1917—563d Meeting.*

President W. P. Hay in the chair, 45 persons present.

W. L. McAtee and Alexander Wetmore called attention to the presence of white-winged crossbills in the vicinity of Washington.

W. L. McAtee mentioned the lingering of a Cape May warbler and a blue gray gnatcatcher into December and the finding of a box turtle on January 7, 1917.

E. A. Goldman reported Hudsonian chickadees in the vicinity of New York City and Boston.

A. S. Hitchcock spoke of the precautions that were being taken in the care of the herbarium of the British Museum.

The regular program consisted of three communications as follows:

Some European Experiences with Entomologists; L. O. Howard.

Recent Additions to the List of North American Birds; H. C. Oberholser.

The Fossil Seacow of Maryland; Wm. Palmer.

January 27, 1917—564th Meeting.†

President Hay in the chair, 45 persons present.

Dr. O. P. Hay showed a metacarpal of a horse with well

* Abstracts in Journ. Washington Acad. Sci., vol. 7, pp. 118 to 120, February 19, 1917; and in Science, N. S., vol. 45, pp. 343, 344, April 6, 1917.

† Abstracts in Journ. Washington Acad. Sci., vol. 7, pp. 165, 166, March 19, 1917; and in Science, N. S., vol. 45, pp. 367, 368, April 13, 1917.

developed lateral metacarpals and a specimen of three fused metacarpals of a cow.

W. L. McAtee and Alexander Wetmore made remarks as to certain misconceptions of notes of birds and as to a theory of migration of birds.

Dr. L. O. Howard commented on a recently held anti-mosquito convention in New Jersey.

The regular program consisted of two communications as follows:

Exploitation of Neglected Aquatic Resources; H. M. Smith.

Showers of Organic Matter; W. L. McAtee.

February 10, 1917—565th Meeting.*

President Hay in the chair, 30 persons present.

The regular program consisted of two communications as follows:

A Mortality of Fishes on the West Coast of Florida; H. F. Taylor.

Changes in the Avifauna about Burlington, Iowa, 1885 to 1917; Paul Bartsch.

February 24, 1917—566th Meeting.†

President Hay in the chair, 50 persons present.

Dr. M. W. Lyon, Jr., called attention to Smallwood's compilation of the International Rules of Zoological Nomenclature.

Dr. R. W. Shufeldt communicated a short paper, "Notes on the Trunk-fishes,"‡ and exhibited a specimen of *Lactophrys tricornis*.

Dr. L. O. Howard commented on the parent tree of an unusually fine variety of oranges.

Mr. Wm. Palmer commented on the recent "freeze" in Florida.

The regular program consisted of three communications as follows:

A Pioneer Naturalist in Southern Florida.—Extracts from the Diary of Titian R. Peale, 1825; T. S. Palmer.

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* Abstracts in Journ. Washington Acad. Sci., vol. 7, pp. 166, 167, March 19, 1917; and in Science, N. S., vol. 45, pp. 367, 368, April 13, 1917.

† Abstracts in Journ. Washington Acad. Sci., vol. 7, pp. 201, 202, April 4, 1917; and in Science, N. S., vol. 45, p. 594, June 8, 1917.

‡ Published in Brooklyn Aquarium Society "Bulletin," vol. 3, no. 9, May, 1917, pp. 2, 3, figs. 1, 2.

Some Notes on the Aleyrodidae; A. L. Quaintance.

The Shad and its Relatives in the Mississippi River; Emerson Stringham (introduced by R. E. Coker).

March 10, 1917—567th Meeting.*

President Hay in the chair, 45 persons present.

Dr. H. M. Smith exhibited a manuscript and hand illustrated book dealing with beetles.

President W. P. Hay presented some notes on flying squirrels.

Dr. H. E. Ames called attention to a newspaper clipping recording the flight of two tagged ducks.

The regular program consisted of two communications as follows:

Precipitins; M. W. Lyon, Jr.

Porpoises and Steamers; William Palmer.

March 24, 1917—568th Meeting.†

President Hay in the chair, 31 persons present.

Dr. L. O. Howard reported that the book presented by Dr. Smith at the 567th meeting was a handmade copy of all the descriptions of the North American beetles contained in a large French monograph dealing with that group of insects.

Three communications were presented for the regular program as follows:

Notes on Aplodontia; W. P. Taylor.

The Extraordinary Strepsipterous Type of Parasitism; W. Dwight Pierce.

Zoological Statuary at the National Capital; R. W. Shufeldt.

April 7, 1917—569th Meeting.‡

President Hay in the chair, 45 persons present.

Dr. R. W. Shufeldt exhibited lantern slides of living California quail.

Dr. L. O. Howard called attention to a specimen of the cocoon of a Cecropia moth containing moonstones.

A. Wetmore stated that he had seen bluejays insert small acorns and kernels of corn into large cocoons.

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*Abstracts in Journ. Washington Acad. Sci., vol. 7, pp. 239, 240, April 19, 1917; and in Science, N. S., vol. 45, p. 464, May 11, 1917.

†Abstracts in Journ. Washington Acad. Sci., vol. 7, pp. 271–273, May 4, 1917.

‡Abstracts in Journ. Washington Acad. Sci., vol. 7, pp. 315, 316, May 19, 1917; and in Science, N. S., vol. 45, p. 618, June 15, 1917.

The regular program consisted of two communications as follows:

A Note on the Hibernation of the Mud-Turtle; Alexander Wetmore and Francis Harper.

Botanizing in the Hawaiian Islands; A. S. Hitchcock.*

April 21, 1917—570th Meeting.†

President Hay in the chair, 35 persons present.

The regular program consisted of two communications as follows:

Notes on American Flying Squirrels; A. H. Howell.

On the Finding of Supposed Pleistocene Human Remains at Vero, Florida; O. P. Hay.

May 5, 1917—571st Meeting.‡

President Hay in the chair, 25 persons present.

President Hay exhibited a lantern slide of some very immature flying squirrels.

The regular program consisted of two communications as follows:

The Influence of Cold in Stimulating the Growth of Plants; F. V. Coville.

The Rate of Growth in Certain Lower Vertebrates; W. P. Hay.

October 20, 1917—572d Meeting.§

President Hay in the chair, 42 persons present.

General T. E. Wilcox presented a brief note on the occurrence of the California vulture in Idaho.

Dr. R. W. Shufeldt exhibited a specimen of the "gopher," *Testudo polyphemus*.

Dr. L. O. Howard referred to the peculiar insect fauna found in the burrows of the "gopher."

President Hay referred to the peculiar species of frog found in the burrows of the "gopher."

Dr. T. S. Palmer remarked on bird roosts lately seen in the vicinity of Washington.

* Published in Sci. Month., vol. 5, pp. 323 to 349, October, 1917; and pp. 417-432, November, 1917.

† Abstracts in Journ. Washington Acad. Sci., vol. 7, pp. 358-360, June 4, 1917.

‡ Abstracts in Journ. Washington Acad. Sci., vol. 7, p. 394, June 19, 1917.

§ Abstracts in Journ. Washington Acad. Sci., vol. 8, pp. 25-27, January 4, 1918.

Mr. W. L. McAtee exhibited six rare bird papers.

Mr. Wm. Palmer made comments on the above papers.

Lieut. M. W. Lyon, Jr., commented on the occurrence of several cases of hookworm infestation lately seen by him.

The regular program consisted of three communications as follows:

A Key to Ornithological Literature; T. S. Palmer.

The Alpine Flora of the Adirondacks and the White Mountains; A. S. Hitchcock.

Notes on some United States Batrachians; R. W. Shufeldt.

November 3, 1917—573d Meeting.*

President Hay in the chair, 58 persons present.

Dr. T. S. Palmer called attention to the centennial of the first botanical society in the vicinity of Washington.

Dr. L. O. Howard called attention to the centennial of the Medical Society of the District of Columbia.

Dr. H. M. Smith reported the results of the fur seal census taken in the Pribilofs during the past summer.

Mr. C. Birdseye remarked on the waste of seal meat by sealers on the northeast coast of North America.

Lieut. M. W. Lyon, Jr., exhibited a photograph of a case of congenital absence of kidney.†

Mr. Wm. Palmer exhibited a sectioned tympanic bone of a whale.

The regular program consisted of three communications as follows:

An Unusual Human Specimen; Rear-Admiral G. W. Baird.

How the Pine Squirrels help to Feed the Bears of the Yellowstone Park; Vernon Bailey.

The Fur Industry of Labrador; C. Birdseye.

November 17, 1917—574th Meeting.‡

President Hay in the chair, 78 persons present.

Dr. R. W. Shufeldt exhibited two grasshoppers, the black Louisiana form of *Rhomaleum micropterum*, and a specimen of the same species from Florida.

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* Abstracts in Journ. Washington Acad. Sci., vol. 8, pp. 27, 28, January 4, 1918.

† Published in Anat. Rec., vol. 13, pp. 303, 304, October 20, 1917.

‡ Abstracts in Journ. Washington Acad. Sci., vol. 8, pp. 40, 41, January 19, 1918.

The regular program was a symposium on "Recently Introduced Pests and the Problem of Accidental Introduction," and consisted of four communications as follows:

The Pink Bollworm of Cotton; C. L. Marlatt.

Recently Introduced Fruit Insects; A. L. Quaintance.

Some Biological Aspects of the Spread of the White Pine Blister Rust; Perley Spaulding.

Some Points for Consideration in a Discussion of the Problem of Accidental Introductions; L. O. Howard.

December 1, 1917—575th Meeting.*

President Hay in the chair, 26 persons present.

Dr. Walter P. Taylor exhibited and discussed the distribution of marmots from the State of Washington.

Alexander Wetmore discussed the peculiar molting in ducks.

Dr. T. S. Palmer called attention to the recent successful meeting of the A. O. U.

Dr. L. O. Howard called attention to a recent article in a French scientific journal giving analysis of bread found on a captured Zeppelin, as compared with that taken from German prisoners.

W. P. Hay exhibited lantern slides of the marine turtles of eastern North America and gave an account of their habits, distinctive characters, and uses to man.

Alexander Wetmore remarked on red bats seen November 17, 1917.

The regular program consisted of two communications as follows:

Haak as Author of Brisson's 1762 Edition of Regnum Animale; Charles Wardell Stiles; (Paper presented by Dr. T. S. Palmer, under the title The Author of Brisson's 1762 Edition of Regnum Animale, in the absence of Dr. Stiles, who was called away on war service).

The Relative Resistance of the Red Blood Corpuscles of the Sheep, Ox and Hog; Lieut. M. W. Lyon, Jr.†

* Abstracts in Journ. Washington Acad. Sci., vol. 8, pp. 41, 42, January 19, 1918.

† Published in Journ. Infectious Dis., vol. —, pp. — —, January, 1918.

December 15, 1917—576th Meeting.

THIRTY-EIGHTH ANNUAL MEETING.

President Hay in the chair, 19 persons present.

The annual reports of officers and committees were received.

The following officers were elected for the year 1918:

President: J. N. Rose.

Vice-Presidents: A. D. Hopkins, H. M. Smith, Vernon Bailey, Ned Hollister.

Recording Secretary: M. W. Lyon, Jr.

Corresponding Secretary: W. L. McAtee.

Treasurer: Ned Dearborn.

Members of Council: J. W. Gidley, Wm. Palmer, Alex. Wetmore, E. A. Goldman, A. S. Hitchcock.

President Rose was nominated by the Society as a Vice-President of Washington Academy of Sciences.

President Rose appointed as Committee on Publications for 1918: C. W. Richmond, J. H. Riley, Ned Dearborn, W. L. McAtee; and as Committee on Communications for 1918: William Palmer, Alexander Wetmore, R. E. Coker, L. O. Howard, A. S. Hitchcock.

Vol. 30, pp. 1-2 January 22, 1917

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW CUCKOO FROM NEW ZEALAND.

BY ALEXANDER WETMORE.

While comparing specimens of *Urodynamis taitensis* (Sparrman) it was found that those from New Zealand differ markedly from birds from Polynesia. As there is no name available for this New Zealand race, hitherto unrecognized, it may be known as

Urodynamis taitensis pheletes subsp. nov.

Characters.—Similar to *Urodynamis taitensis taitensis* but more heavily streaked below (especially on the breast and sides of the neck) and with the under parts more buffy.

Description.—Type, female adult, Catalogue No. 124653, Collection U. S. National Museum, from Otago Province, New Zealand, collector, W. Smythe. Above fuscous black with crossbars on back and wings varying from vinaceous-cinnamon to cinnamon; head and neck streaked with light pinkish cinnamon; tail barred heavily with cinnamon (the dark and light bars equal in width), tipped with white; wing coverts tipped irregularly with white or buff; secondaries and inner primaries tipped with white; superciliary stripe pinkish buff anteriorly, paler behind the eye; under parts white tinged with cream color; breast and sides streaked boldly with long streaks of fuscous black; flanks and thighs buffy with broad bars of fuscous black; sides of the neck with broad cinnamon borders on the dark longitudinal streaks, these cinnamon edgings faintly indicated on the upper breast; throat with faintly indicated cinnamon streaks.

Measurements (of type).—Wing, 190 mm.; tail, 234; exposed culmen, 26; tarsus, 35.5; middle toe with claw, 30.

Range.—New Zealand. (Specimens examined from Auckland, Remuera and the Province of Otago.)

Remarks.—The adult of this form is readily distinguished from *Urodynamis t. taitensis* (from Funafuti, Ellice Islands) by its more buffy and more heavily streaked under parts. Immature birds are much darker and more buffy below than young birds from Fiji and the Samoan Islands. In addition they have the ground color of the back darker.

Sparrman in his original description* does not give the type locality of his *Cuculus taitensis*, but this has been fixed by Rothschild and Hartert† as Tahiti. *Cuculus tahitius* Gmelin‡ is assigned by the describer to the Society Islands. Mathews,§ moreover, has designated Tahiti as the type locality. Vieillot‖ does not state where the material upon which he founded his *Cuculus perlatus* was secured, but this again is fixed by Mathews (l. c.) as Tahiti. *Cuculus fasciatus* of Forster¶ comes from Huaheine and Otaheite. It also is assigned definitely to Tahiti by Mathews (l. c.). The type of *Eudynamys cuneicauda* Peale (which is preserved in the U. S. National Museum) comes from Ovalau in the Fiji Islands. It is an immature individual of *U. t. taitensis*. No other names seem to have been applied to these cuckoos.

In separating the form from New Zealand an adult cuckoo from Funafuti Atoll in the Ellice group, an immature bird from the Samoan Islands and Peale's type from Ovalau in the Fiji group have been taken as representing *U. t. taitensis*. It seems probable that with more material other races will be apparent from Polynesia where these cuckoos have a wide range and where they are stated to be resident in many localities.

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* Mus. Carlson., II, 1787, No. XXXII.
† Nov. Zool., XII, 1905, p. 258.
‡ Syst. Nat., I, Pt. I, 1788, p. 412.
§ List of Birds of Australia, London, 1913, p. 321.
‖ Nouv. Dict. d' Hist. Nat., VIII, 1817, p. 232.
¶ Descr. An., 1844, p. 160.

Vol. 30, pp. 3–6 January 22, 1917

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PRELIMINARY DIAGNOSES OF APPARENTLY NEW BIRDS FROM COLOMBIA AND BOLIVIA.

BY W. E. CLYDE TODD.

The present paper is the fifth of the series to appear in these Proceedings giving brief preliminary descriptions of the apparently new birds received from time to time by the Carnegie Museum from tropical America. The author has again to acknowledge his indebtedness to Mr. Harry C. Oberholser for advice and assistance in working out certain of these forms, and to thank the authorities of several different institutions for the loan of material for use in this connection. All measurements are in millimeters, and the names of colors are as given in Mr. Robert Ridgway's "Color Standards and Color Nomenclature."

Phœnicothraupis rubiginosus sp. nov.

Adult male very similar to the same sex of *Phœnicothraupis salvini salvini* von Berlepsch, but slightly darker in general coloration. Adult female resembling that of *Phœnicothraupis fuscicauda* Cabanis, but everywhere much brighter and yellower, less brownish.

Type No. 52,057, Collection Carnegie Museum, adult male; Turbaco, Bolivar, Colombia, January 9, 1916; M. A. Carriker, Jr.

Ostinops decumanus melanterus subsp. nov.

Similar to *Ostinops decumanus decumanus* (Pallas) of Guiana, etc., but general coloration decidedly darker and blacker, with little or no chestnut tipping to the feathers of the upper and under parts.

Type No. 42,045, Collection Carnegie Museum, adult male; Las Vegas, Santa Marta, Colombia, May 28, 1913; M. A. Carriker, Jr.

Ostinops sincipitalis australis subsp. nov.

Similar to *Ostinops sincipitalis sincipitalis* Cabanis, but upper parts duller brown, yellow of forehead paler and more restricted, under parts

more decidedly suffused with brown, and size smaller. Differs from *O. sincipitalis neglectus* Chapman in its smaller size, more brownish suffusion of the upper and under parts, paler yellow forehead, and in particular in the dull greenish (instead of rich deep yellow) color of the bill.

Type No. 51,486, Collection Carnegie Museum, adult male; Buenavista, Bolivia, August 14, 1915; José Steinbach.

Icterus mesomelas carrikeri subsp. nov.

Similar to *Icterus mesomelas taczanowskii* Ridgway in size and general coloration, but with the white outer margins of the remiges very narrow or wanting, as in *Icterus mesomelas salvinii* Cassin.

Type No. 49,711, Collection Carnegie Museum, adult male; Fundacion, Santa Marta, Colombia, October 18, 1915; M. A. Carriker, Jr.

Myiobius modestus suffusus subsp. nov.

Similar to *Myiobius modestus modestus* Todd, but under parts decidedly more yellowish, less buffy, especially on the under tail-coverts.

Type No. 52,134, Collection Carnegie Museum, adult male; Turbaco, Bolivar, Colombia, January 13, 1916; M. A. Carriker, Jr.

Attila caniceps sp. nov.

Pileum dull grayish, with obscure narrow shaft-streaks of dusky, the lores flecked with white; sides of neck and back dull olive citrine, shaded posteriorly with Dresden brown, and passing into pale wax yellow on the rump and upper tail-coverts; tail dull brown (between Brussels brown and raw umber); primaries dusky, with narrow external margins of grayish; secondaries dusky, externally margined with Dresden brown, the inner ones wholly of this color; wing-coverts dusky, tipped with buckthorn brown; chin and upper throat obscurely streaked with grayish white and dusky brown; lower throat and breast dull yellowish citrine, fading into white on the abdomen, all these parts with obscure dusky streaks; flanks and under tail-coverts pale lemon yellow, more or less shaded with buffy; under wing-coverts yellow ocher.

Type No. 52,736, Collection Carnegie Museum, adult male; Jaraquiel, Bolivar, Colombia, March 3, 1916; M. A. Carriker, Jr.

Attila neoxenus sp. nov.

Above dark citrine, brighter on the pileum, which is narrowly streaked with black, and passing into orange citrine posteriorly; rump and upper tail-coverts empire yellow; tail rather dark Dresden brown; wings dusky, the secondaries more or less margined externally with dark olive buff, the wing-coverts tipped with dull buffy yellow; throat, breast, and sides of head obscurely streaked with citron yellow and serpentine green; abdomen white, passing into amber yellow on the flanks and under tail-coverts; under wing-coverts Naples yellow.

Type No. 51,152, Collection Carnegie Museum, adult male; Rio Yapacani, Bolivia, February 18, 1915; José Steinbach.

Microrhopias melanogastris iliaca subsp. nov.

Decidedly larger than either *Microrhopias melanogastris melanogastris* (Pelzeln) or *M. m. bahiæ* (Hellmayr), and with the flanks in the male more extensively white. Wing (type) 57; tail, 62; bill, 13.5.

Type No. 51,582, Collection Carnegie Museum, adult male; Villa Montes, Rio Pilcomayo, Bolivia, October 7, 1915; José Steinbach.

Xiphocolaptes obsoletus sp. nov.

Somewhat resembling *Xiphocolaptes emigrans costaricensis* Ridgway, but general coloration much darker, between Brussels brown and raw umber; the pileum and sides of the head deep brown or blackish, with buffy streaking; under parts more distinctly streaked, especially anteriorly; bill shorter, stouter, and paler. Wing (type), 144; tail, 117; bill, 46; tarsus, 29.

Type No. 50,881, Collection Carnegie Museum, adult female; Rio Yapacani, Bolivia, September 21, 1914; José Steinbach.

Xiphocolaptes procerus rostratus subsp. nov.

Similar to *Xiphocolaptes procerus procerus* Cabanis and Heine, but averaging larger, the bill especially being proportionately longer and stouter; coloration decidedly more rufescent, less olivaceous; and streaking of under parts wider and more conspicuous.

Type No. 52,771, Collection Carnegie Museum, adult male; Jaraquiel, Bolivar, Colombia, March 4, 1916; M. A. Carriker, Jr.

Xiphocolaptes major obscurus nom. nov.

The above name is proposed to replace the recently described *Xiphocolaptes major saturatus* Cherrie (Bull. Am. Mus. Nat. Hist., XXXV, 1916, 187), which name is preoccupied by *Xiphocolaptes saturatus* Ridgway, Proc. U. S. Nat. Mus., XII, 1890, 14, in text.

Phæochroa cuvierii notia subsp. nov.

Similar to *Phæochroa cuvierii cuvierii* (Delattre and Bourcier), but outer rectrices with much more extended white tips, and without any blue-black subterminal band.

Type No. 52,769, Collection Carnegie Museum, subadult male; Turbaco, Bolivar, Colombia, January 15, 1916; M. A. Carriker, Jr.

Celeus innotatus sp. nov.

Nearest apparently to *Celeus loricatus* (Reichenbach), from which it differs in having the spotting of the upper and under parts, wings, etc., very much reduced both in size and extent, leaving only a few small spots on the breast and upper back in adult males.

Type No. 52,769, Collection Carnegie Museum, adult male; Jaraquiel, Bolivar, Colombia, March 4, 1916; M. A. Carriker, Jr.

Bubo virginianus elutus subsp. nov.

Similar to *Bubo virginianus scotinus* Oberholser, but upper parts much paler, less rufescent, and legs more heavily mottled with dusky. From *Bubo virginianus mesembrinus* (Oberholser) it differs markedly in its much less deeply rufescent coloration, both above and below.

Type No. 52,583, Collection Carnegie Museum, adult female; Lorica, Bolivar, Colombia, February 17, 1916; M. A. Carriker, Jr.

Pyrrhura subandina sp. nov.

Adult similar to immature *Pyrrhura luciani* Deville, but entire loral region crimson instead of mostly maroon; forehead (except for a narrow crimson frontal band) bluish; cheeks mostly bluish instead of maroon; blue nuchal band broader and less mixed with green; red color of rump and abdomen somewhat darker and duller, and under parts in general more tinged with bluish.

Type No. 52,830, Collection Carnegie Museum, adult male; Jaraquiel, Bolivar, Colombia, March 7, 1916; M. A. Carriker, Jr.

Eupsychortyx cristatus littoralis subsp. nov.

Similar to *Eupsychortyx cristatus horvathi* von Madarász, but upper back averaging less decidedly rufescent; superciliary and malar stripes much mixed with antique brown, and lower throat also more or less tinged with the same color.

Type No. 38,151, Collection Carnegie Museum, adult male; Mamotoco, Santa Marta, Colombia, August 28, 1911; M. A. Carriker, Jr.

Eupsychortyx decoratus sp. nov.

Similar in general to *Eupsychortyx leucopogon* Gould, but somewhat paler above, and the entire throat rich orange chestnut, leaving only the extreme chin whitish or buffy. Breast orange chestnut, concolor with the throat, spotted with black and white, the sides and flanks very heavily marked with orange chestnut.

Type No. 51,975, Collection Carnegie Museum, adult male; Calamar, Bolivar, Colombia, January 1, 1916, M. A. Carriker, Jr.

Vol. 30, pp. 7-8 January 22, 1917

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW STARFISH FROM THE MAGELLANIC REGION.

BY AUSTIN H. CLARK.*

The new starfish described below was dredged by the "Albatross" on her voyage from the Atlantic into the Pacific. It represents a type hitherto not known from the Magellanic portion of the subantarctic belt.

FAMILY ODONTASTERIDÆ Verrill.

Odontaster propinquus new species.

Five arms; R=29 mm.; r=14 mm.; R:r=2.1:1; superomarginals 17. This form agrees most minutely with *O. elongatus* (Sladen) from Kerguelen, Marion and Heard Islands, excepting in having much shorter arms and no pseudopedicellariæ. It will probably prove to be a Magellanic variety of that species.

Type.—Cat. No. 36,976, U. S. N. M., from "Albatross" Station 2771, off southeastern South America, in 50½ fathoms.

* Published with the permission of the Secretary of the Smithsonian Institution.

Vol. 30, pp. 9–12 January 22, 1917

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

NEW BULIMULUS FROM THE GALAPAGOS ISLANDS AND PERU.

BY WILLIAM HEALEY DALL.

Among some alcoholic specimens collected by the "Albatross" at the Galapagos Islands in 1887–8, were two small specimens belonging to the section *Naesiotus* which were overlooked at the time of Dr. Stearns' report of 1893.* Being engaged on a report on a collection made during the California Academy of Sciences Galapagos Expedition of 1905–6, it seemed proper to describe the above mentioned species in order that they might be included in the general summary of the landshell fauna.

Bulimulus (Naesiotus) saeronius n. sp.

Shell very small, smooth, short-conic, the last whorl much the largest, five-whorled, the apex dimpled, the apical whorl delicately transversely striated, the suture deep, widening and becoming channelled on the last whorl; the whorl in front of it minutely crenulately marginated; color pale straw yellow, with an obscure, darker, narrow peripheral band on the last whorl; base rounded, more or less transversely wrinkled, with a narrow umbilical perforation; margin of aperture continuous, sharp, expanded, internally thickened; pillar lip white, very solid, with a prominent median tubercle; body with a relatively large, prominent tooth, which is but little prolonged into the interior of the whorl; the outer lip has no callosity. Height, 7.0; max. diameter, 4.5; height of last whorl, 4.5; of the aperture, 3 mm.

Indefatigable Island, Galapagos group. U. S. Str. Albatross. Cat. No. U. S. Nat. Mus. 274,097.

Of the group of species with a denticulated aperture which is peculiar to this island, this is the smallest.

* Proc. U. S. Nat. Mus., vol. XVI, No. 942.

Bulimulus (Naesiotus) trogonius n. sp.

Shell small, olivaceous, with five and a half whorls separated by a very distinct suture; pupiform, with a rather blunt dimpled apex, the initial whorl conspicuously transversely striated; sculpture of minute regular transverse (or axial) wrinkles crossed by microscopic spiral bands where the wrinkles are interrupted or modified; last whorl subcylindric, much the largest; base attenuated, with a minute umbilical chink; aperture small, simple, sharp-edged, the outer and pillar lips connected by a layer of callus; pillar short, stout, anteriorly subtruncate within the aperture. Height of shell, 7.0; of last whorl, 5.0; of aperture, 2.5; max. diameter of shell, 3.0 mm.

Albemarle Island, Galapagos group, at an altitude of about 1300 feet above the sea. U. S. S. Albatross. Cat. No. U. S. Nat. Mus. 274,096.

This is the smallest species of *Naesiotus* yet recorded. It belongs to the group of *B. amastroides* Ancey, and may well represent the stock from which the varied *Bulimulus* fauna of the islands has been gradually evolved by modification and isolation.

Paul Reibisch described a species of *Pupilla* under the name of *wolfi* which he supposed to be the same as the *P. wolfi* of Miller, originally from Guayaquil on the mainland. Dr. Pilsbry informs me that the Galapagos species is not the same as the continental *wolfi*, and therefore I propose for it the specific name **reibischi.** Reibisch's *P. clausa* and *P. munita* seem sufficiently distinct. Reibisch's *Bulimulus acutus* is not the same as the much earlier *B. acutus* Leach, and may take the name of **rugatinus.** His *B. terebra* is not the same as *B. terebra* Matheron 1832 (fide Pilsbry), but the latter I have not yet been able to consult, and it may be a *Bulimulus*. The name *venustus* Reibisch is preoccupied by Beck in 1838, but Reibisch's name is a synonym of *ustulatus* Sowerby. *Bulimulus vermiculatus* Dall (not of Beck, 1838) is a synonym of *B. cinereus* Reibisch, but the latter is preoccupied by Reeve in 1848, and the species may take the name of **cinerarius.**

Bulimulus (Scutalus?) apurimacensis n. sp.

Shell of moderate size, dull whitish with axial more flesh colored streaks, the interior of the aperture light yellowish brown; spire acute, of seven whorls, the nuclear whorls reddish brown, transversely delicately striate, the apex dimpled; base with a wide funicular umbilical pit, above minutely perforate; whorls moderately convex, suture distinct, not appressed or channelled; sculpture of the last four whorls of retractively oblique fine axial threads regularly disposed, with about equal interspaces, covering the entire shell, but a little less distinct near the aperture; outer and inner lips approximated, connected over the body with a thin layer of callus, aperture egg-ovate, the lip widely reflected and sharp, the pillar simple; a section shows that above the perforation in the last whorl the hollow of the axis expands, funnel-like, and in the next preceding whorl is anteriorly contracted and posteriorly expanded, and similarly

throughout the spire. Measurements of the largest, medium and smallest specimens in millimeters are as follows, the great majority being of medium size:

Length of shell.	of last whorl.	aperture.	diameter.
32.0	20	15	20
31.0	20	15	18
24.5	17	12	14

Collected on trees and shrubs near Paseje, Apurimac valley, Peru, by Prof. Hiram Bingham of the Peruvian expedition of the National Geographic Society. Cat. U. S. Nat. Mus. No. 251,835.

The described species nearest to this is the *B.* (*Scutalus*) *cor*æ*formis* Pilsbry, from the Marañon valley on the east slope of the Andes. The latter is much larger, with a relatively smaller umbilical funnel and a different colored throat.

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TWO NEW OPHIURANS FROM THE CHINA SEA.

BY AUSTIN H. CLARK.*

A study of the unnamed ophiurans in the collection of the United States National Museum has brought to light the two following hitherto undescribed species from the China Sea.

Ophiopteron alatum sp. nov.

The disk is 4.5 mm. in diameter, and the arms are apparently about 25 mm. long.

The dorsal surface of the disk is covered with large naked radial shields and naked overlapping plates, the latter extending in a narrow band with parallel sides from the centre of the disk to the interbrachial border, and outwardly between the radial shields in a very narrow elongate triangle the apex of which lies at or near the base of the arms.

The centre of the disk is occupied by a pentagonal plate with rounded corners directed interradially, which has a raised and thickened border. On each side of this pentagon is a large subcircular plate, the diameter of which is about two-thirds that of the central plate. These five subcircular plates are separated by very small oval plates which lie on the angles of the central pentagon. Beyond the subcircular plates is a smaller plate, triangular in shape with the apex more or less rounded, and beyond this a very narrow triangular plate which reaches nearly or quite to the arm bases; these last two plates lie between the radial shields.

Following the small plates situated at the angles of the central pentagon is an oval plate which is about twice as long as broad, the longer diameter lying in the interradial line, beyond which are two pairs of plates, or two irregular columns of from two to four plates, reaching to the spine bearing plates of the interradial border of the disk. On either side of this interradial series of plates are a few plates with the greater part of their surface concealed through the imbrication of the plates lying within them, which delimit the straight border of the interradial plated strip.

* Published with the permission of the Secretary of the Smithsonian Institution.

The radial shields are very long, triangular, about half again as long as broad, reaching to the subcircular plate situated on the side of the central plate of the disk; their distal border is slightly wider than, to twice as wide as, the interradial band of plates; their inner distal angles are slightly produced and rounded; their outer borders are parallel to those of the adjacent radial shields; their inner borders are in contact distally, proximally diverging very slowly so as to leave a very narrowly triangular area which is occupied by plates.

The interradial border of the disk, and a patch on the lateral margin is occupied by about a dozen polygonal plates each with a short cylindrical spine which may have a rounded end, or may bear a few spinelets; these plates extend for a short distance around the outer corners of the radial shields. The interbrachial spaces below are naked except for the few spiniferous plates described above, and numerous minute calcareous spicules.

In the proximal part of the arm the upper arm plates are six sided, the proximal and distal sides of about the same length, straight, the two lateral sides about twice as long as the two posterolateral sides; in the outer part of the arm they become fan-shaped with a truncate proximal angle.

At the base of the arm the arm spines are eight in number; the second, third and fourth from the mid-dorsal line are the longest, and the uppermost is nearly as long; these are all webbed to the tip; the fifth is about as long as the first, and has a somewhat enlarged and very thorny tip; it is united to the fourth by a web which reaches about half way up both spines; the sixth is not much more than half as long as the fifth, with a club-shaped and very thorny tip and no web; the seventh is much shorter and more thorny; the lowest is in the form of a hook with two strong teeth directed backward toward the mouth; the hooked character of this spine is fully developed on the second side arm plate. The spinules on the ends of the spines, whenever they occur, are webbed for a greater or lesser distance from their bases.

The uppermost spine rapidly decreases in length, after about the ninth side arm plate occurring only as a slight spur; on the third or fourth side arm plate the second spine begins to decrease in length, becoming very small at the middle of the arm, so that beyond this point there is only a more or less partial web between the two uppermost spines (originally the third and fourth) and a small spur at the base of the inner. The lower spines remain of about the same relative proportions to the end of the arms, the hook-like character of the lowest becoming more and more pronounced and the next to the lowest tending to assume more or less the same character; the following spine tends to alternate long and short on succeeding side arm plates.

The tentacle scale is rather prominent, rounded, spanning the angle between the side arm and under arm plates.

The tentacles, as contracted in drying, are covered with numerous, and prominent, though very small, papillæ.

The under arm plates are about as long as broad with parallel sides and a prominent notch in the distal border.

Type.—Cat. No. 38,666, U. S. N. M., from the north China Sea, collected by William Stimpson.

Ctenamphiura sinensis sp. nov.

The disk is nearly circular, being only slightly flattened in the radial regions, 9.5 mm. in diameter.

The radial shields are short and broad, joined interiorly except for their extreme tips, each pair forming a heart-shaped figure which is about as broad as long, and about as long as the distance from its inner angle to the outer border of the rosette of primary plates.

The six primary plates are united in a central rosette which is entirely surrounded by a line of much smaller plates; outside of this the disk is covered with comparatively large ovoid overlapping plates, smaller, however, than the primary plates, which are largest in the middle third of the interradial areas and decrease in size toward the radial shields; in each interradial line just beyond the series of small plates surrounding the central rosette there is a single plate about as large as those of the rosette, rounded trapezoidal in shape. The plates of the dorsal surface are flat and not swollen.

The interbrachial regions below are covered with very small equal circular strongly imbricating plates which near and at the dorsolateral margin of the disk become larger, longer and more pointed, abruptly defining the dorsal surface of the disk.

The oral shields are approximately rhombic, though usually with the distal sides somewhat longer than the proximal; all the sides are slightly concave.

The side mouth shields meet within; they are broadly crescentic with broadly rounded ends; the chord of the crescents of the two adjacent shields make with each other a very broadly obtuse angle.

The distalmost mouth papilla is circular and scale-like, similar to a tentacle scale situated opposite it on the first under arm plate, but slightly larger; the next is much larger though not much broader basally, and conical; the apical is smaller than the central, lower, more or less pointed.

The arms decrease in width, and especially in height, noticeably in the basal fourth, but very slowly from that point onward.

The upper arm plates in the proximal half of the arm are approximately three times as broad as long, the lateral thirds of the distal border broadly convex, the median third concave.

Just beyond the disk the arm spines are ten or eleven in number; the lowest is considerably stouter and longer than (sometimes twice as long as) the others; the next is slightly longer than the following which are short and approximately equal; at the fifteenth side arm plate beyond the border of the disk the number of arm spines is reduced to eight of which the lowest, though stouter, is not much longer than the others; in

the central portion of the arm there are six arm spines, the lowest very slightly longer and stouter than the next, which again is very slightly longer and stouter than the others, these being subequal; and in the outer portion of the arm there are five arm spines, and distally four.

The under arm plates are about one-third broader than long, rectangular, with blunted corners and concave lateral and distal borders. In the enlarged proximal portion of the arm a rounded ridge appears on either side of each under arm plate, just within the lateral border; nearer the base of the arm the ridges move toward each other, becoming at the same time more and more strongly curved so that at the base of the arm the tentacle scale on the under arm plate occupies the center of a deep half cup shaped depression.

The tentacle scales are two in number, rather large, broad, and well rounded.

Type.—Cat. No. 15,470, U. S. N. M., from Hong Kong.

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NEW NAMES IN AMYGDALUS.

BY P. L. RICKER.

In accord with the tendency among botanists to place the Peach and its allies in a genus distinct from the Plums and Cherries several transfers from the genus *Prunus* to the genus *Amygdalus* become necessary. Those which we have had occasion to use are as follows:

Amygdalus dehiscens (Koehne) Ricker.
Prunus dehiscens Koehne, Sarg. Plant. Wils. 1:271. 1912.
Amygdalus mira (Koehne) Ricker.
Prunus mira Koehne, Sarg. Plant. Wils. 1:272. 1912.
Amygdalus mongolica (Maxim.) Ricker.
Prunus mongolica Maxim. Bull. Soc. Nat. Mosc. 45:16. 1879.
Amygdalus nana campestris (Bess.) Ricker.
Prunus nana campestris Bess. Enum. Plant. Volk. 46. 1822.
Amygdalus nana cochin-chinensis (Bailey) Ricker.
Prunus nana cochin-chinensis Bailey, Cycl. Am. Hort. 3:1456. 1901.
Amygdalus nana rubra Ricker.
Prunus nana rubra Hort. Gard. Chron. III. 52:390. suppl. pl. 1912.
Amygdalus davidiana alba (Carr.) Ricker.
Persica davidiana alba Carr. Rev. Hort. 76. 1872.
Prunus davidiana alba Bean, Garden 50:165. 1896.
Amygdalus persica densa (Makino) Ricker.
Prunus persica densa Makino, Tokyo Bot. Mag. 16:178. 1902.
Amygdalus persica camelliaeflora Ricker.
Prunus persica camelliaeflora Hort. in Bailey, Stand. Cycl. Hort. 5:2833. 1916.
Amygdalus persica platycarpa (Decne.) Ricker.
Persica platycarpa Decne. Jard. Fruit. Mus. 7:42. pl. 1872–75.
Prunus persica platycarpa Bailey, Cycl. Am. Hort. 3:1457. 1901.
Amygdalus persica potanini (Batal.) Ricker.
Prunus persica potanini Batal. Act. Hort. Petrop. 12:164. 1892.

Amygdalus petzoldii (Koch) Ricker.

Prunus triloba petzoldii Bailey, Cycl. Am. Hort. 3:1457. 1901.

Prunus petzoldii Koch, Dendr. 1:92. 1869.

Amygdalus triloba (Lindl.) Ricker.

Amygdalus pedunculata Bunge, Enum. Pl. China 22. 1831, not Pallas 1798.

Prunus triloba Lindl. Gard. Chron. 268. 1857.

Amygdalus sweginzowii (Koehne) Ricker.

Prunus sweginzowii Koehne, Mitt. Deut. Dendr. Gesell. 19:97. 1910.

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PROCEEDINGS

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A FOSSIL TSETSE FLY AND OTHER DIPTERA FROM FLORISSANT, COLORADO.

BY T. D. A. COCKERELL.

The Diptera described below were collected recently by Mr. Geo. Wilson, and transmitted to me by Mr. F. H. Ward. They have been placed in the U. S. National Museum. The tsetse flies (*Glossina*) at present belong to the Ethiopian fauna.

Glossina armatipes new species (Glossinidæ).

A specimen in lateral profile, the head and anterior part of thorax missing.

Male.—Length of wing about 7.5 mm., of abdomen about 6.5 mm.; hind femur 4 mm., hind tibia 3 mm. Thorax black, sides not hairy; the position of the bristles can not be made out, the pteropleural and sternopleural bristles usually so conspicuous in *Glossina* can not be seen. Abdomen in lateral view appearing rather slender, the apex curved downward and forward, with a pair of clavate chitinous rods obscurely indicated; hair of abdomen fine and thin, as usual in the genus; base of abdomen broadly dark, beyond this four or five dark brown bands, the first three very distinct, and separated by colorless intervals as wide as themselves. Middle (?) tarsi with fine hairs and coarse black bristles, as usual in the genus. Hind femora with a row of long black bristles on lower side, beginning about 1440 μ from end, these are eight in all, directed downward, the last three short, but the fifth longest (about 560 μ), extending across the whole width of the adjacent flexed tibia. Tibia with fine scattered hairs and a row of strong black bristles on outer face, but I can not see any regular row of short spines such as occurs in modern *Glossina;* at the end of the tibia are two large curved spines, one larger and much stouter than the other. Hind basitarsus very minutely hairy, the anterior side near the base with two stout spines, which are very finely longitudinally striated (the same occur in the living *G. fusca* Walker); tarsi long; claws slender and simple. Wings perfectly clear,

with very pale veins; venation normal for *Glossina*, except that the outer margin of the discal cell is strongly curved above, becoming more or less S-like, so that the end of the cell is narrowed; this is an exaggeration of the condition found in the fossil *G. osborni* Ckll. and the living *G. fusca* Walker.

Miocene shales of Florissant (Geo. Wilson).

I at first thought this species should represent a distinct genus, on account of the shape of the end of the discal cell and the strong armature of the hind legs. I found, however, that the living *G. fusca* possessed all these characters in a less exaggerated form, and that it would be impossible to define a genus satisfactorily. It then appeared possible that the specimen might be referred to the fossil *G. osborni*, but in that species the outer side of the discal cell, if the bulge at the upper end is not considered, is nearly at right angles to the upper side, whereas in *G. armatipes* the outer side, ignoring the bulge, is oblique, at an angle of about 45° with the upper side. *G. osborni* is a typical *Glossina*, whereas *G. armatipes* is a distinctly aberrant species. The fossil species of *Glossina* known from Florissant may be separated thus:

Very large, wings 16 mm. long; outer side of discal cell hardly curved, and anterior basal cell strongly claviform at end . *oligocena* (Scudder).
Wings 10.9 mm. long; outer side of discal cell more oblique, and anterior basal cell hardly claviform at end . . . . . *veterna* Ckll.
Wings less than 8 mm. long
osborni Ckll. and *armatipes* Ckll. (differing as indicated above).

Dolichomyia tertiaria new species (Bombyliidæ).

Length 10 mm.; thorax 2.25 mm. long; wings 5 mm. long, perfectly clear; hind legs long and slender, femora 3.5 mm., tibia 3 mm.; abdomen very long and slender, not noticeably enlarged apically, its depth a little over 1 mm. Head, thorax and legs dark, abdomen dark with broadly hyaline sutures. Venation exactly like *Dolichomyia*, as figured by Williston, but some of the apical nervures obliterated or almost so, being very pale and thin. The following measurements are in microns: praefurca about 160, first basal cell on first submarginal 1090, first basal on discal 850, first posterior on discal 560, second basal on discal 144, second basal on third posterior 240.

Miocene shales of Florissant (Geo. Wilson).

The discovery of a *Dolichomyia* in the Miocene is surprising; the genus is to-day represented by scattered and rare species in South and North America (Colorado).

Oxycera (?) contusa new species (Stratiomyidæ).

Female.—Length 6.3 mm.; head, thorax and abdomen dark, the abdomen without markings; thorax 2.6 mm. wide; abdomen very broad, circular, the breadth and length 3.3 mm.; eyes naked, .5 mm. apart on vertex; wings 5.6 mm. long, perfectly clear, the veins very faint. The venation appears to be normal for *Oxycera*, but most of it is so faint that

it requires a strong light and close study to make it out. The side of the fifth posterior cell on the second basal appears to be less than that on the discal, which is not usual in *Oxycera;* the vein separating the submarginal cells is so extremely faint that I thought it was absent, as in *O. formosa* Meigen; the end of the stigma is about on a level with end of discal cell; the longitudinal veins from the discal cell are straight or practically so. The following measurements in microns were taken with difficulty, but are probably correct: Depth of submarginal cell at level of end of stigma 272, discal cell on first posterior about 720, discal on second posterior 128, discal on third posterior 256 or perhaps more, discal on fourth posterior 320, discal on fifth posterior 384, second basal on fifth posterior 288; end of anal to wing margin 208.

Miocene shales at Florissant (Geo. Wilson).

I am unable to demonstrate the scutellar spines, and they were possibly absent, so it is not positive that the fly belongs to *Oxycera.* Of the genera of Clitellariinæ cited by Williston without scutellar spines, this can not be *Nemotelus* or *Akronia*, as the face is not conically produced; the size and appearance are quite unlike *Hermetia* or *Chrysochlora;* the bare eyes exclude *Pelagomyia;* leaving only the South American genus *Cacosis* of Walker, which is distinguished by antennal peculiarities which can not be made out in the fossil. The fossil shows one antenna appressed to the head, and it is oval with a stout terminal arista, as in *Oxycera morrisii* Curtis, figured by Verrall. The fossil is therefore either an *Oxycera* or very closely related to that genus.

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PROCEEDINGS

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THE ASTEROID GENUS CORONASTER.*

BY WALTER K. FISHER.

The genus *Coronaster* Perrier, currently classified in the Pedicellasteridæ, should include also *Asterias* (*Stolasterius*) *volsellata* Sladen, which Professor Verrill recently made the type of *Heterasterias*,† of the family Asteriidæ.

Coronaster, as usually understood, includes the following nominal species: *C. parfaiti* Perrier, the type, from the Cape Verde Islands; *C. antonii* Perrier, founded upon a very immature specimen from Morocco; *C. briareus* (Verrill), from south of Key West, and also northward between N. lat. 37° 18′ 11″ and 36° 41′ 05″; *C. bispinosus* Ives, locality unknown, perhaps identical with *briareus*; *C. octoradiatus* (Studer), from South Georgia Island.

Verrill‡ has given the most recent diagnosis of *Coronaster*: "Delicate starfishes with a small disk and numerous slender rays, covered with long, slender spines in radial rows. The dorsal skeleton is weak, made up of the rows of median and superomarginal plates, connected together by slender transverse ossicles. Each plate of the longitudinal rows usually bears one slender spine. Both rows of marginal plates well developed and spiniferous. No interactinal [actinal intermediate] plates. Adambulacrals diplacanthid. Large, felipedal [unguiculate], dermal major pedicellariæ occur above and below. Minor

* Published with permission of the Commissioner of Fisheries.

† Monograph of the Shallow-water Starfishes of the North Pacific Coast, etc., 1914, p. 46.

‡ Report on the Starfishes of the West Indies, Florida, and Brazil, Bull. Univ. Iowa, Vol. 7, No. 1, Mch. 20, 1915, p. 31.

pedicellariæ form large circumspinal wreaths, borne on contractile sheaths. Tube-feet are relatively large, in two rows, not crowded. A pair of large peroral spines on the margins of the oblong jaws, with groups of oral marginal pedicellariæ."

I have examined a specimen of *Coronaster briareus* from 90 fathoms, Gulf Stream, south of Key West. In this specimen R equals 81 mm., or slightly more than in the largest example listed by Professor Verrill (1915, p. 31). In this specimen the tube-feet are crowded and quadriserial, or arranged in what one might prefer to call two crowded zig-zag series, inasmuch as the pores remain biserial. On the outer two-fifths of one ray the pedicels are biserial, while on the other four, the quadriserial arrangement extends to the tip. Perrier* mentions that in *C. antonii* the tube-feet are quadriserial on part of the ray, although the specimen is very small.

I have compared this specimen of *C. briareus* side by side with large and medium-sized examples of *Heterasterias volsellata* (Sladen) from the Philippine Islands, which has similarly arranged quadriserial tube-feet, with biserial pores, only slightly zig-zag in very large specimens. Furthermore the highly characteristic skeleton of *volsellata* is nearly exactly duplicated, with minor specific differences, by that of *briareus*. This skeleton, which holds good also for *C. parfaiti* and *C. antonii* as figured by Perrier,* consists of slender, lobed plates, joined by more or less elongate connecting ossicles in such a way as to form a median radial, and two marginal, regular longitudinal series, joined together at the intervals of the primary plates by transverse ossicles, leaving four series of large, rectangular papular areas. At each node of this skeletal mesh is a sharp spine with a retractile wreath of abundant pedicellariæ. The inferomarginal plates abut tightly against the adambulacrals. Furthermore, both species have the curious hand-shaped, unguiculate major pedicellariæ of conspicuous size, figured by Professor Verrill.†

Perrier‡ has given carefully drawn figures of *C. parfaiti* and *C. antonii*. As already noted the skeleton is essentially the

* Expèd. scientif. du Travailleur et du Talisman, Échinodermes, 1894, p. 96, pl. 8.
† Verrill, 1915, op. cit., pl. 9, fig. 4c.
‡ Perrier, 1894, op. cit., pl. 8.

same as that of *briareus* and of *volsellatus*. It seems reasonable, on account of the small size of Perrier's specimens, to consider them immature. They match very well the immature, regenerating rays of *volsellatus*, which also have the pedicels biserially arranged, and at a certain stage biserial at the base and tip and quadriserial in the middle portion.

Coronaster volsellatus has one adambulacral spine, the other species generally two. In *C. parfaiti* there are three spines on the first five plates, and two on the others. *C. antonii* has the spines "solitary on the majority of the plates, but in pairs on certain others among them." I do not think the monacanthid condition of *volsellatus* of sufficient importance to cause a generic separation. The new species, *Coronaster halicepus*, is diplacanthid and is evidently a close relative of *volsellatus*.

Coronaster is therefore represented in the East Indies by two species, and in the Atlantic by five nominal forms.

The family affiliations of *Coronaster* are not easy to determine, its lineage being somewhat involved. The tendency to crowding in the arrangement of pedicels partakes of the Asteriidæ, while its mouth plates are quite as "brisingoid" as those of *Odinia*, and perhaps more so than the oral angles of *Labidiaster*, two groups placed in the Brisingidæ. Its skeleton is more like that of a simplified *Pedicellaster* than like that of *Asterias*, or allies. Parenthetically, the mouth plates of *Pedicellaster* are more prominently "adambulacral" than those of any genus of the Asteriidæ, even of *Coscinasterias*, and are nearly or quite as prominent, relatively, as the oral angles in *Brisinga*. In *Pedicellaster* and *Coronaster* the ambulacral plates are more "brisingoid," uncrowded, and the pedicel pores are in two series, even if later the feet themselves lie in four ranks. In very large specimens of *Coronaster*, the pedicel pores form two slightly zigzag rows, much less pronounced than in small specimens of *Coscinasterias* (in the broader sense), and the ambulacralia are less crowded. My own feeling is that until we arrive at a more satisfactory basis for the subdivision of the Asteriidæ than is now current, it will be much better to leave *Coronaster* in the Pedicellasteridæ, rather than to relegate it to the Asteriidæ, even though one of its species has long occupied an undisputed corner in that over-burdened family.

GENUS CORONASTER PERRIER.

Coronaster PERRIER, Ann. sci. nat., art. 8, 1885, p. 13. Type, *C. parfaiti* Perrier; Expèd. sci. du Travailleur et du Talisman, Échinodermes, 1894, p. 92, pl. 8.

Stolasterias (subgen.) *pars* SLADEN, *Challenger* Asteroidea, 1889, p. 584.

Heterasterias VERRILL, Shallow-water Starfishes of the North Pacific Coast, etc., 1914, p. 46. Type, *Asterias* (*Stolasterias*) *volsellata* Sladen.

Coronaster halicepus new species.

Characters.—In general appearance very closely resembling *C. volsellatus*, but differing in having 10 rays, 2 adambulacral spines, relatively broader and shorter major, unguiculate pedicellariæ, with longer claws, heavier ambulacral forficiform pedicellariæ with the jaws conspicuously crossed at tips, and longer forcipiform minor pedicellariæ, each jaw with upward of 12 or even more small teeth in addition to the large terminal teeth (5 or 6 in *volsellatus*). R=260 mm., r=17 mm., R=15±r; breadth of ray at base, 11 mm.; at 25 mm. from base, 14 or 15 mm.

Type.—Cat. No. 37,012, U. S. Nat. Mus.

Type-locality.—Albatross station 5281, between Lubang and Luzon, Philippine Islands, 201 fathoms, dark gray sand, bottom temperature, 50.4° Fahr. Taken also off the Molucca Passage, Molucca Islands, 298 fathoms.

The adambulacral spines form the most trenchant character to separate this species from *volsellatus*. They are 2, slender, slightly tapered, blunt, situated on the furrow margin in an oblique series, the inner being aboral to the outer and about two-thirds to three-fourths as long; the latter is one-half to three-fifths as long as the inferomarginal spine. About every other plate has on the furrow face 1 or 2 forficiform pedicellariæ about 1 to 1.25 mm. long. These extend between the tube-feet, and are at the end of a thick, apparently highly extensible stalk, around the base of which are 1 to several very small pedicellariæ. These pedicellariæ have the ends of the jaws crossed and are broader than in *volsellatus*, where the jaw tips fit together snugly. The trabeculæ of the abactinal and lateral skeleton, and the papular areas, have numerous large six-clawed unguiculate, hand-shaped, pedicellariæ, about 1.5 mm. long. These resemble two miniature hands clasped, with the fingers bent, and are shorter and broader than in *volsellatus*, as well as much more numerous.

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PROCEEDINGS

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DESCRIPTION OF A NEW SIALIA FROM MEXICO.

BY HARRY C. OBERHOLSER.

Some time ago Dr. Louis B. Bishop sent me for examination four specimens of a bluebird from northeastern Mexico. Upon comparison with abundant material these proved to represent a new subspecies of *Sialia sialis*. Dr. Bishop has generously donated these specimens to the Biological Survey collection in the United States National Museum, and has permitted the writer to present the accompanying description. This new race may be called:

Sialia sialis episcopus, subsp. nov.*

Chars. subsp.—Similar to *Sialia sialis fulva*, but blue of upper parts rather darker, and anterior lower parts very much darker.

Description.—Type, adult male, No. 241,188, U. S. N. M. (No. 23,808 Louis B. Bishop); Santa Engracia, Tamaulipas, Mexico, December 15, 1911; F. B. Armstrong. Interscapulum rich blue, between methyl blue and spectrum blue, the feathers with a few rusty edgings; rest of upper parts, including upper surface of tail, lighter blue, between light methyl blue and salvia blue, the tail somewhat duller, more grayish; wing-quills terminally fuscous black, shading basally to pale brown, most of the outer webs and all but the marginal half of the inner webs, together with all of the superior wing-coverts, blue like the upper surface; sides of head blue like the pileum, but somewhat paler and mixed with grayish brown; chin mixed whitish and dull grayish blue; throat, breast, and sides dull chestnut, between chestnut and auburn; abdomen and crissum white; lining of wing light gray mixed with white and washed with blue.

Geographic distribution.—State of Tamaulipas, Mexico, north to the lower Rio Grande Valley in central southern Texas.

Remarks.—This very interesting new form is in general characters somewhat intermediate between *Sialia sialis sialis* and *Sialia sialis fulva*, combining, as it does, the light, more or less greenish, upper parts of the latter with the deep-colored anterior lower parts of the former. It differs from *Sialia sialis sialis* conspicuously in its lighter, more greenish blue upper surface; and from *Sialia sialis guatemalae* in its much darker lower

* Named for Dr. Louis B. Bishop.

parts. The female of ***Sialia sialis episcopus*** differs from the female of both ***Sialia sialis fulva*** and ***Sialia sialis guatemalae*** in the much darker lower surface; and from the female of ***Sialia sialis sialis*** in the more greenish tone of the blue on the upper parts and also usually in the somewhat lighter tone of the anterior under surface. As in the other races of this species, there is considerable individual variation in the color of the blue on the upper surface, and this is exemplified by a male (No. 241,189 U. S. N. M.), which has the blue decidedly darker and more purplish than in the type. Specimens from Fort Clark, Texas, and from El Blanco on the Lower Rio Grande in Texas, belong also to this new race.

Detailed measurements of the good plumaged adults of ***Sialia sialis episcopus*** now available are as follows:

Museum and Number.	Sex	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Tarsus.	Middle toe without claw.
U.S.N.M. 241,188	♂	Santa Engracia, Tamaulipas*	Dec. 15, 1911	F. B. Armstrong	99.	65.5	11.	21.5	15.
U.S.N.M. 241,189	♂	Santa Engracia, Tamaulipas	Jan. 1, 1912	F. B. Armstrong	98.5	67.	11.2	19.	14.
U.S.N.M. 134,465	♂	Fort Clark, Texas	Jan. 12, 1893	E. A. Mearns	101.	66.	12.	20.5	16.8
U.S.N.M. 241,190	♀	Santa Engracia, Tamaulipas	Jan. 2, 1912	F. B. Armstrong	93.5	63.	11.	19.3	16.
U.S.N.M. 241,191	♀	Santa Engracia, Tamaulipas	Jan. 3, 1912	F. B. Armstrong	95.	60.	12.	20.5	15.

* Type.

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A NEW SUBSPECIES OF MEADOW MOUSE FROM WYOMING.

BY VERNON BAILEY.

The common valley meadow mouse of southwestern Wyoming is so strikingly different from typical *Microtus montanus*, to which it is most nearly related, that it seems necessary to recognize by name this extreme variant which gradually changes in characters across Nevada and Utah, and reaches its maximum variation in Wyoming. It occupies the meadows along streams in the arid sage-brush country of the Bear River, Green River, and Wind River valleys, and has the general habits of the larger darker *M. montanus* farther west.

Microtus montanus caryi subsp. nov.

Type from Milford, Fremont County, Wyoming; adult ♂, No. 168,670, U. S. National Museum, Biological Survey Collection. Collected by Merritt Cary, May 8, 1910; original number 1912.

General characters.—About the size of *montanus*, but with relatively shorter tail and paler coloration throughout.

Color.—In spring pelage before the summer moult, upper parts warm buffy gray with a rather coarsely grizzled effect of buff and black tipped hairs; top of tail dusky; sides of nose clear buff; lower parts, feet, and lower surface and sides of tail white or silvery gray. *Late summer* pelage after the fall moult not shown in the collection, but probably darker. *Young* duller and more brownish with darker feet, tails, and under parts.

Skull.—Very similar in size and form to that of typical *montanus*, but less heavily ridged in old males and with less sloping supraoccipital.

Measurements.—Type: Total length, 177; tail, 45; hind foot, 21; of an adult female topotype, 148, 41, 20.

Skull of type.—Basal length, 27.5; nasals, 7; zygomatic breadth, 16; mastoid breadth, 13; alveolar length of upper molar series, 7.

A

Remarks.—From typical *nanus* the present form may be readily distinguished by larger size, and heavier, deeper skull, although its short tail and gray coloration at first suggest that species. The skulls, however, show the connection to be with *montanus* and not with *nanus*.

Specimens examined.—In all, 21, from the following localities in Wyoming:

Milford, 4; Sage Creek (near Milford), 1; Lone Tree, Uinta County, 1; Cumberland, 5; Cokeville, 2; Border, 7; Afton, 1 (too young for positive identification).

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A NEW SPECIES OF HORNED TREE-TOAD FROM PANAMA.

BY LEONHARD STEJNEGER.

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The discovery of a species of *Cerathyla* in Panama adds a new genus to the batrachian fauna of the Isthmus. This genus has been known hitherto only from the Andes of Ecuador, Bolivia and Peru. It is not only one of the rarest genera in collections, but its aspect is also very singular, due to the large triangular head with its bony casque posteriorly extended as two pointed horns, and the dermal flaps on snout and eyelids. Its mode of propagation is equally peculiar.

The specimen and its young, which form the basis of the following description, was collected by Mr. Charles Gordon Holland, Asst. Paymaster, U. S. N., while attached to the U. S. S. *Leonidas*, on May 20, 1915, at Signal Loma (Loma Peak) on the north coast of Panama three miles south of San Isabel.

Cerathyla panamensis sp. nov.

Diagnosis.—Edge of upper eyelid medially with a triangular dermal pyramid ending in a pointed conical tubercle; snout with a short slender pointed dermal appendage; tibio-tarsal joint not reaching tip of snout; tongue longer than wide; distance from extremity of one of the lateral processes of helmet to the other less than its distance from the tip of snout, and less than two and one-half times the interorbital width; interorbital width more than three times the distance between nostrils, more than twice the width of upper eyelid; distance from nostrils to tip of snout nearly equalling their distance from orbits and nearly twice their distance between each other.

Habitat.—Panama.

Type.—Cat. No. 55,320 U. S. N. M.; Signal Loma, three miles south of San Isabel, north coast of Panama; C. G. Holland, collector.

Description of type specimen.—Tongue longer than broad; palatine teeth in a nearly straight line across the whole width of the palate behind the choanae, interrupted in the middle; vomerine series V shaped, converging behind, ending anteriorly in an elevation in front of the choanae; snout with a short, compressed, pointed, dermal flap; upper eyelid with a median triangular dermal pyramid ending in a pointed conical tubercle; distance between nostrils slightly less than half their distance from tip to snout, and half their distance from orbit; width of upper eyelid equal to distance of nostrils from snout; interorbital space twice as wide as upper eyelid; distance between points of horns of helmet much less than their distance from tip of snout; posterior outline of casque rounded; tympanum very distinct, its longest diameter more than three-fourths the diameter of orbit; a bony tubercle at angle of mouth; fingers long, slender, with a rudiment of web and well-developed disks, first much longer than second; toes one-third webbed with well-formed disks, third slightly shorter than fifth; a single metatarsal tubercle; a small dermal heel flap; the hind leg being carried forward along the body, the tibio-tarsal articulation extends forward to between the eye and tip of the snout; skin on top of head involved in the cranial ossification, finely granular; skin on back smooth, on throat and chest smooth with scattered tubercles; belly granular with the tubercles more closely set. Color (in alcohol) brownish drab above, without any distinct pattern of darker markings; a narrow whitish ring around the eye, and a similar line along the upper lip, more or less interrupted by brown; legs indistinctly cross-barred; the posterior aspect of the femur with indistinct white spots, behind which a dark brown line; underside whitish with indistinct brownish marblings; a dark brownish line on the inner side of the arm.

DIMENSIONS.

	mm.
Tip of snout to vent	60
Tip of snout to nostrils	6
Tip of snout to anterior rim of orbit	13
Tip of snout to posterior edge of tympanum	28
Tip of snout to tip of occipital horn	33
Distance between tips of occipital horns	27
Distance between nostrils	3.5
Distance of nostrils from orbit	7
Interorbital width	12
Width of upper eyelid	6
Greatest width of head	32
Forelegs from axilla	40
Hind legs from vent to tip of longest toe	99
Tibia	33

Remarks.—This species appears closely allied to *Cerathyla bubalus*

Espada, from the Andes of Ecuador and Peru, but differs in the much wider interorbital space and in the longer snout.

With the adult specimen described above, there is a very young one (No. 55,321, U. S. N. M.), only 17 mm. long, but fully developed. It has evidently just been severed from its mother, as the two strings, issuing one on each side from the chest near the shoulder look as if they had just been ruptured. When received, the mother specimen had the back covered with a loose flap of skin which came off easily when gently lifted by the forceps. On the exposed side of this flap there are about 12 pairs of whitish cords, apparently freshly ruptured and similar to the ones on the chest of the young one, which indicate that at least so many young ones had been attached to the mother's back just previous to capture. This condition fully bears out the account given by Boulenger of the closely related *Cerathyla bubalus* carrying its eggs on the back (Proc. Zool. Soc. London, 1903, vol. 2, pp. 115–116). The young ones evidently undergo their entire development while attached to the mother, after which the skin of her back, to which the eggs adhered, sloughs off. On the piece of skin shed there are distinct impressions of the outlines of the eggs, apparently at least 14. This would indicate a larger number of eggs than in *C. bubalus*, in the specimen of which recorded by Boulenger there were only 9.

In the adult specimen the neural spines of the dorsal vertebræ protrude on the back like a series of saw-teeth. It is also worthy of notice that the diapophyses of the sacral vertebræ are distinctly dilated.

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PROCEEDINGS

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NOTES ON A COLLECTION OF FISHES FROM THE HEAD OF CHESAPEAKE BAY.

BY LEWIS RADCLIFFE AND W. W. WELSH.*

In the course of an investigation for the Bureau of Fisheries in the spring of 1912, in the head of Chesapeake Bay and vicinity, opportunity was afforded to make a small collection of the fishes of the region. The territory covered included the Susquehanna River from Port Deposit to its mouth, the Northeast River, the Elk River and its tributary, the Bohemia, the Sassafras River, the Susquehanna Flats, and Chesapeake Bay south to a line from Howell Point to Stony Point. From April 8th to May 8th the numerous pound-nets were visited almost daily, and many visits were made to the several large seines in operation during this time. Small collecting seines were also used in Heron Run and the old canal (here connected with the river by a break in the bank) at Lapidum, near Port Deposit, Maryland; in Swan Creek, the Elk and Bohemia rivers, the Sassafras River and Turner's Creek, and at the Bureau of Fisheries station at Battery Island, 3½ miles below Havre-de-Grace, Maryland.

In June, 1882, Dr. Tarleton H. Bean made a small collection of fishes in this region, the results of which were published in the Proceedings of the U. S. National Museum, Vol. VI, 1883, pp. 365–367.

PETROMYZONTIDÆ.

1. **Petromyzon marinus** Linnæus. Lamprey.

An abundant species at this season. Many small ones, 14 to 17 cm., seen among the river herring taken in the seines and pound-nets. A few adults reported by the fishermen.

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ACIPENSERIDÆ.

2. **Acipenser sturio** Linnæus. Sturgeon.

This species is reported to be very scarce. None seen by us.

LEPISOSTEIDÆ.

3. **Lepisosteus osseus** (Linnæus). Black gar.

A single example 85 cm. in length, weighing 4¼ lbs., was taken in a fyke-net in the Bohemia River.

SILURIDÆ.

4. **Ameiurus catus** (Linnæus). White cat.

Abundant, and of considerable market value to the pound-net fishermen.

5. **Ameiurus nebulosus** (LeSueur). Yellow cat.

More abundant than the preceding species. Individuals ranged in color from a uniform muddy yellow through various degrees of marbling to a uniform dark slate, almost black.

CATOSTOMIDÆ.

6. **Carpiodes cyprinus** (LeSueur). Carp sucker.

A single example, 34.8 cm. long, taken in a shore seine at Cherry Tree Point, in brackish water.

7. **Catostomus commersonii** (Lacépède). Sucker.

Common. The largest example seen was 45 cm. in length and weighed 2 lbs.

8. **Hypentelium nigricans** (LeSueur).

An example 23.6 cm., taken in a pound-net in the Elk River, and a small one in Swan Creek, were the only examples seen.

9. **Erimyzon oblongus** (Mitchill). Chub sucker.

Two males, 21 and 20 cm. long, from Bohemia River and Swan Creek. The larger example shows, in addition to the three tubercles on each side of the head usual in breeding males of this species, a fourth and smaller tubercle on each side just below a line from nostril to pupil. Both examples have numerous small excrescences on the anal fin, largest on basal portion; in the smaller example there are also excrescences on the lower caudal lobe, under side of caudal peduncle, and along sides nearly to base of ventrals.

These examples agree with specimens taken by us in the Chesapeake and Ohio Canal at Seneca, Maryland, and with an example in the U. S. National Museum from New Bedford, Mass. We have compared these examples with two examples of *E. sucetta*, one from Savannah, Georgia, and the second from Lost Lake, Indiana, and find the difference in scaling between the two species to be as follows:

	E. sucetta	*E. oblongus*
Number of transverse rows of scales running downward and backward between shoulder and base of caudal	36 or 37+1	42 to 45 +1 or 2
Predorsal scales	12 or 13	15 or 16
Scales from origin of ventral upward and forward to and including median line of back	15	18
Scales upward and backward from the same point	13	15
Scales from origin of anal upward and forward	13	15

10. **Moxostoma macrolepidotum** (LeSueur). Mullet.

Common; many caught in pound-nets. The largest example seen was 41 cm. in length, and weighed 1¾ lbs.

CYPRINIDÆ.

11. **Cyprinus carpio** (Linnæus). Carp, Dutchman.

Common.

12. **Hybognathus nuchalis** Agassiz. Gudgeon.

This form, common throughout the region, was found to be extremely abundant in Swan Creek. The individuals here were of large size (reaching 16.2 cm.) and far outnumbered *Notropis hudsonius amarus*, from which they could be readily distinguished by the lustrous brassy sheen covering the entire body.

13. **Semotilus corporalis** (Mitchill). Chub.

Only taken in the old canal basin at Lapidum, Maryland, where it occurs in considerable numbers.

14. **Semotilus atromaculatus** (Mitchill). Chub.

A single example taken at Lapidum, Maryland.

15. **Leuciscus vandoisulus** Cuvier & Valenciennes.

Common in Swan Creek. A breeding male 6.3 cm. long had many small tubercles distributed over entire surface of head; among the small ones on top of head were enlarged ones; a row of seven large ones above orbit; a small tubercle near apical margin of scale on nearly all of the body scales; upper margin of first pectoral ray armed with a row of small, antrorse, spine-like tubercles, largest on distal portion of ray.

16. **Notemigonus crysoleucas** (Mitchill). Pond roach.

Common. One example 18 cm. long, taken in a pound-net in the Bohemia River, showed the characteristic coloration of *N. versicolor* (De Kay).

17. **Notropis procne** (Cope).

This species appears to be common in the small streams, being especially abundant in Swan Creek. A few examples were taken at Lapidum and Heron Run.

In our examples of this species the scales of the back are narrowly edged with brownish, forming a very distinct cross-hatching. Lateral band dusky, not (or indistinctly) continued around tip of snout. Lateral line complete. Six divided rays in anal fin.

18. **Notropis bifrenatus** (Cope).

Our examples of this species were seined on the beaches of the Sassafras, Elk, Bohemia and Susquehanna Rivers, where it seems to be common. None were taken in the small creeks, where *N. procne* was abundant.

In our examples the dusky edging of the scales of the back is continued onto the body of the scale, the cross-hatchings being much less distinctly outlined than in *N. procne*. Lateral band darker than in *N. procne*, and continued distinctly around tip of snout. Lateral line incomplete. Six divided rays in anal fin.

In alcoholic examples of this and the preceding species, the black edgings to the scales immediately above the dark lateral band are absent, giving the appearance of a light band above the dark one.

19. **Notropis hudsonius amarus** (Girard). Gudgeon.

Everywhere abundant. Lateral band silvery or leaden, with traces of a blackish blotch at base of caudal. No light band above this stripe. Lateral line continuous; anal rays 7 (rarely 8).

20. **Notropis analostanus** (Girard).

Mostly confined to the small creeks, and especially abundant in the old canal at Lapidum, Maryland.

21. **Notropis cornutus** (Mitchill).

Taken only in Swan Creek and in the old canal at Lapidum, in both of which places it was abundant.

Two males (10.1 and 11 cm. in length) in breeding dress, had in addition to the tubercles on head and nape, smaller tubercles arranged in rows on the upper surface of the pectorals.

22. **Notropis photogenis amœnus** (Abbott).

This species, which we have taken in large numbers in several of the tributaries of the Potomac near Washington, D. C., appears to be less abundant here, only three examples being taken, one from Swan Creek and two from Lapidum.

23. **Rhinichthys atronasus** (Mitchill).

Ten examples were taken in the rocky pools of Heron Run.

24. **Exoglossum maxillingua** (LeSueur). Cut Lips.

Sparingly common in Swan Creek, and one example taken at Lapidum, Maryland.

ANGUILLIDÆ.

25. **Anguilla rostrata** (LeSueur). Eel.

Abundant everywhere.

DOROSOMATIDÆ.

26. **Dorosoma cepedianum** (LeSueur). Mud shad.

A single individual, 32 cm. in length, taken in a pound-net in the Elk River, was the only example seen.

CLUPEIDÆ.

27. **Pomolobus mediocris** (Mitchill). Hickory shad.

Three females, 35.7, 37.5 and 46.2 cm. in length, with roe well advanced but not ripe, were the only examples seen.

28. **Pomolobus pseudoharengus** (Wilson). Branch herring.

Reported to be much less abundant than in former years. This spring no large run of this species occurred.

The average length and weight of 7 males (from 26.5 to 29 cm. long) was 28.3 cm. and .5 lb.

The average length and weight of 5 females (from 29 to 31 cm. long) was 30 cm. and .6 lb.

Twenty-five examples (sex and length not recorded) averaged .54 lbs. each.

29. **Pomolobus æstivalis** (Mitchill). Glut herring.

FAT-BACK, BLUE-BACK, BLACK-BELLY.

It is reported that there is a falling off in the run of this species from that of the past three or four years.

This year (1912) this species was first taken in the Elk River on April 11th, but did not appear in any considerable numbers until the 16th. The run reached its heighth on April 27th, and by May 8th was almost over.

The average weight of 25 males (26.5 to 31.5 cm. long) was .56 lbs. per fish.

The average weight of 50 females (27.5 to 34 cm. long) was .68 lbs. per fish.

The average weight of 99 fish of both sexes (27 to 34.5 cm. long) was .61 lbs. per fish.

Of the many thousand individuals seen the majority had a single black blotch at shoulder, but individuals with a row of from three to nine blotches were not uncommon, and a considerable number were seen which showed traces of a double row.

30. **Alosa sapidissima** (Wilson). Shad, white shad.

Prior to May 8th the catch of shad was extremely small, most of the catch coming from brackish water.

31. **Brevoortia tyrannus** (Latrobe). Bug-fish.

None seen. A few reported to have been taken in a shore seine at Cherry Tree Point, Maryland, prior to May 3d. At this point the water is usually slightly brackish. The fishermen report that this species is generally abundant towards the close of the shad season.

ESOCIDÆ.

32. **Esox reticulatus** LeSueur. Pike.

Common. Females, in spawning condition, with *ripe* eggs, were seen as follows:

April 11, 1 example 31 cm., ½ lb., Elk River.
April 18, 1 example, Elk River.
April 24, 1 example 50 cm., 1⅜ lbs., Elk River.
April 25, 1 example 58 cm., 2¼ lbs., Bohemia River.

Several large examples were seen at Cherry Tree Point, taken with a shore seine in brackish water.

POECILIIDÆ.

33. **Fundulus heteroclitus** (Linnæus). Bull minnow.

Six examples taken in the Sassafras River.

34. **Fundulus diaphanus** (LeSueur). Bull minnow.

Abundant.

BELONIDÆ.

35. **Tylosurus marinus** (Walbaum). Silver gar.

One example, 40.1 cm. long, taken in Turner's Creek, Sassafras River.

GASTEROSTEIDÆ.

36. **Apeltes quadracus** (Mitchill). Stickleback.

Taken only in the Sassafras River, Turner's Creek, and at Battery Station. Apparently not abundant.

ATHERINIDÆ.

37. **Menidia beryllina** (Cope). Silversides.

Abundant in the Sassafras River and Turner's Creek. A very few examples taken at Lapidum, Maryland, Battery Station and in the Bohemia River.

CENTRARCHIDÆ.

38. **Enneacanthus gloriosus** (Holbrook).

Several examples taken in sluggish streams tributary to the Sassafras River.

A single example from the inner basin at Battery Station.

39. **Lepomis auritus** (Linnæus). Moccasin.

Common in the Elk and Bohemia rivers. One small example from Swan Creek.

40. **Lepomis gibbosus** (Linnæus). Moccasin, Tobacco-box.

Abundant.

41. **Micropterus dolomieu** (Lacépède). Black bass.

One example, 35.2 cm. in length, weighing 1¼ lbs. taken in a pound-net in the Bohemia River. This example was afflicted with "pop-eye." No others were seen.

42. **Micropterus salmoides** (Lacépède). Oswego bass.
BLACK BASS.

Common in the Elk and Bohemia Rivers where many are taken in pound-nets. The largest example seen was 49 cm. in length and weighed 4⅛ lbs.

Two small examples seen in Swan Creek.

PERCIDÆ.

43. **Perca flavescens** (Mitchill.) Yellow perch.

Abundant. It would appear from our measurements that in this region this species attains a length of from 6 to 9 cm. one year after hatching, and first breeds at the age of two years, when a length of 15 to 19 cm. is attained.

44. **Hadropterus sellaris** Radcliffe & Welsh.

The type and co-type, both 4.9 cm. in length, were taken with a 25 ft. seine, in a swift riffle of Swan Creek, near Havre-de-Grace, Maryland, on May 2d. For description of this species see Bull. Bur. Fisheries, Vol. XXXII, 1912 (1914), p. 29–32, pl. XVIII.

45. **Bolesoma olmstedi** (Storer).

Everywhere abundant. The differences in size and coloration between the sexes of this species, which was in breeding dress, were very striking. The average length of 38 adult males (5.5 to 8.7 cm.) was 7.36 cm. Forty-five adult females (4 to 7.8 cm.) averaged 6.15 cm. in length. All these fish were in spawning condition. The average length of examples taken in the smaller streams was considerably less than of those from the shores of the larger rivers.

In the breeding males the ground color was a dark olive gray, darkest dorsally, with saddles and W-shaped markings indistinct or absent; vertical fins greatly enlarged; membranes between the first and third dorsal spines mesially jet black, rest of spinous dorsal with irregular plumbeous mottlings; second dorsal and caudal with numerous wavy plumbeous lines, these not extending onto lowermost rays of caudal; anal and ventrals slate-gray to slate-black; pectorals lighter with traces of mottlings.

Breeding females showed the usual coloration of the species.

In the male the anal papilla is small, bilobate, the sperm duct opening at the tip of the papilla between the lobes, while in the female the opening of the oviduct is much larger, and situated immediately in front of a large, expanded, heart-shaped papilla, three times as large as that of the male.

SERRANIDÆ.

46. **Roccus lineatus** (Bloch). Bass, striped bass, rockfish, rock.

Common. Many ripe males were taken throughout April, but no ripe females were seen. The males of this species mature when very small. The following measurements were taken:

1 ripe male 28 cm. long, weight ½ lb.
1 ripe male 26.5 cm. long, weight ⅜ lb.
1 ripe male 24 cm. long, weight ¼ lb.
1 ripe male 21.8 cm. long.

One female with roe well developed, but quite hard, measured 96 cm. in length and weighed 23 lbs.

47. **Morone americana** (Gmelin). White perch.

By far the most abundant resident species. The largest example seen was 35 cm. long, and weighed 1¼ lbs. Individuals 26 to 28 cm. in length, weighing 1 lb., were abundant. Small individuals, however, are so exceedingly numerous that the average weight per fish, as taken in the pound-nets, runs from .15 to .17 lbs. Examples of both sexes 12.5 to 17 cm. in length, averaging .11 lbs. in weight, were found in spawning condition.

Eggs of this species were first received at the Battery Station on April 4th, and on the 8th of May the breeding season was by no means over, a large proportion of the females still carrying unripe eggs.

PLEURONECTIDÆ.

48. **Pseudopleuronectes americanus** (Walbaum). Flounder.

One example 32.5 cm. long, received from Robin's Point, Maryland. The water here is usually brackish.

SOLEIDÆ.

49. **Achirus fasciatus** Lacépède. Hog-choker.

Abundant.

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PROCEEDINGS

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NEW GENERA AND SPECIES OF AMERICAN MUSCOID DIPTERA.

BY CHARLES H. T. TOWNSEND.

The following are descriptions of new forms of exceptional interest, which it seems desirable to publish at this time.

Spirobolomyia new genus.

Genotype, *Sarcophaga singularis* Aldrich, 1916, Sarcophaga & Allies, 184-6.

Differs from *Sarcophaga* as follows: Vibrissal axis hardly two-thirds head-height. Vibrissae not constricting facial plate. Proboscis about three-fourths head-height. Frontals diverging obliquely two bristles below base of antennae. Parafacials about half as wide as clypeus. Cheeks less than half eye-length. Preacrostichals present but very small. Lateral scutellars two. Hind tibiae of male with only short villosity on distal half or less. No median macrochaetae on second or third abdominal segments. Forceps of male large and carinate. First hypopygial tergite of female entire.

In addition to the material cited by Aldrich, the National Museum collection contains a specimen reared by Mr. H S. Barber from a dead *Julus* sp., from Jackson's Island, Md.

Thelylepticocnema new genus.

Genotype, *Sarcophaga incurva* Aldrich, op. cit., 260-2.

Differs from *Sarcophaga* as follows: Vibrissal axis much less than head-height and slightly less than antennal axis. Clypeus not as wide, the epistoma but moderately projected. Vertex of male over two-thirds width of one eye, that of female nearly eye-width. Both verticals developed in male. Frontals diverging one bristle or so below base of antennae. Frontalia of male over twice as wide as one parafrontal in middle, those of female slightly less than same. Cheeks of male hardly two-thirds eye-length, those of female over two-fifths same. Preacrostichals present.

Squamae longer than wide. No median macrochaetae on second abdominal segment; fairly strong macrochaetae on third. Male hypopygium small, the forceps minute. First hypopygial tergite of female incised. Arista only short-plumose half way. Male tibiae not villous.

In the genotype the hind legs of the male are remarkably specialized for grasping the female, the tibia being shortened to fit against heavy spine-brushes or pads on the flexor surface of the femur. A male was taken by myself on Manzanares Creek, in the Pecos Forest Reserve, New Mexico, at about 7500 feet, on carpet of short herbage on hillside in open pine forest, August 30, 1916. The abdomen is bright silvery pollinose; with a median vitta, and a waved vitta on each side of same, black. *S. insurgens* Ald. is evidently a male of *incurva* in which the development of the sexual character of the hind legs was arrested soon after inception. A female which I regard as congeneric was taken by myself near Franconia, New Hampshire, July 24, 1915.

Titanogrypa new genus.

Genotype, *Sarcophaga melampyga* var. *alata* Aldrich, op. cit., 109–10, raised hereby to specific rank.

Differs from *Sarcophaga* as follows: Vibrissal axis much less than head-height. Clypeus rather narrowed, but the vibrissae well separated. Proboscis longer than head-height. Arista short-plumose half way. Eyes descending low, the cheeks little over one-fourth eye-length. Male vertex fully three-fourths eye, that of female hardly as wide as eye. Frontalia and parafrontalia not narrowed posteriorly, nearly or quite equal to each other in width in both sexes. Outer verticals long and strong in male. Two reclinate fronto-orbitals in both sexes. Frontals diverging one bristle below base of antennae. Parafacialia little over half as wide as clypeus. Facio-orbitals in row of microchaetae only. Postsuturals three. Lateral scutellars two, no discals; between the two laterals on each side the edge of scutellum is furnished in both sexes with a thick patch of short specialized hairs. Costal spine strong. First vein bristled half way, the third to small crossvein. Squamae longer than broad. None of male tibiae villous. Long strong erect median marginals on intermediate abdominal segments in both sexes, anal segment with a median discal pair in front of marginal row. Male claws only a little elongate. Male hypopygium rather small. First hypopygial tergite of female concealed within a long and narrow vertical slit formed by anal segment and bordered with decussate bristles.

A long series of both sexes of this species was taken by Mrs. Townsend and myself at Miami, Florida, in 1908. Many females were dissected—TD517, 586, 1325, 1328, etc. The first-stage maggot possesses a most astonishing development of the oral portions of the cephalopharyngeal skeleton, unlike anything so far known. The generic name refers to this character. The allotype of *S. melampyga* Ald., from Key West, Fla., is this species.

Wohlfahrtiopsis new genus.

Genotype, *Sarcophaga johnsoni* Aldrich, op. cit., 162–5.

Differs from *Sarcophaga* as follows: Clypeus narrower, proboscis distinctly exceeding head-height. Arista short-plumose two-thirds to three-fourths way. Male vertex fully as wide as eye, that of female wider. Frontals weakly divergent at base of antennae. Frontalia very broad, not narrowed. Parafacialia broader than clypeus, with hairs of even strength in irregular rows. Cheeks fully three-fifths eye-length. Postsuturals two. Squamae conspicuously longer than broad. No median marginals on segment two of abdomen. First hypopygial tergite of female incised.

A very marked form approaching *Wohlfahrtia* in head characters, and confined to sea beaches.

Rafaelia new genus.

Genotype, *Rafaelia rufiventris* new name for *Sarcophaga rufiventris* Aldrich, op. cit., 150–1 (nec Wiedemann, 1830, Auss. Zweifl. II, 362).

Differs from *Johnsonia* Coq. in hind crossvein being about half way between small crossvein and cubitus, costal spine strong, first and third veins partly bristled but the fifth bare, male without proclinate orbitals, female with two such, both verticals developed in both sexes, ocellars strong, and no median macrochaetae on second abdominal segment. Clypeus narrow, epistoma cut off. Frontals stopping at base of antennae. Tarsi elongate and thickened, especially those of female. Vibrissal axis shorter than antennal axis. Frontal profile bulged. Face only gently widened from front in both sexes, the male front only a little narrower than that of female. Macrochaetae strong. The apical cell is closed and more or less distinctly short-petiolate.

The species is founded on a male and a female taken by myself at San Rafael, near Jicaltepec, on the Rio Nautla, State of Veracruz, June 20, 1896. They were labeled by Coquillett "*Helicobia rufiventris* Wied." with a query, but do not agree with Wiedemann's description. The form belongs unmistakably on external characters to the *Johnsonia* group-unit.

Holotype, No. 20,947 U. S. N. M., female; allotype, male.

Glaucosarcophaga new genus.

Genotype, *Glaucosarcophaga knabi* new name for *Sarcophaga villipes* Aldrich, op. cit., 178–9 (nec Wulp, 1895, Biologia C.-A., Dipt. II, 269).

Differs from *Sarcophaga* as follows: Vibrissal axis hardly three-fifths head-height and distinctly shorter than antennal axis. Epistoma but slightly projected beyond vibrissae, moderately wide, somewhat warped forward from plane of clypeus. Proboscis barely one-half head-height. Arista rather short-plumose on little over basal half. Female vertex fully equalling or exceeding eye, the front nearly equilateral. Frontals not divergent, stopping at base of antennae. Frontalia very wide, not narrowed, widening posteriorly, being in middle about two and one-half times as wide as one parafrontal. Ocellars strong. Parafacialia two-

thirds to three-fourths width of clypeus. Facio-orbitals in row of very fine and short hairs only. Cheeks hardly one-half eye-length. Postacrostichals vestigial. Costal spine strong. First vein bristled less than half-way, third to or nearly to small crossvein. No median macrochaetae on second abdominal segment, weak median marginals on third, weak marginal row on anal segment. First hypopygial tergite forming wide vertical slit bordered with decussate bristles. The male is not known.

The species is founded on two females taken by Mr. F. Knab at Cordoba, Veracruz, April 1 and 10, 1908. It lacks preacrostichals and otherwise fails to agree with Wulp's description of *villipes*. Named in honor of Mr. F. Knab.

Holotype, No. 20,948 U. S. N. M.

Acridiophaga new genus.

Genotype, *Sarcophaga aculeata* Aldrich, op. cit., 143–4.

Differs from *Sarcophaga* as follows: Vibrissal axis not over three-fifths head-height, shorter than antennal axis. Clypeus broader than length of third antennal joint, rather shortened; epistoma broad, well projected below, nearly in plane of clypeus. Facialia rather flattened, the vibrissal angles considerably narrowing the facial plate. Proboscis about two-thirds head-height. Male vertex less than one-half eye, that of female little over three-fourths eye. Frontals diverging obliquely one or two bristles below base of antennae. Outer verticals not developed in male. Male with two reclinate fronto-orbitals. Frontalia narrowing posteriorly in both sexes, narrower than one parafrontal in female. Parafacialia over half width of clypeus, rather thickly hairy on orbital half. Facio-orbitals represented by four or five bristly hairs a little longer than the others. Cheeks a little less than half eye-length. Three strong postsuturals. Three or four preacrostichals. Squamae rather longer than broad. None of male tibiae villous. Median marginals of second abdominal segment weak or vestigial, weak marginal row on third and anal segments. Male hypopygium rather small. First hypopygial tergite of female entire; theca ending in spatulate lobes.

This genus includes many species, most of which are particularly parasitic on Acridiidae, ranging from the western States through tropical America to the Argentine.

Metoposarcophaga new genus.

Genotype, *Sarcophaga pachyprocta* R. R. Parker, 1916, Journ. N. Y. Ent. Soc., XXIV, 171–5.

Differs from *Sarcophaga* as follows: Lower profile of head short, the vibrissal axis strikingly less than antennal axis. Clypeus rather narrowed and elongate, carina more or less distinct. Epistoma projecting only a little, somewhat warped. Proboscis hardly two-thirds head-height. Arista not very long-plumose. Male vertex three-fourths eye, that of female fully as wide as eye. Frontals diverging one bristle below base of antennae. Outer verticals strong in male. Frontalia appreciably nar-

rowed posteriorly in both sexes, nearly or about as wide as one parafrontal. Parafacialia about two-thirds width of clypeus. Facio-orbitals in row of fine hairs only. Cheeks of male about one-third eye-length, those of female two-fifths same. Three postsuturals. Three strong preacrostichals, the hind ones long. First vein bristled about half-way, third to small crossvein. None of male tibiae villous. Front and middle metatarsi about half the length of their tibiae. Male claws not very elongate. Median marginals present on second abdominal segment of female, but weak or vestigial in male. Strong median marginals on third segment of both sexes. Male hypopygium large, the first tergite disk-like with posterior exposure. First hypopygial tergite of female entire.

This form may be recognized at once by its much produced frontal profile, combined with strong preacrostichals.

Raimondia new genus.

Genotype, *Raimondia uruhuasi* n. sp.

Differs from *Sarcophaga* as follows: Vibrissal axis fully three-fourths head-height, a little less than antennal axis. Clypeus narrow and elongate, only a little wider than facialia; carina prominent, epistoma narrow and but little projected beyond vibrissae. Facialia very wide, considerably flattened but showing convexity. Vibrissal angles scarcely constricting facial plate. Proboscis shorter than head-height. Antennae inserted slightly below eye-middle, second joint moderately long, third joint about one and one-half times second. Arista weakly plumose less than two-thirds way. Female vertex not as wide as eye. Frontals diverging in gradual curve but stopping about even with end of frontalia. One decussate pair of reclinate fronto-orbitals. Frontalia very broad, wider than one parafrontal in middle, gradually narrowed posteriorly. Parafacialia very broad, quite as wide as length of third antennal joint, with median longitudinal patch of hairs in about three irregular rows. Cheeks rather over half eye-length. Three strong postsuturals. Preacrostichals not represented even by bristles. One strong postacrostichal. Lateral scutellars two, the hind ones approximated. Squamae longer than broad. Tarsi slightly elongate, female claws long. No median marginals on second abdominal segment, rather strong but slender median marginals on third segment, marginal row of slender ones on anal segment. First hypopygial tergite apparently normal. Male unknown.

Raimondia uruhuasi n. sp.

Length of body, 12 mm.; of wing, 10.5 mm. One female, Uruhuasi Bridge, Canyon of Rio San Gaban, Peru, about 6,500 feet, February 3, 1910, on flowers of *Baccharis* sp. (Townsend).

Blackish; head silvery with a faint golden shade, giving way to blackish with change of light incidence on parafrontals except anterior end, in transverse band even with second antennal joint, and in an elongate marking on parafacials next eye. Cheeks and occiput more or less ashy-brown pollinose, thinly black-hairy. Frontalia brown, palpi black.

Antennae black, third joint with a brown sheen. Thorax and scutellum ashy-brown pollinose, more or less silvered in oblique view; vittae black with wide brown borders, the whole of the three vittae changeable to brown in front view. Abdomen black, pale brownish to silvery pollinose, a wide black median vitta, the hind borders of segments more blackish or subshining. Legs black. Wings clear, with narrowly clouded crossveins. Tegulae whitish, with pale fuscous borders and yellowish edges.

Holotype, No. 20,949 U. S. N. M.

This striking genus is named as a tribute to the memory of that enthusiastic, capable and indefatigable Italian naturalist, Antonio Raimondi, who penetrated nearly every corner of Peru during his residence of nineteen years in that country, and who has left us in his work "El Peru" a detailed account of his early ambitions and subsequent travels, told in a style that is charming in its simplicity and directness.

Cistudinomyia new genus.

Genotype, *Sarcophaga cistudinis* Aldrich, op. cit., 278–80.

Differs from *Sarcophaga* as follows: Striking head profile of *Eutheresia* and *Paratheresia*, the vibrissal axis much shorter than antennal axis and equal to about two-thirds head-height. Clypeus broad and short, the carina more or less distinct; epistoma much narrowed by vibrissal angles and well projected below them. Facialia strongly arcuate, considerably flattened. Proboscis little over half head-height. Third antennal joint one to one and a half times second. Arista thickly long-plumose practically to tip. Male vertex almost as wide as eye, that of female nearly or more than one and one-fourth times eye, the front strongly bulged in profile. Frontals thickly placed, not divergent, stopping at base of antennae. Outer verticals developed in male. Frontalia broader than one parafrontal in middle and distinctly narrowing posteriorly in both sexes. Parafacialia scarcely narrowed below, about as wide as frontalia, with two or three irregular rows of very fine hairs or only scattered hairs. Cheeks of female nearly three-fifths eye-length, those of male over half same. Sternopleurals three to six, normally four. Postsuturals two, with two to four short bristles in front. None of male tibiae villous. No median macrochaetae on second abdominal segment, a marginal row on third and anal segments in both sexes. Male hypopygium small, with small forceps. First hypopygial tergite of female entire, showing a strongly arcuate outline.

This most interesting form, which is far removed from the *Sarcophaga* type, is evidently a true parasite confined to the box-turtle.

Eutheresiops new genus.

Genotype, *Eutheresiops trixoides* n. sp.

Differs from *Eutheresia* as follows: Vertex about as wide as eye. Frontalia broader; parafacialia nearly as broad as anterior end of frontalia, and bearing a small patch of hair below next orbit. Cheeks over one-half eye-length. Eyes hairy. Antennae shorter, third joint two to two

and one-half times second. Epistoma proportionately broader. Three sternopleurals. Two lateral scutellars, apical decussate pair, and discal pair. Very weak median marginals on abdominal segment two, strong ones on segment three; discal row on anal segment, with only weak bristles behind. Palpi not enlarged. Male unknown.

Eutheresiops trixoides n. sp.

Length of body, 8.5 mm.; of wing, 8 mm. One female, Mound Valley, Sierra Madre of western Chihuahua, about 7500 feet, August 23, 1909 (Townsend).

Blackish, ashy-silvery pollinose. Frontalia brown, palpi fulvous, first two antennal joints rufous, third antennal joint brown or blackish. First abdominal segment and hind borders of intermediate segments more or less blackish, the rest of abdomen and all of thorax and scutellum pollinose. The usual four brown thoracic vittae. Legs black. Wings clear. Tegulae whitish.

Holotype, No. 20,950 U. S. N. M.

Jicaltepecia new genus.

Genotype, *Jicaltepecia rafaela* n. sp.

Differs from the other genera of the *Compsilura* group as follows: Eyes bare. Facialia ciliate about one-third way. Parafacialia only a little narrowed below, with rows of fine hairs the whole length. Vertex about two-thirds eye, the front and face gradually widening from same, the face below being about one and one-half times eye. Cheeks less than one-fourth eye-length. Outer verticals not developed. Frontalia about same width as one parafrontal; latter scarcely narrowing posteriorly, the former strongly so. No true median discals on any of abdominal segments, the anal segments with some short lateral discals, the third segment at times with scarcely differentiated short discals. Male unknown.

Jicaltepecia rafaela n. sp.

Length of body, 7 mm.; of wing, 5.5 mm. One female, San Rafael, Jicaltepec, Veracruz, March 2, 1896 (Townsend).

Head golden, occiput cinereous, frontalia velvet-brown, antennae blackish, palpi fulvous. Thoracic scutum pale golden; with four black vittae, the inner ones linear and narrow, the outer broad and blotchlike, all four united behind suture by a black blotch. Scutellum golden, showing blackish basally. Abdomen black, basal half or so of segments two to four pale golden pollinose. Legs brownish. Wings clear. Tegulae yellowish-white.

Holotype, No. 20,951 U. S. N. M.

Euphoroceropsis new genus.

Genotype, *Euphoroceropsis alba* n. sp.

In form like *Euphorocera*, from which it differs as follows: Cubitus with only trace of wrinkle. Vibrissal axis about half antennal axis.

Second antennal joint short; third fully four and one-half times second, widening gradually toward apex. Arista longer than whole antenna, gradually tapered. Vertex about eye-width, front and face gradually widening from same. Anal segment thickly bristled, especially on hind half. Ovipositor chitinous, rounded-spatulate. Male unknown.

Euphoroceropsis alba n. sp.

Length of body, 13 mm.; of wing, 11 mm. One female, Tampico, Mexico, reared by Mr. D. L. Crawford, February 19, 1914, from lepidopterous pupa whose caterpillar had fed on foliage of avocado-pear.

Face silvery-white pollinose. Antennae blackish, third joint reddish basally. Palpi fulvous. Frontalia brownish, parafrontalia silvery-ashy; occiput ashy, beard white. Thorax and scutellum silvery-ashy pollinose, with the usual four vittae. Abdomen blackish, segments two to four silvery pollinose on basal half more or less. Legs blackish. Wings clear. Tegulae white.

Holotype, No. 20,952 U. S. N. M.

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PROCEEDINGS

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THE COWHAGE AND RELATED SPECIES.

BY CHARLES V. PIPER.

In connection with economic investigations of the Florida Velvet Bean and other cultivated forms of *Stizolobium*, various related species characterized by having stinging hairs on the calyx and pods, have been studied both from growing plants and from herbarium material. The stinging hairs from one or more of these species were formerly used in medicine as an anthelmintic. This substance was known as cowhage, couhage or cowitch, the names also being applied to the plant which produces the substance. The medicinal use of cowhage as an anthelmintic was first recorded by Browne (Browne, Patrick. Civil and Natural History of Jamaica, p. 291. 1756) and later described in detail by Bancroft (Bancroft, Edward. An Essay on the Natural History of Guiana, pp. 390 et seq. 1769).

The name cowhage or cowitch is of East Indian origin, according to Watt (Watt, George. Dictionary of Economic Products of India, 5:286), a corruption of *kiwach* or *kiwanch*, the Hindu name of the plant. While the name is of East Indian origin, the official cowhage seems to have been secured wholly, or at least mainly, from the West Indian plant.

With few exceptions botanists have considered that there is but one species of cowhage, to which the name *Mucuna pruriens* is generally applied. The facts are far too complex to permit of such a simple disposition.

The pre-Linnaean history of the various plants referred to cowhage is much complicated, but at least three different plants were involved. Parkinson in 1640 described a cowhage from Surat, India, with black shining seeds. Morrison in 1680 de-

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scribed a cowhage also from Surat, but with spotted seeds. A few years later Ray secured what was evidently this same spotted seeded plant from the East Indies. At first he regarded it as identical with Parkinson's black-seeded bean, but afterwards in deference to Plukenet's opinion, considered it distinct. Still later various botanists found and recorded cowhage-like plants in Ceylon, Java, Malabar and Amboina. In the West Indies similar plants were found in Jamaica and Barbados.

The generic name *Stizolobium* was proposed by Browne (Brown, Patrick. The Civil and Natural History of Jamaica, p. 290. 1756) and based on two species, namely, the common cowhage of Jamaica which Browne considered the same as one described from Ceylon by Burmann, and the "Smaller cowhage" of Jamaica, a plant which remains wholly obscure, but is probably merely a form of common cowhage. Browne did not use binomials, but his generic name *Stizolobium* has been accepted by various botanists in preference to *Mucuna*, among them Medicus (Medicus, Friedrich Casimir. Vorlesungen Churpf. Phys. Ges.); Persoon (Persoon, Christian Hendrick. Synopsis Plantarum, 2:298. 1807.); Kuntze (Kuntze, Otto. Revisio Generum Plantarum, 1:207. 1891.); and Hiern (Hiern, William Philip. Catalogue of the African Plants Collected by Dr. Friedrich Welwitsch, 1:250. 1896).

Stizolobium as here used, is distinguishable from *Mucuna* by the pods having neither wings nor plaits; by the relatively small seeds with thin testa; and by the short hilum. Two subgenera may be characterized as follows:

Hilum surrounded by a large caruncle; stems annual, herbaceous . . . . . **Chialule**

Hilum naked or with rudimentary caruncle; stems woody or half woody . . . . . **Brachyule**

Chialule includes *Stizolobium deeringianum* Bort, the Florida velvet-bean, and species with a similar hilum. *Brachyule* embraces *Stizolobium pruriens* and the following other species:

Stizolobium bracteatum KUNTZE, Rev. Gen. Pl. 208. 1891.
Carpopogon bracteatum ROXB. Hort. Beng. 54. 1814.
Mucuna bracteata DC. Prodr. 2:406. 1825.

S. comorense n. comb.
M. comorensis VATKE, Oestr. Bot. Zeitschr. 28:262. 1878.

S. sericophyllum n. comb.
M. sericophylla PERKINS, Frag. Fl. Philipp. 1:86. 1904.

S. coriaceum KUNTZE, Rev. Gen. Pl. 207. 1891.
M. coriacea BAKER in Oliver Fl. Trop. Afr. 2:187. 1891.
S. axillare n. comb.
M. axillaris BAKER, Journ. Linn. Soc. 22:465. 1887.
S. rhynchosoides n. comb.
M. rhynchosoides TAUB.; Engl. Bot. Jahrb. 23:194. 1897.
S. poggei HIERN. Cat. Welw. Afr. Pl. 1:252. 1896.
M. poggei TAUB.; Engl. Bot. Jahrb. 23:194. 1897.
S. melanocarpum KUNTZE, Rev. Gen. Pl. 208. 1891.
M. melanocarpa HOCHST. in A. Rich. Tent. Fl. Abyss. 1:215. 1847.
S. stans KUNTZE, Rev. Gen. Pl. 208. 1891.
M. stans WELW. in Oliver Fl. Trop. Afr. 2:186. 1871.
?*M. erecta* BAKER, Kew Bull. 65. 1895.
S. mollissimum n. comb.
M. mollisiima KURZ, Journ. As. Soc. Bengal 43.[2] 187. 1874.

STIZOLOBIUM PRURIENS (L.) MEDICUS, Vorles. Churpf. Phys. Ges. 2:399. 1787.
Dolichos pruriens L. Syst. Nat. Ed. 10:1162. 1759.
Mucuna pruriens DC. Prodr. 2:405. 1825.

Linnaeus' name is based on the description and plate of Rumphius' *Cacara pruritus* (Herbarium Amboinense 5:393. tab. 142. 1747.) and therefore the species must be the plant native to Amboina.

No herbarium material has been found in any of the great herbaria that can possibly be the plant of Rumphius. Upon the writer's request, Dr. J. C. Konigsberger, Director of the Botanical Garden at Buitenzorg, Java, has succeeded in obtaining mature pods of the cowhage native to Amboina, and these prove to be identical with the plant common in the Philippine Islands. From ample Philippine material, the following description is drawn. The species belongs to the section *Brachyule* and is at once distinguished by the seeds from *S. pruritum*.

Annual vine twining to a height of several meters; stems terete, somewhat angled or striate longitudinally, sparsely pubescent with short stout retrorse hairs; leaflets plane, rather firm when mature, ovate, the lateral oblique, mostly obtuse, commonly cuspidate pointed, sparsely appressed pubescent on each side, paler beneath; raceme pendent, densely flowered, 10 to 30 cm. long; flowers dark purple; pedicels slender, 5 to 10 mm. long; calyx scarcely saccate, densely appressed canescent without and within, armed on the exterior with numerous golden stinging hairs, the lobes acute; corolla 4 cm. long, the keel exceeding the wings, glabrous except the base of the wings which are densely short bearded on the lower edge near the base; pods slightly falcate, 8 to 11 cm. long, compressed, 15 to 18 mm. broad and half as thick, 5 to 7-seeded, distinctly constricted between the seeds, densely covered with reddish-brown appressed stinging hairs about 2 mm. long; longitudinal ridge obsolete or evident only on the basal half of the pod; seeds buff, densely speckled with dark brown, shiny, rhomboid-orbicular in outline, much compressed,

10 to 12 mm. long, the linear hilum ⅔ as long and surrounded by a very low black caruncle.

Fort McKinley, Rizal Province, Luzon, P. I. *Merrill* No. 6348, September, 1908; also "cultivated at Manila"; Montalban, Rizal Province, Luzon, P. I. *C. B. Robinson*, No. 9648, January 23, 1910; *Merrill*, March 10, 1906; Laguna Province, P. I., *C. B. Robinson*, March 5–11, 1910.

All of the above material is in the Philippine Bureau of Science. In the Herbarium of the Botanical Garden at Berlin is additional material as follows:

Philippines: Montalban, *Warburg* No. 12,585; Mt. Merivales, *Warburg* No. 12,897.

Celebes: Minahassa, *Koorders* No. 17,639B in 1897.

This species is closely allied to *Stizolobium sericophyllum* (Perkins) which has similar pods and seeds, but with thickish densely soft pubescent leaves, the pubescence not appressed. The constrictions between the seeds form nearly complete partitions within the pod.

Through the Office of Seed and Plant Introduction this species has been introduced as follows, the seeds collected by the writer: S. P. I. 31,602 from La Carlota, Negros; No. 31,603 from Bosoc, Negros; and No. 31,604 from Alabang, Luzon, all in the Philippine Islands. Seeds of what is apparently the same species were received from Medan, Sumatra (S. P. I. No. 26,663) but these failed to germinate.

The plant is not strictly annual, but dies after fruiting. Growing plants in Florida lived three years without blooming.

STIZOLOBIUM PRURITUM (WIGHT) n. comb.

Mucuna prurita WIGHT in Hooker, Botanical Miscellany, 2: 348. 1831.

The original description is as follows:

"Mucuna *prurita*; floribus thyrsoideis, leguminibus oblongo-curvatis compressis ecarinatis urentibus, foliolis subtus hirsutis, intermedio rhomboideo obtuso, lateralibus extus dilatis. (Suppl. Tab. XIII.)

"Carpopogon pruriens. *Roxb. Hort. Beng. p.* 54.

"Dolichos pruriens. *Roxb. Drawing in Mus. of E. Ind. C. n.* 284. (*an Linn et alior*).

"Stizolobium pruriens. *Spreng. Syst. Veget. v.* 3, *p.* 252?

"Nai Corana. *Rheed. Malab. v.* 8, *p.* 61. *t.* 35.

"Cacara pruritus. *Rumph. Amb. v.* 6. *p.* 393. *t.* 142.

"Poonepoosikie. *Tamul.*

"*Stems* suffruticose, twining, branched; *branches* rounded, hairy. *Petioles* much enlarged at the base, 6–8 inches long, cylindrical, hairy. *Leaves* ternate, middle leaflet rhomboid, or rhomboideo-elliptical, obtuse, mucronate; lateral ones much dilated on the outside, and also mucronate; on short, thick, rusty, tomentose stalks; above nearly glabrous, below silvery, from short appressed white hairs; the veins very prominent beneath. *Stipules* filiform-subulate, those of the leaflets much smaller than the others. *Racemes* peduncled, axillary, pendulous, much shorter than the petioles, thyrsoid. *Flowers* large, purple. *Pedicels* in threes, short, arising from a small thick tubercle. *Calyx* pubescent, 2-lipped; upper lip entire, obtuse; under one 3-cleft, the lobes acute. *Corolla:*

Vexillum not half the length of the keel, varying in colour from dirty-white to pale purple; *Wings* shorter than the keel, dark purple; *Keel* cylindrical to near the end, where it suddenly curves upwards, and terminates in a sharp spinous point. *Stamens* diadelphous; *Anthers* alternately linear and globular. *Pistil: Germen* short, hairy; *Style* filiform, pubescent for its whole length; *Stigma* subcapitate. *Legume* 3–4 inches long, and bent at the extremities, three-fourths of an inch to an inch, or nearly so, broad, slightly compressed on the valves, not at all carinated, contracted between the seeds, and hence subtorulose, entirely covered with a thick coating of erect, white, prurient* hairs, which usually turn black in drying, and brown in maturity. *Seeds* 4–5, oval, separated by cellular partitions, not bound by a circular linear *hilum*, but attached to a large lateral *funiculus*.

"Found twining in hedges and among bushes, usually near water. In the neighborhood of Negapatam, it is common in sandy soil. It flowers during the rainy and cool seasons, and ripens its fruit about March. It may be considered, indeed, extensively distributed over India; but nowhere perhaps so abundantly as in the Presidency of Madras. The young pods are dressed and eaten by the natives.

"It would appear from a query of De Candolle, "an Planta Americana eadem certe ac Indica?" that there is some doubt as to the identity of the American and Indian plants named *Mucuna pruriens*; in my opinion not without reason, for I suspect De Candolle's character is taken from the former, and Sprengel's from the latter. The keeled legumes and acuminated leaves which distinguish the first are certainly at variance with my plant. On comparing my drawing with Woodville's plate, Tab. CLXXIII, a very remarkable difference appears in the form of the racemes, and also in their size. The form of the segments of the calyx, in his figure, is very different from those of my plant; in his, they are represented as long, subulate teeth; in mine, they are short and triangular, with their upper segment nearly a correct triangle.

"(Upon a careful comparison of Dr. Wight's figure and specimens, with the figure of Jacquin, (*Americ. t.* 122,) and American individuals in my Herbarium, both from St. Vincent and from Guiana, I am inclined to agree with Dr. Wight, and to consider the American and Asiatic species to be different. In our plant the leaves are smaller, the leaflets more obtuse (not acuminated), and the middle leaflet more truly rhomboidal, the flowers are more constantly in threes, and, what affords perhaps the best character, the pods are greatly broader, compressed, free from any raised line on the back of the valve, whilst in the American *M. pruriens* the pods are much narrower, terete, and keeled on the valves. Rumphius' plate is very characteristic of our plant, and Jacquin's is equally excellent as a representation of the American one; while Rheede's is less happy, especially in the leaves. Under these circumstances, I trust Dr. Wight will approve of my giving the specific name already adopted in the Herbarium Amboinense, to designate the Eastern species. H.)."

Three characters are emphasized in this description, namely the shape of the calyx lobes, the form of the leaflets, and the absence of carina of keel on the back of the pod valve. The calyx differences referred to by Wight may be seen by comparing Woodville's plate drawn from a plant in the Banksian herbarium, with the colored plate of Wight. There is considerable variation, however, in the calyx lobes of all the Stizolobiums which lack stinging hairs so that this character can not be relied upon for specific identification, the variation including both actual and relative

*The American *M. pruriens* is the famous Cowhage or Cow-itch, employed as a vermifuge in the West Indies.

length and the acuteness of the apex. The variation in the species with stinging hairs on the calyx and pods is of the same sort. In Woodville's plate the calyx-lobes are especially elongated, however, but this we suspect is in part an error of the artist. At least in no specimens examined are they quite so long and slender.

The leaf differences referred to are perhaps valid. In all the Stizolobiums the leaflets vary greatly in size dependent on the vigor of the plant or the relative amount of shade. While the apex of the leaves is usually acute or acuminate and mucronate, they may be obtuse and mucronate on the same plant, especially on small leaflets, but in the plant we take to be the same as Wight's they are mostly obtuse.

The most important character is the pod, the valves of which are said to lack the longitudinal keel or carina. In all the forms studied the keel is present in matured pods though absent in full-sized unripe pods. This fact gives rise to the suspicion that Wight was led to error by not possessing fully matured fruit.

In reference to this and other matter Dr. Otto Stapf writes under date of August 26, 1912, as follows:

"The Herbarium,
"Royal Botanic Gardens, Kew,
"26. 8. 12.

"The plant from which Wight's figure of Mucuna prurita (text) was prepared is undoubtedly from the Presidency of Madras. We possess the original drawing with the Tamil name written on in Tamil characters; but no locality is stated. As to the discrepancy between the name in the text and the plate Wight himself in a letter to W. Hooker of 5th March 1832 deplores it as regrettable, without, however, explaining how it came about. Very likely the plate was finished and struck off before Wight was quite clear about the distinctiveness of M. prurita from Asia and M. pruriens from America. From the letter referred to it also appears that Wight had originally another name for M. prurita in mind, but fell in with W. Hooker's suggestion, although somewhat reluctantly.

"We possess a specimen communicated by Wight to W. Hooker and written up as M. pruriens from 'Madras.' It is the plant figured in Hook. Bot. Misc. 11, (suppl. tab. XIII). There are two other specimens also from Wight, one with the Herb. Wight propr.' label and the other from the distribution set; but neither has ripe pods, so that your suspicion that Wight's description of the pods as being 'not at all carinated' was due to the pods being immature, is evidently well founded.

"As to your question (1) is the name M. prurita to be credited to Hooker or Wight? I am inclined to vote for Wight who is responsible for the publication. What Hooker did was antecedent to the publication and the utmost a sticker for historical justice could claim would be M. prurita Hook. ex Wight.

"Ad question (2), I would reply, the name M. prurita stands on the Madras plant, as described and figured by Wight. Even if it should turn out that Rumphius's Cacara pruritus is not Mucuna prurita Wight, from Madras, but another Mucuna, the rule of the conservation of the earliest specific epithet could not be invoked as Cacara pruritus is pre-Linnean."

The actual identity of Wight's plant is important from a nomenclatorial standpoint. There are three subspecies closely resembling his

plate, which are most easily separable by the seeds. One, very widespread, has the seeds gray marbled with black; the second is characterized by shiny black seeds, and the third by brown seeds. In Wight's plate the immature (?) seeds are represented as pale chestnut from which it might well be that his description is based on the brown-seeded plant. As a brown-seeded plant that we have cultivated for three years has the leaflets nearly always obtuse the conclusion seems justifiable that it is the same as that described by Wight. This was received from I. H. Burkill, Esq., Reporter of Economic Products of India, and said to be from wild plants growing in the neighborhood of Calcutta, S. P. I. No. 25,263. It has been grown in the greenhouse at Washington and two seasons at Biloxi, Miss., and Gainesville, Fla. At Biloxi it had barely matured pods when killed by frost December 6.

To Wight's description may be added: Mature pods 6 to 7 cm. long, subterete, falcate, covered with erect reddish-brown easily-deciduous stinging hairs, each valve of the pod with a strong, nearly central keel extending the whole length; seeds pale to dark brown, about 12 mm. long, 8 mm. wide, not much flattened, the caruncle white.

On immature pods the pubescence is at first greenish-yellow. Before maturity the hairs on each side of the keel turn reddish first so the pod has the appearance of being longitudinally striped with differently colored hairs.

Other lots of seed were received from Waliar, Malabar, India, No. 01,664 and Kistna, Madras, No. 01,668. Both proved indistinguishable from No. 25,263.

Stizolobium pruritum officinale n. subsp.

Leaflets mostly obtuse, mucronate, paler and more pubescent beneath, usually about 10 cm. long; pods falcate, 6 to 7 cm. long, each valve strengthened by a longitudinal nearly central keel extending the entire length, and usually a secondary imperfect ridge near the distal end, the whole covered with erect reddish-brown hairs; seeds 10 to 12 mm. long, 6 to 8 mm. wide, not much flattened, the ground color gray, finely sprinkled with minute irregular brown specks and more or less marbled with black, especially on the back; caruncle white, prominent.

The type was grown from seed obtained from Dr. William Fawcett, Kingston, Jamaica, under S. P. I. No. 21,566 and cultivated in 1909 at Biloxi, Miss. The type specimen is preserved in the Economic Herbarium of the Bureau of Plant Industry.

On immature pods the hairs are yellowish and before ripening the hairs on the keel and margins redden first, so that there is the appearance of two longitudinal rows of pale hairs on each side.

This is the common cowhage of the West Indies, apparently native in America and the only form which does not seem distinguishable from the commonest East Indian form as well as from that generally distributed in Africa, Madagascar, India, and some of the Malayan Islands. As all of its close relatives are Old World plants there can be no question as to

its being endemic there. Its occurrence in Jamaica, Barbados and Guiana previous to 1769 as well as its present wide dispersal in the American tropics, suggest strongly that it is also native to the New World, though it is possible that it may have been intentionally introduced by man.

If we may rely on the testimony of Husbands, of Browne and of Bancroft, that the negro slaves used the plant medicinally, this may have been sufficient incentive for them not only to bring it from Africa but to carry it wherever they went in the American tropics. However, there is no evidence that the negroes in Africa did or do use the plant in a medicinal way. If such is the case no mention is made of the fact in numerous books of African botany and travel examined.

On the other hand, the plant was well known and long used medicinally by the natives of India, it being mentioned according to Watt (Dict. Ec. Prod. India. 5:286) in ancient Sanskrit works as an aphrodisiac, but its use as an anthelmintic was introduced in comparatively recent years.

Roxburgh (Flora Indica 3:283. 1832) however writes:

"Annual, twining. Racemes pendulous. Legumes armed with stinging hairs.

"Dolichos pruriens, Linn. Supp. 657. &c.

"Naicorana. Rheede. Mal. viii. t. 35.

"Teling.—Doola gonda. Sans.—Murkuti. Atma goopta ro

"Kupikuchoo. Beng.—Alkooschee.

"Common in hedges, in most parts of India. Flowering time the cold season. (I have never been able to learn that the natives of these parts of India, make any use of any part of this plant, except the hairs of the legumes which they do not use as a medicine, (vermifuge) but as an ingredient to help to poison wells. However its having been of late taken inwardly to destroy worms, proves that it is not that poison they take it for; and it is more than likely that the other plants employed for the same base end, are fortunately much less dangerous than those who employ them imagine. Indeed it is only the most ignorant superstitious Poligar Mountaineers who are known to attempt to poison water.")

Ainslee (Materia Medica 1:93. 1826), Bentley and Trimen (Medicinal Plants 2:78), and Watt (Dict. Ec. Prod. India 5:286) all assert that the natives of India eat the young, tender pods. This seems very questionable, but several closely related cultivated species which lack the stinging hairs on the pods are thus eaten. These cultivated plants have by several botanists been considered to be only varieties of the cowhage.

The alternative supposition, namely, that the plant is native to the tropics of both hemispheres, remains. Engler (Engler, Adolph. Sitzungsberichte der Preussichen Academie der Wissenschaften zu Berlin 1905, 1:180–231) has discussed at length the plants that occur in the tropics of both the Old and New Worlds. Some of these plants, like the cowhage, have their close relatives only in the other hemisphere.

The list of plants common to the tropical America and Africa is a long one, and after excluding all species that may have been transported by ships, by ocean currents, by birds or by winds, there remain many for which none of these explanations can be accepted. The most satisfactory theory to Engler that will account for the facts is that there were for-

merly land connections or at least scattered islands between Brazil and Africa.

The supposition that the plants may at some former time have migrated by way of northeast Asia and northwest America, Engler considers untenable because most of the plants occurring both in Africa and America are not found in Asia.

In recent years the cowhage has been collected in many parts of the West Indian region. Specimens have been examined as follows:

Jamaica, Constant Spring, *Churchill*, March 21, 1897;
Cuba orientale, *C. Wright* No. 140;
Porto Rico, *Sintenis* 2575, *Heller* 4403;
Colombia, *Santa Marta*, Smith 638;
Granada, St. Georges, *Broadway*, December, 1904;
Venezuela, Tovar, *Fendler* 2200;
Costa Rica, San Jose, *Hoffman* 47;
Surinam, *Hostmann* 55;
Brazil, *Riedel;*
Santo Domingo, *Turpin;*
Martinique, *L. Hahn* 446.

From the Old World six different lots have been cultivated under their introduction numbers as follows:

21,954 From the Department of Agriculture, Buitenzorg, Java, through Dr. M. Treub.
24,422 From the same source as the preceding.
25,753 From Calcutta, India, through Consul-General W. H. Michael, the seed purchased from a seedsman.
26,292 } From Coimbatore, India, through Rev. Geo. N. Thomssen.
26,293 }

Most of the herbarium material from India and Africa seems referable to this subspecies, but some specimens are aberrant, especially in pubescence. Very few specimens possess mature pods and without these there must remain doubt as to their precise identity.

Stizolobium pruritum maculatum n. subsp.

Very similar to *S. pruritum officinale* but pods larger, 8 to 9 cm. long; young pubescence on the pod at first whitish, later turning pinkish and finally tawny, all of the hairs changing color simultaneously; seeds larger, distinctly compressed, gray, very densely speckled with black and having few or no black marblings.

The type specimen is in the Economic Herbarium of the Bureau of Plant Industry, grown at Gainesville, Florida, in 1912, from S. P. I. No. 25,725 secured from the State Gardens, Baroda, India, presented by B. F. Cavanaugh, Esq.

STIZOLOBIUM PRURITUM BIFLORUM n. comb.

Mucuna pruriens biflorum TRIMEN, Handbook Flora Ceylon 63: 1894.

Seeds black, shiny.

Trimen's original specimen from Batticaloa, Ceylon, is preserved in the herbarium at Perideniya and from it the following notes were taken. "Leaflets very silky beneath, 3–4 cm. long. Pods falcate, 5 cm. long, with a single stout rib extending from the tip nearly to the base, the whole pod covered with red erect stinging hairs. Seeds 5, black, shiny."

The specimen is from a rather weak plant as indicated by the small leaflets and the 2-flowered clusters, a common phenomenon on weak plants in the related species.

Identical with Trimen's plant are S. P. I. Nos. 26,183 and 29,907, both received through Maj. A. T. Gage, Royal Botanical Garden, Sibpur, Calcutta, India, and No. 24,935 from C. Drieberg, Esq., Secretary, Ceylon Agricultural Society, Colombo.

Herbarium material of the same thing has been examined at the Royal Botanic Garden, Calcutta, as follows:

Perak, Straits Settlements, *L. Wray*, February, 1889, No. 3326. "Kumbang Kota."

Palkate 2000 Lohardryga, C. B. Clarke, October 30, 1883. (This probably means between Palket and Lohardaga, Bengal.)

Stizolobium microspermum n. sp. (§ *Brachyule*).

Stems twining to a height of 2–3 meters, annual, slender, terete, striate angled, retrorsely pubescent; leaves trifoliolate, the petiole pubescent like the stems, 6–10 cm. long; petiolules fleshy, pubescent, about 6 mm. long; leaflets ovate-lanceolate, the lateral oblique, acute, 4 to 10 cm. long, about equalling the petioles, the pubescence fine, appressed, denser and silky beneath; pods 5-seeded, 7 cm. long, with 2 complete or nearly complete longitudinal ridges, and constricted between the seeds; hairs rusty red, closely appressed, rather dense with silky sheen; internal partitions nearly complete; seed black or nearly so, oval, much flattened, 9 mm. long, 6 mm. wide, the hilum 6 mm. long, surrounded by a very small paler caruncle.

From the botanical garden at Buitenzorg, Java, S. P. I. Nos. 32,112 and 24,423, cultivated at Biloxi, Miss., Miami, Fla., and in the greenhouse at Washington, D. C. The type is a specimen of 32,112 grown at Miami, Fla., in 1914, and preserved in the Economic Herbarium of the U. S. Department of Agriculture.

Very closely related to *S. pruriens* but with much smaller pods and seeds.

Stizolobium venulosum n. sp.

Stems herbaceous, finely canescent; leaves trifoliolate; leaflets 5–8 cm. long, firm, ciliate, rather obtuse, cuspidate, nearly glabrous above, strongly reticulated and finely hirsutulous beneath, the veins prominent,

the central leaflet obovate, broadest above the middle, truncate or slightly rounded at base, the lateral ones obliquely ovate; inflorescence dense, about 20-flowered, the peduncle pubescent with dense erect hairs; calyx similarly pubescent and with numerous stinging hairs, the lobes acutish, about as long as the tube; corolla purple, 2.5 cm. long, the keel much exceeding the wings; extra-floral nectaries at base of pedicels oblong.

Taung-gyi, South Shan States, Burma, 5500 ft. alt., April 17, 1910, *Capt. R. W. MacGregor*, No. 1144, in Herb. Calcutta Bot. Garden (Type).

Szemao Mts., Yunnan, China, No. 12,749A, *Dr. Henry* in 1899. The last has young pods 5 cm. long, densely covered with seal-brown stinging hairs.

The form of the extra-floral nectaries as well as the long keel suggests that this species is a close ally of *Stizolobium bracteatum* (Roxb.) Kuntze, but it apparently lacks the broad bracts of that species. The species probably belongs to § *Brachyule* as does *S. bracteatum*.

Stizolobium forbesii n. sp. (§ *Brachyule*).

Stems herbaceous, terete, longitudinally striate-angled, appressed-puberulent; leaflets broadly ovate, rather obtuse, cuspidate, thin, membranous, sparsely appressed, puberulent on each side, especially beneath, about 15 cm. long; petioles puberulent as long as the leaflets; petiolules very pubescent, 5 mm. long; peduncles terete, densely puberulent; racemes dense, 15 to 40 flowered; calyx campanulate, densely sericeous without and within, 15 mm. long, and bearing a few red stinging hairs; calyx-lobes triangular, acute, longer than the tube, the ventral longest; corolla "albi-virescenti"; wings 6–7 cm. long, pubescent on the lower margin near the base; keel a little exceeding the wings, abruptly curved at tip; standard much shorter than the wings; pods 16 cm. long, 3 cm. broad, linear, compressed, nearly straight, the subacute tip slightly curved, the thickish valves bearing 3 or 4 coarse longitudinal ribs, 2 submarginal and 2 intermediate, the dorsal one wholly or partly obsolete, the other three complete, the whole pod densely covered with chestnut-red short erect hairs much like velvet; constrictions between the 6 or 7 seeds very slight; seeds smooth, chestnut-colored, shiny, much flattened, 12 to 17 mm. long, 8 to 9 mm. broad, the hilum black, linear, 7 mm. long and surrounded by a low black caruncle.

Timor Laut, *Forbes*, No. 3320B, November, 1883 (type in Herb. Kew).

Malay Archipelago, *Reidel*, comm. by Dr. A. B. Meyer, 1883. (Herb. Kew).

Larat Island, *Dr. M. Treub*, in 1893 (Herb. Buitenzorg).

Java, Kediri, *S. H. Koorders*, No. 23,040B, June 16, 1896 (Herb. Buitenzorg).

Kei Island, *Dr. M. Treub*, cultivated at Buitenzorg (Herb. Buitenzorg).

An interesting species whose nearest relative is *Stizolobium poggei* (Taubert) Hiern from Africa.

STIZOLOBIUM HIRSUTUM (WIGHT & ARNOTT) Kuntze, Rev. Gen. Pl. 203. 1891.

Mucuna hirsuta WIGHT & ARNOTT Prodr. Fl. Ind. Or. p. 254. 1834.

The original description is as follows:

"M. hirsuta (W. & A.) branches, petioles, racemes and under side of the leaflets hirsutely tomentose; leaflets ovate, upper side hirsutely pubescent; racemes drooping, long peduncled; floriferous part somewhat long; pedicels as short as the calyx; calyx-segments broadly lanceolate, acuminated, the length of the tube; legume linear, curved, very densely covered with rigid stinging hairs, not sulcated on the sutures; valves without plaits; hilum linear.

"Wight Cat. n. 750."

Specimens of Wight's No. 750 are in the herbaria at Calcutta and at Kew but no exact data as to locality are given. Two other specimens at Kew are labeled "E. India, Walker," and "Nilgherries, Gardner in 1847." In the Calcutta herbarium is a recent specimen collected by C. E. C. Fischer, No. 1651, January 23, 1910, at Karimalia, South Malabar, altitude 5000 ft.

The species is easily distinguishable by the thickish leaflets densely covered on each side with a silvery pubescence that becomes rusty in age. The calyx is similarly pubescent. No mature pods or seeds have been seen. Apparently the species is rare and restricted to the mountains of southern India.

In the light of the data disclosed by these studies the plants described by pre-Linnaean authors may with considerable confidence be identified as follows:

S. pruriens

Rumphius Herb. Amb. 5:393, tab. 142. 1747.

This description is the first cited basis for *Dolichos pruriens* L. and therefore the species must rest upon the correct indentification of the Amboina plant.

S. pruritum biflorum

Parkinson Theatr. Bot. 2:1056. 1640.

Rheede Hort. Malab. 8:61. tab. 36. 1688.

under the name Nai-Corana.

Hermann Mus. Zeyl. 67. 1717.

under the name Adsarijapala.

S. pruritum officinale

Morrison Plant. Hist. Univ. Oxon. 2:69. 1680.

Ray Hist. Plant. 1:887. 1686.

Hermann Par. Bat. Prod. 364. 1689.

Plukenet Phytographia tab. CCXIV. fig. 1. 1691.

Also all other references to the American plant.

In the compilations of other pre-Linnaean botanists all of the above were referred to a single species, and this is also the case in the writings of many modern botanists.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

FOUR NEW ECHINODERMS FROM THE WEST INDIES.

BY AUSTIN H. CLARK.

Despite the fact that the West Indian region has been the scene of more intensive study than any other portion of the tropical seas, hitherto unknown animal types are continually being discovered there. Since the inception of the investigation of the Caribbean abysses a dozen able and energetic zoölogists have contributed to the increase and systematization of our knowledge of the echinoderm fauna, and yet new, and often remarkable, types still turn up with surprising frequency.

Of the four echinoderms described in the following pages the two crinoids and the starfish were collected by the "Albatross;" the ophiuran was collected by Mr. John B. Henderson during the course of his memorable cruise on the "Tomas Barrera."

I. CRINOIDS.

Neocomatella ornata new species.

The centrodorsal is discoidal, with a broad flat finely pitted polar area 4 mm. in diameter.

The cirri are XIX, 19–21, about 20 mm. long; the first segment is very short, the second somewhat longer, the third about as long as broad, the fourth and fifth the longest, about twice as long as broad, the fifth slightly longer than the fourth; the fifth is a transition segment, proximally dull like the preceding, but highly polished in its distal fourth; the sixth is about as long as the fourth, and the following gradually decrease in length, becoming about as long as broad on the eighth or ninth, and beyond slightly broader than long; the transition and following segments have the distal dorsal edge prominent; after the seventh the dorsal side rises evenly from the base to the tip so that the segments are trapezoidal in shape, and in lateral view the cirrus has a serrate appearance; after the eleventh the proximal half of the dorsal side becomes rather less produced, but the distal half rather more so, so that in lateral view there

A

appears to be a low broadly rounded dorsal spine on each segment which arises from somewhat more than the distal half of the dorsal surface of the segments. In the more compressed distal segments the produced distal dorsal edge, at first crescentic in end view, becomes narrower, but does not lose in height, so that it changes to rounded triangular and, as less of the dorsal surface is involved, appears tubercular; a faint median carination is traceable on the distal half of the later segments; the opposing spine is very low, median in position, involving the entire surface of the penultimate segment; the terminal claw is slightly longer than the penultimate segment, rather slender, and moderately curved.

The ends of the basal rays are just visible in the angles of the calyx; the radials are only slightly visible in the angles of the calyx over the ends of the basal rays; the I Br_1 are exceedingly short and band-like, in lateral apposition for rather more than their basal half but separated by a U-shaped gap anteriorly; the I Br_2 are broadly pentagonal, the lateral edges about as long as those of the I Br_1, approximately twice as broad as long; the II Br are 2; the I Br axillary and the elements of the II Br series are rounded dorsally and laterally, and entirely free laterally; the synarthrial tubercles are broad and low, though rather noticeable.

There are nineteen arms in the type, about 120 mm. long; the first two brachials are equal and similar in shape, slightly wedge-shaped, the longer side out, about twice as broad as the exterior length; the first brachial, like the II Br_1, is interiorly united for nearly its entire length; the second, like the II Br_2, is usually interiorly in apposition with its neighbor, though not united to it; the first syzygial pair (formed of the third and fourth brachials) is about as long as broad; the fifth and sixth brachials are oblong, about twice as broad as long, the following brachials become very oblique, and after the eighth or ninth triangular, about as long as broad, later becoming wedge-shaped, and somewhat less oblique distally; the terminal portion of the arms is not preserved. The ossicles of the I Br and II Br series and the first two brachials have the dorsal surface thickly covered with small shallow pits; the distal edge of the second brachial is everted and somewhat prominent, tending to form a rounded distal dorsal prominence which is thickly beset with small spines; this condition rapidly increases distally, the brachials after the eighth having strongly produced distal ends which are armed with a frill of rather coarse spines, these produced distal ends standing out nearly perpendicularly to the axis of the arm; with the gradual narrowing of the arm distally this eversion of the distal ends of the brachials gradually narrows, but does not decrease in height, so that on the later brachials it appears as a laterally oblong distal tubercle with the summit thickly studded with small spines standing vertically outward and reaching rather more than half the lateral diameter of the brachials in height. In lateral view these tubercles appear as rounded distal spines, the general effect being the same as in the more carinate varieties of *Tropiometra picta*.

Syzygies occur between the first and second brachials, again always between the third and fourth; the next syzygy is almost always between

the seventeenth and eighteenth (but varying from between the thirteenth and fourteenth to between the eighteenth and nineteenth); the distal intersyzygial interval appears to be from six to eight oblique muscular articulations. The syzygies are exceedingly difficult to detect as the perisome covering the dorsal surface of the segments is somewhat swollen and opaque, thus masking the structure underneath.

P_1 is about 15 mm. long, much stouter basally than the succeeding but tapering with moderate rapidity and slender and flagellate in its distal two-thirds, composed of about forty segments, at first about twice as broad as long, more or less rhombic with the corners cut away, becoming about as long as broad and squarish after the tenth; the terminal comb is long, rising gradually, with twenty-five teeth, which at first are low, after the fifth becoming blunt-triangular, higher than broad basally (about as high as the lateral diameter of the segment bearing them), with the apex leaning somewhat distally; in the outer part of the pinnule the shape changes somewhat, the last nine being much more rounded distally, erect, and slightly shorter; the teeth are slightly recurved; P_2 is 8 mm. long, much more slender than P_1 basally and with fewer segments, but otherwise similar to it, and with a similar comb; the following pinnules gradually decrease in length to P_6, which is 6 mm. long with a rather small comb; P_6 is rather stouter than P_5, which resembles the preceding, and P_7 and the following pinnules are stouter still, though slender in the distal half; this stoutness persists in the following pinnules, though in the distal pinnules it is less in extent, occupying only about one-third of their length; the genital pinnules are about 6 mm. or 7 mm. long, stout basally but evenly tapering and becoming slender in the distal half, with sixteen segments of which the first three are twice as broad as long, the fourth is somewhat smaller and proportionately slightly longer, the fifth or sixth is squarish, those after the ninth longer than broad, and the distal more than twice as long as broad; the distal pinnules are 10 mm. long, the proximal segments much broader than long, large, the following becoming gradually narrower and proportionately shorter, squarish after the fifth or sixth, and slender and rather more than twice as long as broad distally. The surface of the pinnule segments is rough, and the ends are always more or less spinous; the distal dorsal surface of the segments is usually studded with small spines, but is never produced nor carinate.

The color in alcohol is white.

Type.—Cat. No. 34,482 U. S. N. M., from "Albatross" Station 2321, off Havana, Cuba, in 230 fathoms.

Nemaster insolitus new species.

The centrodorsal is discoidal, broad, rather thin, the flat polar area from 3 mm. to 4 mm. in diameter, sometimes with a slight shallow median pit; the cirrus sockets are closely crowded, arranged in one and a more or less complete second alternating rows.

The cirri are xv-xxi, 10–12, 10 mm. to 12 mm. long; the first segment

is very short, the second squarish or slightly longer than broad, the third from half again to nearly twice as long as its proximal diameter, the fourth the longest, twice as long as its proximal diameter or somewhat longer; the fifth is as long as the third, and the following gradually decrease in length to the antepenultimate, which is about as long as broad; the penultimate segment is somewhat longer ventrally than dorsally, one-third to one-half again as broad as its ventral length; the opposing spine is small, erect, arising from the whole dorsal surface of the penultimate segment, the apex slightly beyond the center of the latter; the terminal claw is long and slender, about three-quarters of the length of the penultimate and antepenultimate segments together, moderately curved; the second and following segments as far as the terminal three or four are very strongly constricted centrally as viewed dorsally, with much expanded articulations; but this character is only slightly marked in lateral view, being due to the lateral expansion of the articulations over the ends of the articulating ridges as a center; most of the segments are smooth dorsally, but the antepenultimate always, the preceding often, and the one preceding that sometimes, has a small subterminal tubercle or small spine which, though often but slightly marked, is always present; its position on the antepenultimate segment is but little in advance of the center, on the preceding more distal, and on the third from the last it is situated near the distal border.

The ends of the basal rays are visible as small tubercles in the angles of the calyx; the radials are concealed in the median line, showing slightly in the angles of the calyx; the I Br_1 are oblong, with the proximal border often convex, about two and one-half times as broad as the median length, rounded laterally and entirely separated, even at the base; the I Br_2 (axilaries) are almost triangular, between one and one-half times and twice as broad as long, the anterior angle sharp, though not produced, the lateral sides short, forming an obtuse angle with those of the I Br_1, or parallel in the proximal half but diverging in the distal; II Br 4 (3+4); division series comparatively slender and widely separated; first ossicles following each axillary united interiorly for about the proximal two-thirds, those following the I Br axillary then diverging at an acute angle, those after the II Br axillary remaining in apposition in the distal third, though not united.

Sixteen to twenty very slender arms about 150 mm. long; the first brachial is wedge-shaped, about twice as broad as the exterior length; the second is similar in shape and size; on arms springing from a II Br axillary the first brachial is much larger, being not greatly broader than the exterior length; first syzygial pair (on arms arising from the II Br axillaries composed of the second and third brachials, on those arising from the I Br axillaries of the third and fourth) oblong, about half again as broad as long, or slightly broader; following three brachials (following one or two on arms springing from a II Br axillary) oblong, about twice as broad as long, then becoming very obliquely wedge-shaped, about as long as broad, in the distal part of the arm less obliquely wedge-shaped, almost oblong, about as long as broad, and in the attenuated

terminal portion longer than broad; after the first two or three the brachials develop overlapping and finely spinous distal edges which become prominent after the sixth or eighth, though their development is never very great; they are plainly evident even in the attenuated terminal portion of the arm. Syzygies occur between the third and fourth brachials (the second and third in arms arising from a II Br axillary), again between the sixth and seventh to ninth and tenth, and subsequently at intervals of four oblique muscular articulations.

The mouth and anal tube are about equidistant from the center of the disk; the mouth is radial; the disk is entirely covered with a pavement of very small plates, with a few larger ones which rise above the general surface scattered about the interpalmar areas; in the lateral interbrachial regions of the disk the mass of small plates tends to divide into two columns of large plates based upon a single plate in the interradial angle.

P_D is 12 mm. long, stout basally but tapering rather rapidly and slender and flagellate in the distal two-thirds, with nearly forty segments of which the first is about twice as broad as long, the second is nearly as long as broad, the third is of about the same proportions, and the following gradually increase in length, becoming about as long as broad after the seventh and slightly longer than broad in the terminal portion; the segments in the proximal third have very prominently everted and spinous distal ends; the comb consists of thirteen teeth, the terminal two or three more or less obsolete; the teeth are slightly longer than broad basally, about as long as the lateral diameter of the segment which bears them, rounded, well separated, and beset with small marginal spines; except for the first two or three all the teeth are double, the segments bearing another similar, but smaller, tooth on the opposide side; P_1 7 mm. long, much more slender than P_D though similar to it, and with a similar comb; P_3 is small, slender and weak, 3 mm. long with about fifteen segments, bearing a more or less imperfect comb distally; P_4 and the following pinnules resemble P_3, but are without combs; on arms arising directly from a I Br axillary P_1 resembles P_D as described, P_2 resembles P_1, etc.; the distal pinnules are 9 mm. long, very slender, with about twenty segments of which the first is short, the second half again as long as broad, the following rapidly becoming elongate, and about three times as long as broad; the segments all have very strongly overlapping and spinous distal ends, as do the segments of all the pinnules except in the distal portion of the first one or two.

Color in alcohol white, yellowish white, or violet, the cirri and pinnules dark purple with the ends of the segments white, in sharp contrast.

Type.—Cat. No. 25,458 U. S. N. M., from "Albatross" Station 2146, Caribbean Sea, in 34 fathoms.

II. STARFISH.

Pilnthaster productus new species.

Five arms; R=27 mm.; r=12 mm.; R:r=2.25:1; superomarginals 10 or 11, of which the distal 8 are united interiorly to form the ray.

General form pentagonal, with slightly incurved sides, the angles of the

pentagon produced into rather long slender arms, which are as long as the distance from their bases to the center of the disk.

The abactinal surface is covered with more or less regular hexagonal plates which are largest in the central portion, within a circle the periphery of which is indicated by the madreporite. From the apical plate a regular row of nine plates, all approximately equal in size and smaller than the plates in the center of the abactinal region, runs to the arm bases, where it terminates against two or three large, irregular, wedge-shaped plates. In the outer two-thirds of the abactinal area this radial row is bordered with a similar row on either side. In the interradial triangles the plates decrease regularly in size from the center to the margin, remaining hexagonal as far as the row adjoining the superomarginals, in which the plates are very irregular in shape and in size. The plates of the abactinal surface are naked, except for a peripheral row of flattened granules, which on the four or five central plates in the radial rows is supplemented by a second similar row of higher granules just within it; the most proximal of these plates bearing the second row of granules usually has it developed only along the distal margin, while the plates of the two rows adjoining the median row have the second row developed on the adradial side. A few plates, especially in the central region, have from one to three widely scattered granules on their surface.

The madreporite is prominent, rounded triangular, with a very convex and irregular surface.

The superomarginals are similar and of equal size as far as the arm bases, thence decreasing rather rapidly to the arm tips. They are somewhat tumid, especially those of the arms, and are naked except for a bordering series of closely packed flattened granules, which disappears on the outer half of the arm. Those in the interbrachial arc may bear scattered granules on the surface, and may have in addition one or two extra rows along the lower border and extending for a short distance along the sides.

The inferomarginals are everywhere much lower than the superomarginals, though reaching the same vertical plane; in the interbrachial arc they correspond to the superomarginals, but on the arms they do not decrease so rapidly in length, and so come to overlap the bases of the next succeeding superomarginals.

On the actinal surface the decrease in size of the inferomarginals at the arm bases is much more abrupt than in the case of the superomarginals, and along the arms the former are much narrower, being twice as long as broad, whereas the superomarginals are always broader than long.

The inferomarginals are bordered with a row of flattened granules like the superomarginals, while those of the interbrachial arc have an additional row actinally extending part way up the sides, and just beneath the upper margin numerous closely packed granules which extend downward along the sides.

The actinal intermediate plates do not extend beyond the third inferomarginal; that is, they are entirely confined to the triangle between the adambulacrals and the inferomarginals of the interbrachial arc. They

are arranged in three rows parallel to the adambulacrals, with two or three additional next to the median inferomarginals. The innermost row (next to the adambulacrals) consists of about nine (corresponding to fourteen adambulacrals), the next of four or five, and the third of three, within which are two or three against the central inferomarginals. The actinal intermediate plates are covered with rather large spaced granules, consisting of a border series and from nine to fifteen central, according to the size of the plate.

The adambulacral plates are twice as broad as long, with a straight furrow margin. They carry four or five untapered furrow spines which are in length about equal to half the width of the plate, and are subequal, very regular, arranged in a straight row. Beyond these is a naked space, followed by a row of two or three rather stout, more or less conical, spines, usually more or less diagonal in position with the distal nearest the furrow series. Beyond these again are from four to six well spaced granular spines in two rows, resembling the granules on the actinal intermediate plates, but slightly larger and more spaced; on the distal adambulacrals these become more numerous, smaller, and less spaced.

The mouth plates are triangular, very inconspicuous; the furrow margin is longer than the edge adjacent to the first adambulacral. The armature consists of three well spaced stout spines, followed by four much more slender crowded spines, similar to those of the furrow series on the adambulacrals; within these are three or four stout well spaced spines continuing the second series on the adambulacrals; within these again are five or six spaced granules, continuous with the granules on the adjacent actinal intermediate plates.

The color in alcohol is white.

Type.—Cat. No. 36,930 U. S. N. M., from "Albatross" Station 2154, off Havana, Cuba, in 310 fathoms.

III. BRITTLE STAR.

Ophiocnida cubana new species.

Disk 4.3 mm. in diameter, slightly convex as in *O. filogranea*, covered with prominent, slightly tumid, imbricating scales, among which the circular primary plates, which are of nearly equal size and are separated by spaces equal to their diameter or somewhat greater (up to about a diameter and a half), stand out rather prominently.

In general the arrangement of the scales on the disk, and the form, size, proportions, and amount and character of the partial separation of the radial shields, agree with the same features in *O. filogranea*.

Scattered evenly over the surface of the disk there are approximately seventy-five smooth cylindrical spines which in length are equal to about two-thirds of the diameter of the circular primary plates.

Along the periphery of the disk, beginning in a line between the outer angles of the subtriangular radial shields, are very numerous and thickly set spines, somewhat shorter than the spines on the dorsal surface, which

are continued over the edges of the disk, on the lower side in each interbrachial arc covering a triangular restricted area, just as do the very much shorter and much more numerous and thickly set spines in *O. filogranea.*

The broad spineless areas bordering the genital slits are covered with large and prominent imbricated scales as in *O. filogranea.*

The arms are approximately 33 mm. long; the upper arm plates are about twice as broad as long, more or less fan-shaped, with broadly rounded outer angles. The under arm plates resemble those of *O. filogranea,* but are proportionately slightly longer.

The three arm spines are rather stout basally, but taper rapidly to a point; they are similar and equal in length, being roughly as long as, or slightly longer than, the lateral diameter of the lower arm plates.

On the basal portion of the arms there are two tentacle scales of which the inner is much larger than the outer; further out on the arm the smaller gradually decreases in size and finally disappears. On some arms the smaller may be more or less completely absent even from the arm bases.

The arrangement of the plates about the mouth does not differ from that found in *O. filogranea,* except that the plates are somewhat more swollen, the oral shields are more regularly rhombic, and the distal mouth papillæ are proportionately smaller, being not greatly larger than the proximal, and inwardly more separated.

The structure of the jaws resembles closely that in some specimens of *O. lovéni* at hand from Rio de Janeiro, but the mouth papillæ are more rounded and less pointed, and the distal are more separated interiorly.

Type.—Cat. No. 34,763, U. S. N. M., from Ensenada de Santa Rosa, western Cuba, in 1–3 fathoms.

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PROCEEDINGS
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PRELIMINARY DESCRIPTIONS OF FIVE NEW SPECIES OF CRUSTACEANS FROM THE COAST OF NORTH CAROLINA.

BY W. P. HAY.

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For some time past the writer has been engaged in the preparation of a report on the decapod crustaceans of Beaufort, N. C., and the surrounding territory, and in the course of the work several new species of these animals have come to light. As publication of the complete report will be considerably delayed, it seems desirable to publish the following brief descriptions of the most important of the new forms. The types have been deposited in the U. S. National Museum and full descriptions and figures will be included in the report.

Coralliocaris wilsoni sp. nov.

Holotype, ♂, Cat. No. 47,957 U. S. N. M., U. S. Bur. Fisheries S. S. *Fish Hawk*, about 20 miles off Beaufort, N. C., in 10 to 20 fathoms, August 1, 1914. Paratypes, 2 ♀s, Cat. No. 47,961 U. S. N. M.

Rostrum about one-third as long as carapace, slightly decurved and armed above with 11 to 13 acute, nearly equidistant teeth. Antennal scale broad, equal to the rostrum in length. First pair of legs alike, slender, chelate, the tips of the fingers hairy. Second pair of legs very unequal, the larger one, in the male, having the chela so enlarged that its bulk is almost equal to the rest of the animal; hand cylindrical, movable finger strongly curved and bent inwards, its cutting edge with a prominent lobe near the base; thumb bent downward out of line with the hand, its cutting edge with two teeth. Smaller chela about one-third the size of its mate, somewhat compressed but otherwise similarly constructed.

Three specimens were collected in 1914 from the canals of a large sponge dredged up by the steamer *Fish Hawk* and a series of 8 or 10 was obtained

in the same way in 1915. The species is dedicated to Dr. H. V. Wilson of the University of North Carolina, for many years an investigator at the Beaufort laboratory.

Gnathophyllum modestum sp. nov.

Holotype, ♀, Cat. No. 49,650 U. S. Nat. Mus., U. S. Bur. Fisheries S. S. *Fish Hawk*, about 20 miles S. W. of Beaufort, N. C., in about 15 fathoms, August, 1915.

Rostrum reaching to distal end of basal article of antennule, obliquely truncate and armed above with seven teeth; suborbital spine acute. Telson with the marginal spines at about the distal third, the tip almost truncate and with six spines of which the median and longest pair is about one-fifth as long as the telson.

Color dark reddish brown, telson and tail fins white, legs and flagella of antennae and antennules with purple bands.

Only a single specimen, the type, has been obtained. It is probably most closely related to *G. panamense* Faxon, which it resembles in the length and armature of the rostrum and in the coloration. From *G. americanum* Rathbun, it differs in coloration and in the much weaker second pair of legs. From both it differs also in the position and size of the lateral and terminal spines of the telson.

Automate kingsleyi sp. nov.

Holotype, ♀, Cat. No. 49,637 U. S. Nat. Mus., Beaufort, N. C., collected by O. W. Hyman, July 9, 1916.

Cephalothorax about one-half as long as abdomen, subcylindrical and deeply sinuate in front; rostrum small; eyestalks contiguous, broad at base and with a well developed corneal surface. Scale of antennule slightly exceeding the basal article of the peduncle. Scale of antenna extending to the middle of the terminal article of the peduncle. Third maxillipeds exceeding the antennal peduncles by less than the length of their terminal articles. Chelipeds unequal and somewhat dissimilar; the larger one, which is stouter and rougher than its mate, has the fingers slightly gaping at the base, the thumb in line with the palm and very broad at the base while the movable finger is much narrower and rather strongly curved. Carpus short. Merus about as long as movable finger of chela. Second pair of legs very slender and with the carpus divided into 5 articles having the proportions of 1, 1½, ½, ½, ½. Telson armed above on each side with two spines one of which is at about the middle of the length and the other is about half way between the middle and the distal end.

Length of type, 16 mm.; cephalothorax, 4 mm.

Only one specimen has been examined. The most remarkable character noted is that the hands in this female specimen are as large and broad as are those of the male of any other known species. The species is dedicated to Dr. J. S. Kingsley, one of the early students of the crustaceans of the Beaufort region.

Pagurus cokeri sp. nov.

Holotype and paratype, Cat. No. 49,638 U. S. Nat. Mus., U. S. Bur. Fisheries S. S. *Fish Hawk*, 30 miles S. of Cape Lookout lightship, August, 1915.

Anterior portion of carapace as long as broad, its anterior margin with three projections of which the middle one is decidedly more advanced and is terminated by a spine about twice as long as the spines of the lateral ones. Eyestalks short and stout, their length equal to about twice the diameter of the cornea, scale small and with a spinulose tip. Antennal peduncle a little shorter than that of the antennule, its basal article with a small lateral spine curved downward and forward, its second article with a spine on the inner distal angle and several spinnules on the inner side of the outer distal prolongation; acicle curved; flagellum longer than body. Smaller hand with the movable finger about four times as long as the palm and, when closed, meeting the immovable finger for only a short distance near the tip.

Two specimens have been obtained. It is most closely related to *E. bouvieri* Fax. from which it differs chiefly in the character of the smaller hand.

It is named in honor of Dr. R. E. Coker, of the Bureau of Fisheries, who has contributed extensively to our knowledge of the Beaufort fauna.

Paguristes armatus sp. nov.

Holotype, Cat. No. 49,699 U. S. Nat. Mus., U. S. Bur. Fisheries S. S. *Fish Hawk*, about 30 miles S. of Cape Lookout lightship.

Anterior portion of carapace considerably longer than wide, its front margin thickened; rostrum acute, straight-sided and considerably exceeding the rather obtuse lateral projections. Eyestalks longer than the greatest width but not quite equal to the length of the anterior portion of the carapace, nearly straight and not much enlarged distally. Chelipeds approximately alike in size and form, short and thick; merus with a few spines distally; carpus and hand covered with strong, sharp-pointed, conical tubercles, of which those on the upper margin of the movable finger, palm and carpus are longer than the others.

One specimen only was secured. The species is rather closely related to *P. spinipes* A. Milne Edwards, but differs in having much shorter eyestalks and differently formed hands.

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PROCEEDINGS

OF THE

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MUTANDA ORNITHOLOGICA.
I.

BY HARRY C. OBERHOLSER.

During the past several years the writer has incidentally noted a number of necessary changes in the current scientific names of birds. It seems desirable to throw these into the ornithological current, where they may be picked up by any workers who may have occasion to use them. It is therefore the present purpose to publish these in a series of articles under the above caption from time to time as opportunity permits.

Family ANATIDAE.

Nettion torquatum (Vieillot).

This duck was originally described from Paraguay as *Anas torquata* by Vieillot,* but this name is preoccupied by *Anas torquata* Gmelin,† a synonym of *Branta ruficollis* Pallas. Another name is therefore required for the species, and is found in *Anas leucophrys* Vieillot ‡; and *Nettion torquatum* should henceforth be known as *Nettion leucophrys* (Vieillot).

Chloephaga magellanica (Gmelin).

The specific term *magellanica*,§ by which this bird has commonly been known, is rendered untenable by *Anas magellanica* Sparrman,‖ which refers clearly to *Chloephaga hybrida* (Molina). The proper name for *Chloephaga magellanica* of authors becomes, therefore, *Chloephaga leucoptera* (Gmelin).¶

Family FALCONIDAE.

Cerchneis gracilis (Lesson).

The species at present known as *Cerchneis gracilis* (Lesson) of the Seychelles, is in need of a new name, since it was originally *Falco*

* *Anas torquata* Vieillot, Nouv. Dict. d'Hist. Nat., V, 1816, p. 110.

† Reise Russl., II, 1774, p. 179, t. 14.

‡ Nouv. Dict. d'Hist. Nat., V, 1816, p. 156.

§ *Anas magellanica* Gmelin, Syst. Nat., I, ii, 1789, p. 505 (Straits of Magellan).

‖ *Anas magellanica* Sparrman, Mus. Carlson., fasc. II, 1787, t. 87 (Straits of Magellan).

¶ *Anas leucoptera* Gmelin, Syst. Nat., I, ii, 1789, p. 505 (Falkland Islands).

gracilis,* a term preoccupied by *Falco gracilis* Temminck,† which is a synonym of *Geranospizias caerulescens* (Vieillot). It may, therefore, be called **Cerchneis araea**, nom. nov.

Cerchneis alopex deserticola Reichenow.

The name *Cerchneis alopex deserticola*, proposed by Dr. Reichenow ‡ for a west African hawk, is preoccupied by *Falco sparverius deserticolus* Mearns,§ now conceded to be the same as *Cerchneis sparveria phalaena* (Lesson). The African bird therefore requires a new title, and may stand as **Cerchneis alopex eremica**, nom. nov.

Family RALLIDAE.

Rallus intermedius Milne-Edwards.

The fossil rail called *Rallus intermedius* by Milne Edwards‖ needs a new name, for its present one is invalidated by *Rallus intermedius* Hermann,¶ which is now a synonym of *Porzana pusilla* (Pallas). The fossil species (*Rallus intermedius* Milne-Edwards) may therefore be known as **Rallus adelus** Oberholser, nom. nov.

* Traité d'Ornith., 1831 (May, 1830), p. 93 (loc. ign.).

† Nouv. Rec. Planch. Color. d'Ois., I, livr. 16, Nov., 1821, pl. 91 and text (Eastern Brazil).

‡ Ornith. Monatsber., VII, No. 12, December, 1899, p. 190 (Mangu, hinterland of Togo, western Africa).

§ Auk, IX, No. 3, July, 1892, p. 263 (Fort Verde, Arizona).

‖ Oiseaux Foss. de la France, II, 1869–1871, p. 144 (vicinity of Paris, France).

¶ Obs. Zool., I, 1804, p. 198 (Argentor River, France).

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PROCEEDINGS
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A NEW APHIS-FEEDING APHELINUS.

BY L. O. HOWARD.

Until last summer only four species of Aphelinus have been reared from plant-lice by the men in the Bureau of Entomology in 35 years. It is therefore interesting to add a fifth species.

Aphelinus lapisligni n. sp.

Female.—Length, 1.05 mm.; expanse, 2.19 mm.; greatest width of forewing, 0.57 mm. A medium sized black species. Eyes faintly hairy, but with well bristled margins. Antennae rather short, stout, of the *A. nigritus* rather than the *A. semiflavus* type. Third funicle-joint 1½ times longer than broad; club 2½ times longer than broad. Base of forewing singularly free from bristles; aside from the more or less irregular row proximally bordering the oblique hairless streak, there are seen but six or seven of these bristles in the distal angle between the marginal vein and the hairless streak. Body uniformly glistening black; wings infuscated below marginal vein; forelegs with basal two-thirds of femora black; apical third whitish yellow; tibiae whitish yellow; tarsi dusky towards tip; middle femora and tibiae black, light at tips, trochanters yellowish, femora enlarged; hind legs same. Antennae yellowish white, club darker towards tip.

Type, U. S. N. M., 21,126.

Numerous specimens reared from *Aphis bakeri* Cowen, Forest Grove, Oregon, August 25 to September 15, 1916, by Mr. L. P. Rockwood, of the Bureau of Entomology, after whom the species is named.

Vol. 30, pp. 79–82 May 23, 1917

PROCEEDINGS

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DESCRIPTIONS OF FOSSIL INSECTS.

BY T. D. A. COCKERELL.

The insects described below are of special interest, since the first represents a family not before known fossil, the second a family new to American strata, and the third an additional species of a rare family represented previously in America by only two species, though in Europe by five.

HYMENOPTERA.

Trigonalys pervetus, new species.

Probable length about 6 mm., but only part of thorax, wings and middle and hind legs of one side, and abdomen (lacking apex), are preserved. Thorax, abdomen and middle and hind legs black, the middle tibiæ with the basal half reddish; wings dusky hyaline, nervures dark, stigma small; marginal cell ordinary, pointed on costa; three submarginal cells, first receiving first recurrent nervure a moderate distance from its apex, third receiving second recurrent nervure beyond middle; second submarginal cell subtriangular, third short; basal nervure falling short of transverse medial; hind wing with discoidal cell contracted at base, so that the cubital and discoidal nervures roughly form a cross; scutellum strongly bilobed, the lobes rounded; abdomen not hairy; surface of wing delicately hairy; middle and hind femora short, angulate beneath; tibiæ long and slender, each with two spurs; tarsi very long and slender, the hind tarsi about 3 mm.; mid tarsi with first joint about as long as 2 to 4 together, the latter successively shorter, fifth joint nearly as long as second.

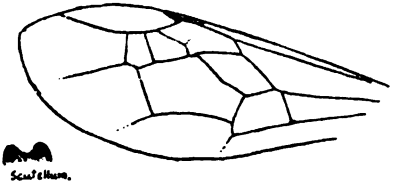

Fig. 1. *Trigonalys pervetus.*

Burmese Amber (Miocene), received from Mr. R. C. J. Swinhoe.

A

This is the first fossil species of Trigonalidæ to be recorded; the family consists to-day of a relatively small number of species widely scattered over the world. The present insect should perhaps constitute a distinct genus, on account of the venation of hind wings and very long tarsi, but the anterior wings agree fairly well with *Trigonalys*, and it appears permissible to refer the species there. Until rather recently, the species of Trigonalidæ have been placed in few genera, but W. A. Schulz, in revising the group, has separated a much larger number.

PROTORTHOPTERA.

Palaeocarria, new genus (Pachytylopsidæ).

A genus of Protorthoptera, with elongated thorax in the manner of the Spanioderidæ, but with the costal area large, the costa arched, the subcosta ending on the margin, and giving off about six oblique branches, several of which are forked. The surface of the anterior wing is coarsely and very distinctly reticulated, and the cubitus is connected with the media by an oblique vein, exactly as in *Pachytylopsis*. The anterior wing is ornamented with a series of three large black patches. The hind wing, so far as visible, has almost exactly the venation of *Palorthopteron melas*. Type *P. ornata*.

Palaeocarria ornata, new species.

Head and thorax, anterior to the insertion of the wings, about 15 mm. long, but the details of structure obliterated. Anterior wings ample,

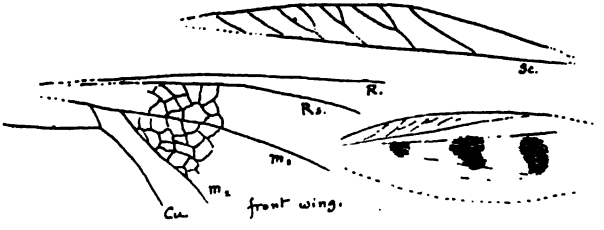

Fig. 2. *Palaeocarria ornata.*

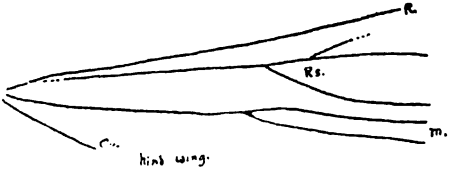

Fig. 3. *Palaeocarria ornata.*

probable length about 45 mm., of which only 33 mm. is preserved; middle of first spot about 9 mm. from base of wing and 6 from costal margin; middle of second spot about 8 mm. from middle of first, the apical side

of second spot distinctly emarginate; third spot reniform, its middle about 10 mm. from middle of second.

Carboniferous (Pennsylvanian), in a nodule at Mazon Creek, Illinois; discovered by Mr. J. C. Carr, after whom the genus is named, and submitted for examination through the kindness of Mr. L. E. Daniels. This genus seems to be closely allied to *Pachytylopsis* DeBorre, from the Westphalian of Belgium; so much so that it might be possible to interpret the genus in a broad sense to include *Palaeocarria*. The structure of the thorax in *Pachytylopsis* is unknown; and there are differences in the venation which, taken with the difference in locality, indicate that the Belgian and American insects can hardly be congeneric. The beautiful photographic figure of *Pachytylopsis* published by Handlirsch in 1904 suggests that the wing was banded, though this appearance may possibly be due to inequalities in the rock. *Palorthopteron melas* Handlirsch, also from the Westphalian of Belgium, closely resembles the hind wing of *Palaeocarria* and *Spaniodera*. May it not be the hind wing of *Pachytylopsis persenairei* DeBorre?

Genentomum carri, new species.

Wings about 48 mm. long and 12 broad; differing from *G. validum* Scudder as follows: Anterior wing. Radius with a single branch from upper side, this very long, taking its origin about 5 mm. before end of subcosta, and running nearly parallel with radius; combined radial sector and media with four oblique branches from lower side, the first (as in *G. validum*) very near the junction of the two veins; last oblique branch of media before the junction more than twice as far from penultimate branch as from junction.

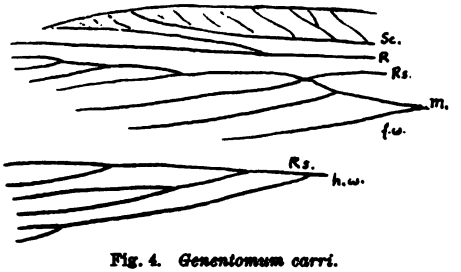

Fig. 4. *Genentomum carri.*

Hind wing. Radial sector with a simple branch, beyond the last forked one.

In a nodule from the Carboniferous (Pennsylvanian) of Mazon Creek, Ill. (J. C. Carr). Transmitted by Mr. L. E. Daniels. This very fine specimen shows only the wings, but they are very characteristic of the genus. The Œdischiidæ, to which *Genentomum* belongs, are only known in America from Mazon Creek; in Europe several genera have been found in the upper Carboniferous of France and Germany.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A REVIEW OF THE GENUS PEDIOECETES IN COLORADO.

BY F. C. LINCOLN.

The doubtful status of the genus *Pedioecetes* in Colorado has caused much confusion in the minds of those engaged in a study of the birds of the State, all of whom, the present writer trusts, will welcome what appears to be an accurate classification and adjustment of this interesting group.

A study of the literature permits but one conclusion as regards this genus, which is, that its status is decidedly chaotic, a condition dating from the publication of the first faunal lists on Colorado birds. A brief review of the treatment accorded *Pedioecetes* in the two most important of these works may be of assistance in comprehending this confusion and the reasons for its existence.

The first important* paper on the birds of Colorado as a unit, appeared in 1897, under the authorship of the late Prof. Wells W. Cooke,† in which all Colorado Sharp-tailed Grouse are included under one form, *campestris;* a note being added to the effect that "It may be that the Sharp-tailed Grouse of Routt County are variety *columbianus* * * *."

Despite this note, however, the first supplement to this work, published in 1898‡, refutes the suggestion, definitely assigning

* A few local lists, etc., had appeared previous to Prof. Cooke's, but they are all compiled in his work, and no specific references are necessary here.

† The Birds of Colorado. By W. W. Cooke. Bull. No. 37, Agricultural Experiment Station, Fort Collins, Colo., March, 1897.

‡ Further Notes on the Birds of Colorado. By W. W. Cooke. Bull. No. 44, Agri. Exper. Sta., Fort Collins, Colo., March, 1898.

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all *Pedioecetes* within the State to *campestris*, a conclusion also continued in the second supplement in 1900.*

The third supplement to this work appeared in 1909,† with something like order reached, when both *columbianus* and *campestris* were admitted to a place in the list, but with an impossible range attributed to the former and the theory advanced that *campestris was then extinct* in the State.

Following this came Mr. Sclater's "History of the Birds of Colorado," published in 1912,‡ which more than ever confused the subject by again including all Colorado examples under *campestris*, and thus the matter has stood to the evident inconvenience of the taxonomist as well as the local student.

That a thorough investigation would be necessary, was readily apparent, and this it has been the privilege of the writer to carry out, with results of more than ordinary interest, when considering the contradictory character of the literature referred to.

Decidedly the most important feature of the work has been the discovery of an apparently unrecognized race which may be described at this point, as it occupies a most vital position in unraveling the tangle.

For this new subspecies, I propose the name:

Pedioecetes phasianellus jamesi, sp. nov.

JAMES'S SHARP-TAILED GROUSE.§

Chars. subsp.—Similar in part to both *Pedioecetes p. columbianus* and *P. p. campestris*, but with relatively longer wings and tail, shorter tarsi, and with bill shorter, heavier and more acutely curved than in either.

Description.—Type; adult male; Colorado Museum of Natural History, No. 4951; three miles west of Castle Rock, Colo., February 15, 1916; collected by A. H. Burns.

Coloration of upper parts, including rump and upper tail-coverts, similar to *columbianus*, but lighter; pileum and occiput dusky, feathers more narrowly edged with light rufous, not banded, tipped with creamy white;

* The Birds of Colorado. By W. W. Cooke. Bull. No. 56, Agri. Exper. Sta.. Ft. Collins, Colo., May, 1900. A second appendix to Bull. No. 37.

† The Birds of Colorado.—Third Supplement. By Wells W. Cooke. Auk, Vol. XXVI, 1909, pp. 400-423.

‡ A History of the Birds of Colorado. By W. L. Sclater. Witherby & Co., London. 1912.

§ It is with much pleasure that I propose to name this new subspecies in honor of Mr. Harry C. James of Denver, a veteran sportsman, through whose interest and enthusiasm the bird was first brought to my attention, and through whose personal efforts many of the specimens were secured.

Breast feathers from *Pedioecetes p. columbianus*, *campestris* and *jamesi*.

No. 4980 *P. p. columbianus* ♀ ad. Jan. 16, 1916. Aspen, Colo.
No. 4258 *P. p. campestris* ♀ ad. Jan. 28, 1915. Laird, Colo.
No. 4951 *P. p. jamesi* (Type) ♂ ad. Feb. 15, 1916. Castle Rock, Colo.

nape more rufous; feathers of lower hind neck, back and wing-coverts without distinct barring as is the case in *both columbianus* and *campestris*. Under parts similar to *campestris*, but with dark markings much larger and extending over the entire surface, except for narrow area on belly and anal region; feathers of chest narrowly tipped with white; dark markings intermediate in width between *columbianus* and *campestris*, but with a distinct and persistent median band of pale grayish buff, as faintly noted in occasional examples of *campestris;** throat creamy white (never ochraceous or buffy as in *columbianus* and *campestris*), unspotted, or (rarely) with minute markings of light dusky faintly suggested; lores soiled white; wide streak of unbroken brownish dusky from nostril to, and including, ear-coverts; patch of dusky black spots on lower cheeks more pronounced.

Measurements of type (in millimeters).—Wing, 218.0; tail, 101.0; culmen from base, 24.8; culmen from nostril, 13.0; tarsus, 40.7.

Females average slightly smaller but differ in no other characters.

Range.—The former range of *jamesi* probably included the entire Arkansas-South Platte Divide through Douglas and Elbert Counties to the limits of the scrub-oak (near Limon); northward through the foothills of the Front and Medicine Bow Ranges (Coal Creek and near Fort Collins); eastward at its northern limits to the Laramie Plains, Wyo. (Jay Em, Goshen Co.). Present range greatly restricted, with the center of abundance at the type locality.

Remarks.—The gray cast of the upper parts of *jamesi* is most striking, particularly when compared with series of *campestris* and *columbianus*, while the differences in breast markings and the light cream-colored throat is equally obvious when viewed from beneath.

In addition to the discovery of this race, as above described, sufficient material has been accumulated to definitely ascertain the exact status of the entire genus within the State, which in due fairness to previous authors should be presented in full, as it contains the precise solution of the enigma previously outlined, viz:—the unrecognized form described above.

The range of *Pedioecetes p. columbianus* is now definitely known to extend in no place east of the Continental Divide, its distribution in Colorado being roughly, the region to the west of this natural barrier, and from the Wyoming line (Columbine, Routt Co.) south nearly or quite to the New Mexican line (Pagosa Springs, Archuleta Co.). Surprise must be felt that this conclusion was not reached years ago, as the high altitudes prevalent on the divide must form a perfect barrier to any extensive lateral movements of this or the related forms. The total absence of authentic records, however, is conclusive evidence that such is actually the case.

The presence of *campestris* is of recent date in Colorado, the birds having come into the State coincident with the Prairie Chickens (*Tympanuchus*), with whom they are still found in some numbers. Present records

*This character persists throughout the entire series of *jamesi* but is only found suggested in occasional examples of *campestris*.

would indicate that the 4,500 foot contour marks their extreme western limits, the center of abundance being the sandhill country of northern Yuma and Phillips Counties. Their present range in Colorado may be given as:—west from the Nebraska line to a point about twenty miles east of Sterling, Logan Co., extending from there southeast to the Republican River in Yuma County. The species seems, however, to be gradually pushing westward along the river bottoms, and there is, of course, the possibility of its ultimate meeting with *jamesi* along the foothills, although the great differences in their respective environments make it seem decidedly improbable. It is the present writer's opinion that neither Professor Cooke nor Mr. Sclater actually saw specimens of this subspecies, as none of their records are from the regions it is now known to inhabit, the original error of Professor Cooke (merely followed by Mr. Sclater) probably being based purely upon conjecture and lack of investigation.

Pedioecetes p. jamesi has evidently been the immediate cause of this confusion, as many of the records already published in reality belong to this form. Thus, a specimen from near the type locality at Castle Rock was identified several years ago as subspecies *columbianus* by the Biological Survey, a probable error as the separation previously outlined would indicate. In addition to this separation from the western form, a long stretch of totally dissimilar country lies between its easternmost records and the western limits of *campestris*, the typical habitat of *jamesi* being the rough, broken scrub-oak country that immediately adjoins the foothills in many places on the eastern slope.

In the northern part of the State, principally in Larimer County, sharp-tailed grouse were formerly fairly numerous, as stated by Professor Cooke, who assigned them to *campestris*. The significant fact that these birds had no geographic connection with the birds of the region to the east, however, was apparently passed unnoticed. Since that time the species has been almost totally exterminated in Larimer County, but from the scant material at hand I would unhesitatingly refer it to *jamesi*.

Summarizing: *columbianus* occupies suitable localities west of the Continental Divide; *jamesi* the broken country adjoining the eastern foothills; and *campestris* a limited area in the prairie or sandhill country of the northeast quadrant.

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THE TWO FORMS OF RED SPELERPES OCCURRING AT RALEIGH, N. C.

BY C. S. BRIMLEY.

A request this fall from Mr. E. R. Dunn of Smith College, who has been recently doing work on the salamanders, for specimens of the "sparsely spotted form of *Spelerpes ruber*, that seems to occur at Raleigh," aroused my curiosity, and later on, in December, I overhauled all my red Raleigh *Spelerpes*.

I may add, by way of explanation, that my original identification of *Spelerpes ruber* at Raleigh, had been made by means of Jordan's "Manual of Vertebrates," and that the common form at Raleigh had become firmly fixed in my mind as "*ruber*."

On looking over my material it became evident that two forms existed at Raleigh side by side, which appeared to be probably distinct species, and that the common form instead of being "*ruber*," was the *Spelerpes montanus* of Baird. A letter received a little later from Mr. Dunn, to whom I had written on the subject, stated that he had compared Raleigh specimens with the type of *montanus*, and was convinced that they were the same.

These two forms, as represented in my Raleigh series, differ as follows:

Spelerpes ruber. Whole upper parts, including head, down to and inclusive of upper jaw, thickly spotted with black, the spots on the back larger, and more or less confluent. Under parts finely dusted with black along center of belly. Edges of lower jaw more or less spotted with black. Ground color more orange than in *montanus*. Palatine teeth curving forward in ten specimens to meet parasphenoids at an acute

angle, in one to meet them at right angles. Parasphenoid patches well separated, nearly parallel, not approximated in front. Head flatter and broader than in *montanus*, its width contained 4.8 to 5.6 times in length to groin. Tail from groin less than one-half the total length. Form rather short and stout. Sixteen specimens from Raleigh examined, eleven of which were measured and examined for dental characters.

Spelerpes montanus. Upper parts with thinly or thickly scattered round black spots, these never confluent anywhere, and few in number or absent on snout and top of head. Under parts with or without large or small black spots or dots, ground color darker red, less orange than in *ruber*. Edges of lower jaw often immaculate in small specimens, usually more or less heavily spotted or clouded with black in adults. Palatine teeth meeting parasphenoids at right angles in about one-half of the specimens, gently curving backward from in front, to meet them without evident angle in the other half. Parasphenoids approximated closely in front and in most specimens divergent behind. Head higher and more arched, particularly back of the eyes, its width contained 5.7 to 7.1 times in length to groin, in fifteen of the specimens measured, in the sixteenth 5 times in length to groin, this last being an unusually short and stout specimen. Tail from groin often one-half total length. Form both of tail and body comparatively long and slender. To this form belong my figures of "*ruber*," in the plate accompanying my description of *Spelerpes schencki* (Proc. Biol. Soc. Wash., 1912, pp. 135–140). Number of specimens examined 112, all from Raleigh, N. C., of which number 16 were measured and examined for dental characters.

Both *ruber* and *montanus* acquire with age a uniform purplish salmon color above which wholly or partially suppresses the markings of the dorsal surface.

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PROCEEDINGS

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NEW STARFISHES FROM THE PHILIPPINES AND CELEBES.*

BY WALTER K. FISHER.

The following new sea stars were collected during the Philippine cruise of the U. S. Fisheries steamer *Albatross*, 1907-1910.

Dipsacaster imperialis, new species.

Diagnosis.—Differing from *D. nesiotes* Fisher in having broader rays, more delicate, longer, and sharper paxillar spinelets, in averaging 1 or 2 additional true furrow spines to each adambulacral plate, and in having an odd interradial series of actinal intermediate plates, which reach only a little more than half the distance between the outer end of combined mouth plates and inferomarginals. Differing from *D. sladeni* Alcock in respect to the inferomarginal spines which are smaller and do not form a definite transverse series, especially on the proximal plates; in having the distal marginals alternating, instead of opposite, and in having more numerous actinal intermediate plates on the ray, the second longitudinal series extending to the twenty-third or twenty-fourth inferomarginal, and the third extending to the sixteenth. R=160 mm., r=55 mm., R=3r—; breadth of ray at base, 62 mm. Rays broad at base, tapering from arcuate interbrachia, at first rapidly, then more gradually. Paxillae with numerous (80-90) slender, sharp, glassy spinelets in a brush-like group. Three oblique transverse series correspond to each superomarginal plate; the latter 38 to 40 in number, block-like, only a trifle wider than long in middle of ray. Inferomarginals with a tuft of enlarged spinelets on ambitus. Furrow spines 8 or 9, rectangular in section, compressed, bluntly pointed, lanceolate in contour, the edge to furrow. Subambulacral spines 25 to 30, of which 4 to 6 form a regular series back of the furrow series. Madreporic body large, 12 mm. in diameter, situated 14 mm. from inner margin of superomarginal plates, and concealed by about 25 paxillae.

Type.—Cat. No. 37,037, U. S. N. M.

Type locality.—"Albatross" station 5115, Verde Island Passage, north coast of Mindoro, 340 fathoms.

* Published with permission of the Commissioner of Fisheries.

Cheiraster diomedeae, new species.

Diagnosis.—Rays 5, long, slender, with narrow marginals carrying 1 superomarginal and usually 2 inferomarginal spines; abactinal plates with 10 to 15 spinelets on disk, and on ray usually 2 to 7; enlarged central spinules scattered on outer half or two-thirds of ray; adambulacral furrow spines 10 to 12; 1 subambulacral spine except on outer part of ray, where there are 2; 11 to 13 oral, and 1 prominent suboral spine. Papularia small, with about 25 pores, which do not reach farther than opposite middle of third superomarginal. Pectinate pedicellariae on the abactinal surface, between the proximal superomarginals, over the intermarginal suture, on the actinal intermediate plates; fasciculate pedicellariae on the actinal surface of inferomarginals. Related to *Ch. snyderi* Fisher. R=86 mm., r=10 mm., R=8.6 r; breadth of ray at base (between first and second superomarginals, 10 mm.; at middle of ray, 5 mm.).

Type.—Cat. No. 37,035, U. S. N. M.

Type locality.—"Albatross" station 5512, Iligan Bay, north coast of Mindanao, 423 fathoms, gray mud, fine sand; bottom temperature 52.8° Fahr.

Lithosoma penichra, new species.

Diagnosis.—Differing from *L. actinometra* Fisher in having slenderer, longer rays, narrower marginal plates, restricted petaloid papular areas, and more angular furrow margin to the adambulacral plates, the consecutive pairs of tube-feet being separated, beyond base of furrow, as in *Nymphaster;* surface of plates and encircling granules as in *L. actinometra;* width of ray at proximal end of first pair of superomarginals (fifth) which meet medially equal to length of 3 or 3¾ superomarginals measured on ambitus (5 in *L. actinometra*). R=86 mm., r=21 mm., R=4+r; breadth of ray at interradius 24 mm., at proximal end of fifth superomarginal, 9.5 mm.

Type locality.—"Albatross" station 5528, between Siquijor and Bohol Islands, Philippines, 439 fathoms, globigernia ooze, bottom temperature 53.3° Fahr.

Nardoa tumulosa, new species.

Diagnosis.—In a general way resembling *N. frianti* Koehler in having prominent, large, hemispherical abactinal plates, but these much fewer and relatively slightly larger than in *frianti*, lower in proportion to width and evenly rounded or dome-shaped. They are confined to the abactinal surface and proximal two-thirds of ray; plates of distal third of ray small, crowded, convex; disk high. R=about 90 mm., r=about 14 mm., R=6.4 r; breadth of ray at base, 17 mm.; height of disk, 21 mm.

Type.—Cat. No. 37,028, U. S. N. M.

Type locality.—"Albatross" station 5160, off Tinakta Island, Tawi Tawi Group, Sulu Archipelago, 12 fathoms, sand.

Bunaster lithodes, new species.

Diagnosis.—Very close to *B. ritteri* Döderlein in general appearance, but differing in lacking the curious ball-and-socket granules of that form, and in having abundant, low, bivalved pedicellariae on the papular areas, and a few narrow tongs-shaped pedicellariae on the abactinal plates; outer actinal intermediate plates larger than the inner, and subambulacral spines slightly narrower; granules between the naked areas of plates smaller and more numerous. R=22 mm., r=5 mm., R=4.4 r; breadth of ray at base, 6 mm.

Type.—No. 2498, Museum of Comparative Zoölogy.

Type locality.—Apo Reef, Mindoro Strait, Philippines.

Asterina cristata euerces, new subspecies.

Diagnosis.—Very close to typical *A. cristata* Fisher but differing in having abactinal, spiniform pedicellariae, only 12 to 14 swollen abactinal plates to a ray, 8 furrow spines, and 8 or 9 marginal mouth spines. R=20 mm., r=9 mm., R=2.2 r; breadth of ray at base, 10 mm.

Type.—Cat. No. 37,036, U. S. N. M.

Type locality.—Ulugan Bay (near mouth of Baheli River), Palawan Island, 2 to 5 feet, mud, sand, sea-weeds.

Henricia microplax, new species.

Diagnosis.—Rays 5. R=45 mm., r=7 mm., R=6.4 r; breadth of ray at base, 8 mm. Rays slender, depressed, slightly swollen at base; disk small with an interradial sulcus near margin. General appearance of abactinal surface similar to that of *H. sanguinolenta;* superomarginal plates forming an inconspicuous series; inferomarginals in a regular conspicuous series; 3 or 4 series of actinal intermediate plates at base of ray; adambulacral spines about 15, besides 3 or 4 on the furrow face of plate.

Type.—Cat. No. 37,006, U. S. N. M.

Type locality.—"Albatross" station 5518, Mindanao Sea, off Point Tagolo, Mindanao, 200 fathoms, gray mud, globigernia, bottom temperature 54° Fahr.

Henricia arcystata, new species.

Diagnosis.—Similar in general appearance to *H. mutans* (Koehler), but with shorter rays, 2 or 3 spinelets on the furrow face of the adambulacral plates (instead of apparently 1), and with a distinct series of T-shaped inferomarginals and crescentric superomarginals. R=72 mm., r=10 mm., R=7.2 r; breadth of ray at base, 9 to 10 mm. Rays slender, depressed, curved at the end, tapering very slightly.

Type.—Cat. No. 37,007. U. S. N. M.

Type locality.—"Albatross" station 5536, between Negros and Siquijor, 278 fathoms, green mud, bottom temperature 53.5° Fahr.

Acanthaster brevispinus, new species.

Diagnosis.—Resembling *A. mauritiensis* de Lorio, but differing in having the abactinal spines of disk reduced to mere spinelets, in having smooth or nearly smooth disk spines on both surfaces and in having only 2 or 3 furrow spinelets, shorter than the length of their plate, instead of decidedly longer. Rays 14 to 16; madreporic bodies, 3 to 5; R=90 mm., r=51 mm., R=1.76 r.

Type.—Cat. No. 37,027, U. S. N. M.

Type locality.—"Albatross" station 5149, off Sirun Island, Sulu Archipelago, vicinity of Siasi, 10 fathoms, coral, shells.

Distolasterias hypacantha, new species.

Diagnosis.—Rays 5. R=129 mm., r=8 mm., R=16 r; breadth of ray at widest part near base, 14 or 15 mm. Resembling *D. mazophora* (Alcock) and *D. euplecta* Fisher, from both of which it differs in having, on the proximal half of ray, a series of small spines between the adambulacral spines and the inferomarginal spines (of which there are 2). On abactinal surface, between the two superomarginal series, are 3 series of spines proximally, and only 1, the carinal, distally; only 1 kind of major pedicellariae present, slender and lanceolate in form; rays pentagonal in section, the width of the lateral face proximally being about two-thirds that of either dorsal face (between superomarginal and carinal row of spines) while distally all four are nearly equal; disk very small, sunken below the dorsal surface of rays; rays constricted at base. *D. dubia* (H. L. Clark) has shorter, relatively stouter rays, stouter abactinal skeleton, larger major pedicellariae, broader and more flattened outer inferomarginal spines, deeply furrowed on the actinal side.

Type.—Cat. No. 37,032, U. S. N. M.

Type locality.—"Albatross" station 5417, between Cebu and Bohol, 165 fathoms, gray mud and sand, bottom temperature 54.4° Fahr.

Tarsaster distichopus, new species.

Diagnosis.—Rays 5. R=48 mm., r=5 mm., R=9.6 r; breadth of ray at base, 6.5 mm. Disk very small, convex; rays long, slender, bluntly pointed; abactinal surface prominently arched, with very slight midradial carinal ridge; actinal surface nearly plane, the sides of ray as defined by the 2 series of marginals, nearly perpendicular, but sloping inward toward the furrow slightly. Differing from *T. stoichodes* Sladen in having 1 adambulacral spine, 1 spine on the midradial plates, prominent unguiculate forficiform pedicellariae in the furrow, and biserial tube-feet.

Type.—Cat. No. 37,031, U. S. N. M.

Type locality.—"Albatross" station 5664, Macassar Strait (4° 43′ 22″ S., 118° 53′ 18″ E.), 400 fathoms, hard bottom, bottom temperature 43.3° Fahr.

Pedicellaster chirophorus, new species.

Diagnosis.—Rays 5. R=27 mm., r=4 mm., R=7r±; breadth of ray at base, 4.5 mm. Rays slender, tapering, disk small; plates cruciform, in regular series, each bearing a short thorny spinelet and 1 to 3 ovoid forcipiform pedicellariae. Adambulacral armature: a transverse row of 3, then 2 spinelets 2 or 3 times longer than those of the adjacent actinal and marginal plates, and here and there along the ray a large unguiculate pedicellaria usually borne on or near the furrow margin; these are 1 to 1.2 mm. long, have usually 3 curved claws or teeth, and resemble 2 minute clasped hands (with 3 short fingers).

Type.—Cat. No. 37,030, U. S. N. M.

Type locality.—"Albatross" station 5656, Gulf of Boni, Celebes (3° 17′ 40″ S., 12° 36′ 45″ E.), 484 fathoms, gray mud, bottom temperature 41.2° Fahr.

Odinia magister, new species.

Diagnosis.—Differing from *O. pacifica* Fisher in having a perfectly smooth integument on the genital region, in having more numerous, stouter and shorter spines (6 or 7) on the largest lateral fans beyond the genital region, and in having a differently formed articulating surface to the first pair of ambulacral plates of the ray. Disk and number of rays unknown. Rays 350 to 360 mm.; breadth at base measured at fifth adambulacral plate (the first one which is not joined to its vis-a-vis of the adjacent ray) 10 mm. Size very large; genital region occupying about one-fourth total length of ray, and crossed by about 10 costae, the first 4 or 5 being very irregular and hard to distinguish; lateral spines 5 to 7, 4 and 3 distally; only 1 subambulacral spine, proximally flattened and grooved at tip; pedicellariae all small; none on the integument of genital region; no integumentary prickles or spinelets.

Type.—Cat. No. 37,026, U. S. N. M.

Type locality.—"Albatross" station 5258, off southern Panay, 10° 27′ 45″ N., 122° 12′ 30″ E.); marked intermediate haul in list of dredging stations.

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PROCEEDINGS
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THE PORTO RICAN GRASSHOPPER SPARROW.*

BY JAMES L. PETERS.

Ridgway, in 1901,† gave the range of *Ammodramus savannarum savannarum* as "Jamaica and Porto Rico, resident; and according to Hartert the islands of Curaçao and Bonaire . . ." Since that time Hartert has described‡ *Ammodramus s. caribaeus* from Curaçao and Bonaire, and *A. s. intricatus*§ from Santo Domingo. Wetmore, in his report on the Birds of Porto Rico,‖ referred specimens of *A. savannarum* from that island to the Haytian race.

While collecting in Porto Rico for the Museum of Comparative Zoölogy in the winter of 1916–17, I secured a small series of the resident Grasshopper Sparrow, and have been able to compare it with the series I collected during the previous winter in Santo Domingo. This study proves that the Porto Rican bird belongs to a hitherto undescribed race, which, instead of being closest to *A. s. intricatus*, is much more like *A. s. savannarum* in appearance, the latter hereby restricted to Jamaica.

The resident form of the Grasshopper Sparrow found in Porto Rico I propose to call

Ammodramus savannarum borinquensis, subsp. nov.

Type, No. 80,493, collection Museum of Comparative Zoölogy, adult male, Cabo Rojo, Porto Rico, February 5, 1917, James L. Peters. (Orig. No. 2009.)

Similar to *A. s. savannarum* (Gmelin), but averaging smaller; crown

* Published by permission of the Director of the Museum of Comparative Zoölogy.
† Bull. 50, U. S. Nat. Mus., Part I (p. 206).
‡ Bull. Brit. Orn. Club, 19, 1907 (pp. 92–94).
§ Nov. Zool., IX, 1902 (p. 298).
‖ Bull. 326, U. S. Dept. Agr., 1916 (p. 127).

A

stripe, edgings of interscapulars, inner secondaries and upper tail-coverts warm buff* instead of light buff, color of the sides of head, flanks, under tail-coverts and band across breast more intense (between cinnamon buff and clay color).

MEASUREMENTS (in millimeters).

M. C. Z. No.	Sex.	Wing.	Tail.	Bill.	Tarsus.
80,492	♂	57	47	12	21
80,493	♂ (type)	58	44	12	21.5
80,494	♀	55	44	12	20.5

December specimens from Jamaica somewhat approach the Porto Rican bird in the intensity of the buff, but may be readily distinguished by the general grayish tone of the upper tail-coverts, which are distinctly buffy in specimens from Porto Rico.

The Santo Domingo bird is different from either, the prevailing ground color of the upper parts is blackish and the buff is paler, particularly above, than even the Jamaican bird.

* Colors according to Ridgway's Standard of 1912.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON THE HERPETOLOGY OF THE VIRGIN ISLANDS.

BY THOMAS BARBOUR.

In continuance of a policy, long since announced, of making a complete survey of the vertebrate fauna of the West Indies, the Museum of Comparative Zoölogy sent expeditions this winter again to Cuba and the Island of Pines, also to Porto Rico and the Virgin Islands. Mr. James Lee Peters spent several months exploring the latter group and visited several islands which have not been visited by a zoologist for many years. He returned to recite the old familiar story of a fauna already sadly depleted and fast disappearing. He found the mongoose excessively abundant upon St. Thomas, St. John and Tortola; he learned that once long ago it had been introduced upon Virgin Gorda, but there it has been completely eradicated *mirabile dictu*, and important if true. This extermination is a unique feat and one for which Virgin Gorda deserves real fame. Anegada is and has ever been quite free, so also Jost van Dyke and Water Island, Mosquito Island, Ginger Island, and others of the smaller outlying Keys.

Most of the islands which Peters visited are similar in general topography. Hilly, and once densely wooded, Tortola, and Virgin Gorda are not strikingly different from St. Thomas. Anegada, on the other hand, belongs to another system—the outer Antillean arc of Suess—and is low, flat, arid, and wholly similar in general characteristics to almost any one of the Bahamas.

These northern Virgin Islands are washed by a northward-drift current. W. C. Fishlock, Esq., curator of the British Experiment Station upon Tortola, told Peters that after the terrific eruption of Mt. Pelée upon Martinique that dugout

canoes and pumice floated ashore upon several islands of the group. This current was also noted by Schomburgk, who visited Anegada about 1836 and who attributed some of the geologic shore formations upon that island to the fact that they were deposits of current-borne silt from the Orinoco River laid down upon her shores. The important and interesting point is that in spite of this evidently strong and efficient current there is no evidence that it has had any influence in supplying the islands with a resident fauna.

I have pointed out in the past that the presence of Amphisbaena upon St. Thomas was extremely significant and I have always had a feeling that other typically Greater Antillean genera would be found to occur among these islands if artificial changes had not already too greatly depleted the fauna. This belief was responsible for Peters' visit, this and the desire to secure Anoles from Tortola to try if possible to settle the status of the much bandied-about *Anolis richardii* of Duméril and Bibron. I can not begin to express the great pleasure I experienced when I found that Peters had a *Bufo* from Virgin Gorda and a *Cyclura* from Anegada. It is no exaggeration to say that these are as significant as any herpetological finds made in the Antilles in recent years. The fauna of the Virgin group, of which only a part still persists, shows that it was truly Greater Antillean and that the islands were beyond doubt connected with a portion of the Greater Antillean land mass—that is with the Cuba, Haiti, Porto Rico area—probably after the separation of Jamaica, to the westward, and the Lesser Antillean land mass, to the southeastward. Dr. G. M. Allen and Mr. Peters while exploring a cave near Ciales in Porto Rico found several jaws which I believe are beyond doubt those of a *Cyclura*, and Mr. G. S. Miller, Jr., informs me that the U. S. National Museum has received what he believes to be the bones of a *Cyclura* from another nearby island. Peters heard of the scinc upon one or two islands, but was unable to secure any; he found snakes very rare—fast disappearing.

SAURIA.

Sphaerodactylus macrolepis Günther.

In the collection there are specimens from St. Thomas, Tortola, Virgin Gorda, and Anegada. These have been compared with a large series in

the M. C. Z. from St. Croix. All belong to the same species; the Anegada specimens are much paler, more ashy, than any of the others, and the variation observable in this large number of individuals shows that *S. grandisquamis* Stejneger, from Porto Rico, distinguished by the larger size of the dorsal scales is really far from conspicuously distinct. The species may perhaps stand, however, since there is no doubt but that the average numbers of scales upon the dorsal area is slightly fewer.

Ameiva exul (Cope).

Peters got ground lizards as follows: 1 from Ginger Island near Tortola, 3 from Tortola, 2 from Mosquito Island near Virgin Gorda, 9 from Virgin Gorda, 13 from Anegada, and 8 from Water Island near St. Thomas. Although this series varies somewhat in coloration from island to island, I believe that beyond doubt all these lots represent the same species. To my disappointment no *Ameiva* of the *polops-wetmorei* series turned up. Ameivæ of this group are excessively rare everywhere, perhaps just disappearing; they may have completely gone in these islands.

Anolis cristatellus Duméril and Bibron.

Peters found this lizard common everywhere, and he secured specimens upon St. Thomas, Anegada, Tortola, Virgin Gorda, Water Island, and Mosquito Island near Virgin Gorda. These have been compared with each other and with specimens in the M. C. Z. from Porto Rico and St. Croix. The species is variable, but I believe the same form inhabits all these different islands. Reinhardt and Lütken (Vid. Meddel. Naturh. Foren., 1862 (1863), p. 249), in their most excellent paper record *cristatellus* from St. Thomas, St. John, St. Croix, Jost van Dyke, Water Island, Tortola, Vieques, and Porto Rico.

Anolis stratulus Cope.

Reinhardt and Lütken (l. c., p. 255) record this species from St. Thomas, Porto Rico, Vieques, Tortola, and Jost van Dyke. Peters found a single example upon Tortola, while Garman got two, years ago, upon St. Thomas, during the *Blake* cruise. These three seem the same as other examples before me from Porto Rico and Vieques.

Anolis pulchellus Duméril and Bibron.

Specimens which have been compared with examples of *pulchellus* from St. Thomas and Porto Rico were taken by Peters upon Virgin Gorda, Tortola, and Anegada. Of these three islands Reinhardt and Lütken had the species from Tortola alone. Peters believes that beyond doubt this and the preceding two species are the only Anoles found upon any of these islands. No sign of *A. krugi* was found, though Stejneger thought (Herp. of Porto Rico, 1902 (1904), p. 659) that possibly *krugi* might occur in the highlands of some of the islands of the Virgin group.

Duméril and Bibron (Erp. Gen., 4, 1841, p. 141) described *A. richardii*, expressly stating that the type was a single example taken on Tortola by

the elder Richard, the botanist. The description in general is vague and verbose but they expressly state that: *a:* the specimen had keeled ventral scales; *b*: the supraorbital semicircles were separated throughout by a single series of scales; *c*: that the large occipital shield was *in contact* with the posterior scales of the semicircles. *Pulchellus* fulfills the first two conditions but not the last. Bocourt figured what he said was the type of *A. richardii* (Miss. Sci. Mex., pl. 15, fig. 6) and the top of the head which he shows fulfills conditions *b* and *c;* but he assures us that the specimen came from Martinique! I can match Bocourt's figure (which shows the upper surface of the head only) with our series of several different Lesser Antillean species but *not* with *A. roquet* (Lacépède) of Martinique; no one, however, of these species has keeled ventrals. Indeed, species with such keeled scales are excessively rare, if not unknown, outside of the Greater Antillean district and the mainland. A few forms like *A. ferreus*, from Guadeloupe, sometimes have the centres of the ventrals swollen but scarcely carinate, in the true sense of the term. Thus the matter stands, and I believe that until the type in Paris can be examined—if it still exists—that it is best to consider *A. richardii* a synonym of *A. pulchellus* and that the type was perhaps anomalous or possibly the describers had another specimen in hand or in mind at the moment the description was penned.

Cyclura pinguis, sp. nov.

Not closely related to any known species. Remarkable in having a heavy, fat, pendulous nuchal fold with but a few flat inconspicuous tubercles representing the nuchal crest; in having the nostrils rather narrowly oval, comparatively small, slanting, and widely separated from the rostral by two rows of large scales. Color in life, where the skin is freshly shed, dark slaty-gray with rather brilliant blue spots—on the tail each spot confined to a single scale.

Type, an aged female, M. C. Z. No. 12,082, from Anegada, British Virgin Islands, March, 1917, J. L. Peters, collector.

Rostral as wide as the mental, not in contact with the nasals; nasals rather small, perforated in an oblique direction, mesially, with a rather narrow elongate opening; each nasal surrounded by many small scales and separated from the rostral by two conspicuous rows of rather large flat scales; no modified supranasals; nasals separated from each other by about four or five polygonal, flat scales, which are similar to those of the whole upper surface of the head; all upper head scales small, flat, or striate, pavement-like, in this aged specimen, their sutures almost indistinguishable; contour scales recalling *C. collei* but arrangement more similar to that of *C. carinata;* no indication of a supraocular disc or nasal horn; occipital very small; eleven supralabials to below the centre of the eye; about four feebly enlarged and keeled scales forming a weak subocular series; no tubercular or swollen scales in the temporal region, no conspicuously enlarged scales below the angle of the mouth; infralabials too indistinct to count; dorsal scales minutely granular; ventrals

much larger, smooth and imbricating; on the nuchal region, a peculiar fleshy fold hanging far over on the right side of the neck, no nuchal spines; series of dorsal spines beginning well posterior to the scapular region, spines 33 in number, highest spines about 10 from posterior end of series, about 1.5 cm. high; series widely interrupted upon the sacral region; caudal crest consisting of about 12 spines which grow progressively smaller from the first to the last spine; upper surfaces of limbs with many series of large diamond-shaped, feebly keeled scales; about 15 femoral pores on each side; toe combs as in *stejnegeri* and *nigerrima;* tail slightly compressed, with segments very poorly defined; each consisting of a short incomplete row and three complete rows each progressively slightly larger in size; distal portion of the tail with a feebly serrate crest of low tubercular scales.

Color in life, brownish gray, on the limbs and tail in patches where the skin has recently shed there are bright blue spots each limited to a single scale.

Mr. Peters heard of the Rock Iguana soon after his arrival upon Anegada but had no success in securing specimens. He reports them excessively rare, an occasional track in the sand being the only evidence of their presence. This island with others near by has suffered terribly from recent hurricanes and the forest or scrub laid low makes getting about the uncleared and uncultivated parts of the islands very difficult, as this wind-blown vegetation has had no time as yet to decay. It was only when Peters found an old iguana hunter who had a dog that finally he was able with extreme difficulty to secure the single living example, now before me. He heard nothing of its existence or persistence in the other islands which he visited, but there can be no doubt that it was previously generally distributed.

Iguana rhinolopha Wiegmann.

A single immature specimen apparently referable to this species was given Mr. Peters by S. Malling-Holm, Esq., who captured it several years ago upon Water Island. Iguanas have been recorded from St. Thomas, Saba, Nevis, and various other islands nearby, sometimes as this species and sometimes as *delicatissima*. Both species occurred, perhaps even on the same islands. They were most probably introduced as food by prehistoric man; there can be little doubt from the nature of their distribution that their dispersal was either deliberately artificial or fortuitous.

SERPENTES.

Alsophis antillensis (Schlegel).

Three specimens from Virgin Gorda vary *inter se* in the intensity of the variegated dark brown dorsum, but in all of them the fifth vertebral row of scales has many of its components parti-colored—half whitish and white black, as is characteristic of the species. Peters did not secure *Lemiadophis* except upon Porto Rico, where he caught two examples of *L. stahli* Stej.

Alsophis anegadae, sp. nov.

Type, an adult, M. C. Z. No. 12,083, from Anegada, British Virgin Islands, March, 1917, J. L. Peters, collector.

Two snakes from Anegada are both alike in having a squamation similar to *A. antillensis* but in being pale ashy gray in color, the fifth scale row not parti-colored, but with a median streak of black. The upper lips are immaculate white, unspotted.

This coloration is probably correlated with the fact that environmental conditions are very different upon Anegada from those characteristics of Porto Rico and the other islands of the Virgin group.

AMPHIBIA.

Bufo turpis, sp. nov.

Type, an adult, M. C. Z. No. 4099, from Virgin Gorda, British Virgin Islands, February, 1917, J. L. Peters, collector.

Very similar to *Bufo lemur* (Cope) of Porto Rico, only differing in a few relatively inconspicuous characters. The flange-like labial margin is sharper and thinner in *turpis;* the snout is slightly more projecting and depressed and the median cephalic ridges are more widely separated, the forehead being rather more deeply concave. The color is ashy gray, the asperities are tipped with black; there are two dark ocelli upon each thigh.

By the merest chance a negro lad, near Spanish Town, Virgin Gorda, found this toad either under or in a water barrel—Peters was not sure which. No one to whom he showed it had ever seen a similar creature nor did the offer of a large reward bring forth a second specimen. Indeed, the fact that there was a resident toad about was a possibility entirely unsuspected by every one. Whether a toad, equally rare, or of similarly retiring habits occurs upon Tortola and St. Thomas may never be known, but we can hardly doubt that once there was one. Stejneger's account of finding *Bufo lemur* is almost as astonishing as Peters' good fortune (see Herp. of Porto Rico, 1902 (1904), p. 573). Reinhardt and Lütken knew of no indigenous toad in this region though (l. c., p. 202) they say that toads occasionally appear in St. Thomas carried in lumber from Haiti and Vieques. This statement is wholly incredible and refers, at that, they say only to *Bufo marinus* (L.) which has been artificially introduced to most of the West Indies. Reinhardt and Lütken evidently had their facts wrong, for *Bufo marinus,* a species impossible to mistake for any other, has never been introduced into Haiti or Vieques. Probably these authors had been informed that Hylas or other arboreal "toads" were occasionally carried about, for this occurs commonly.

Eleutherodactylus antillensis (Reinhardt and Lütken).

Series from both St. Thomas and Tortola are the same as examples from Vieques. It was previously unknown from Tortola. Dry weather conditions made the collecting of Eleutherodactyli very difficult, and on St.

Thomas not a single example of *E. lentus* was taken where it abounds and is usually found to be much more common than this species.

Leptodactylus albilabris (Günther).

Previously known from Porto Rico, Vieques, St. Thomas (type locality), St. Croix, and Jost van Dyke, it is before me now in large series from both Tortola and Anegada. With every added locality recorded the probability that its presence in the islands is fortuitous, becomes less and less. The identity of *albilabris* with *labialis* is probably a pure case of chance resemblance. The Virgin Islands individuals in the M. C. Z., now many, all differ from the large Porto Rican series in that they do not have the conspicuous white middorsal band so frequent in examples from that island. They have instead irregular arabesque or geometric markings of dark slate, edged with a narrow whitish line. Some specimens taken at St. Croix by Messrs. Ruthven and Noble, who chanced to be there together during the summer of 1914, show a very peculiar condition. The edge of the snout is projected and thickened as if to serve as a burrowing adaptation. None of these specimens taken during the winter show this modification; there can be no doubt as to all the individuals being conspecific and this may be a peculiarity assumed only during the mating season.

A recent dissection of the unique type of *Leptodactylus inoptatus* Barbour from Hayti, made by Mr. G. K. Noble, reveals the very unexpected fact that *inoptatus* is in reality a giant *Eleutherodactylus*. It does not seem to be closely related to any hitherto described Antillean species of the genus but it does have certain rather striking features in common with *Eleutherodactylus insignatus* Ruthven recently described from the Santa Marta Mts. in Colombia.

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PROCEEDINGS

OF THE

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DESCRIPTION OF A NEW RACE OF SAY'S GROUND SQUIRREL FROM WYOMING.

BY ARTHUR H. HOWELL.

A study of the Wyoming specimens of the genus *Callospermophilus* in the Biological Survey collection for the purpose of mapping the ranges of the several forms shows that an unrecognized race occupies the Wind River and Gros Ventre ranges, with their foothills. It is here named for Mr. Merritt Cary, of Neligh, Nebraska, in recognition of his work on the Wyoming fauna.

Callospermophilus lateralis caryi, subsp. nov.

Type, Adult female, skin and skull, No. 176,826, U. S. National Museum (Biological Survey Collection), from 7 miles south of Fremont Peak, Wind River Mountains, Wyoming (altitude 10,400 feet); collected July 19, 1911, by Merritt Cary; original number, 2211.

General characters.—Similar to *C. l. castanurus*, but upperparts (in spring pelage) decidedly grayer (less vinaceous); dorsal stripes clearer white; head, mantle, and rump paler; under surface of tail much paler. Compared with *cinerascens:* Under side of tail darker (clear pinkish cinnamon or tawny unmixed with black); mantle paler; skull decidedly smaller. Compared with *lateralis:* Upperparts grayer; dorsal stripes more distinct, the black and white stripes strongly contrasted; sides and underparts clearer white; under side of tail darker.

Color.—Worn winter pelage: Upperparts smoke gray more or less mixed, especially on head, shoulders, and rump, with cinnamon or pale russet; dorsal stripes broad, clear white, bordered on each side with a clear black stripe; underparts grayish white; feet white; under surface of tail varying from pinkish cinnamon to tawny, bordered with black, the sides tipped with pinkish buff. *Summer pelage* (specimen from Gros Ventre Range, 12 miles northwest of Kendall, Wyo.): Head and mantle tawny; sides of nose grayish white; white dorsal stripes tinged with buff; median dorsal area vinaceous cinnamon, mixed with whitish; sides, underparts, and feet washed with cinnamon-buff; tail as in winter pelage.

A

Skull.—Similar to that of *castanurus*, possibly averaging a little larger; decidedly smaller than that of *cinerascens* or of *lateralis*.

Measurements.—Average of 6 adults from Wind River and Gros Ventre ranges: Total length, 274.5; tail vertebræ, 95; hind foot, 40.7. *Skull* (type): occipito-nasal length, 42.7; zygomatic breadth, 25.9; mastoidal breadth, 18.4; least interorbital breadth, 12; length of nasals, 14.2; alveolar length of maxillary toothrow, 8.2.

Remarks.—This race is most nearly related to *castanurus* from which it may always be distinguished by its paler tail. In winter pelage *caryi* is decidedly grayer dorsally than *castanurus;* in summer pelage the differences in color apparently are less, but only a single adult in full pelage has been examined and that from a region where we might expect intergradation to occur. Certain immature specimens of *caryi* bear a marked resemblance to certain specimens of *trepidus* from Nevada, but comparison of typical adults shows that *caryi* differs from that form in having the shoulders and sides of the head darker—tawny instead of ochraceous.

Specimens examined.—Total number, 11, from localities as follows: Wyoming: Fremont Peak, 3; Lake Fork, Wind River Mts., 2; Bull Lake, Wind River Mts., 1; Jakey's Creek, 5 miles south of Dubois, 3; Kendall (12 miles northwest), 1; Jackson, 1.

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PROCEEDINGS

OF THE

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NEW MAMMALS FROM NORTH AND MIDDLE AMERICA.

BY E. A. GOLDMAN.

General comparison of museum material in connection with work in progress has revealed the existence of ten hitherto unrecognized subspecies of mammals representing various orders, families and genera. For the privilege of studying collections in their charge, and other courtesies I am much indebted to Dr. J. A. Allen and Mr. H. E. Anthony of the American Museum of Natural History, New York, and to Mr. Samuel Henshaw, Mr. Outram Bangs, Dr. Glover M. Allen, and Dr. Thomas Barbour of the Museum of Comparative Zoölogy, Cambridge, Massachusetts.

The new forms are described as follows:

Didelphis marsupialis particeps, subsp. nov.

SAN MIGUEL ISLAND OPOSSUM.

Type from San Miguel Island, Panama. No. 8439, ♂ adult, Museum of Comparative Zoölogy (Bangs collection), collected by W. W. Brown, Jr., May 8, 1900. Original number 165.

General characters.—Similar in general to *Didelphis marsupialis etensis* as represented on adjacent mainland, and *Didelphis marsupialis colombica* of South America, but face less blackish and skull differing from both in structural details, especially the narrow braincase and posteriorly spreading zygomata.

Color.—*Type:* Muzzle yellowish; cheeks, middle of face and areas over eyes grayish brown; over fur on top and sides of head and over dorsum black, the under color pale yellowish; under side of neck and abdomen yellowish or buffy, tinged with black; orbital rings, ears, limbs, inguinal region and basal third of tail black; terminal two-thirds of tail (epidermis) yellowish.

Skull.—Rather small, short and broad in general dimensions with broad rostrum, narrow braincase and posteriorly expanded zygomata.

Similar to those of *D. m. etensis* of the adjacent mainland, and *D. m. colombica*, but zygomata narrower anteriorly, more abruptly turned outward posteriorly, the sides less nearly parallel; premaxillæ broader, but less extended posteriorly, the outer borders notched or indented near posterior tips; nasopremaxillary suture longer owing to shortening of premaxillæ; frontopremaxillary line of contact between nasal and lachrymals longer; rostrum similar to that of *D. m. columbica*, broader than that of *D. m. etensis;* molars slightly smaller than in mainland forms.

Measurements.—Type: Total length, 820; tail vertebræ, 405; hind foot, 64. An adult female topotype: 800; 410; 60. *Skull* (type): Greatest length, 102.5; zygomatic breadth, 58.2; breadth of rostrum in front of antorbital foramina, 20.3; postorbital constriction, 10.1; length of longest nasal, 49; length of nasopremaxillary suture, 10; length of nasomaxillary suture, 22.8; maxillary toothrow (back of last molar to front of canine), 44.5.

Remarks.—Like the other mammals of San Miguel Island this opossum is clearly allied to forms inhabiting the adjacent mainland. In contrast with the subspecies occupying Coiba Island the face is light in color. The differential cranial characters noted are rather slight, but apparently distinctive. The type and topotype are in the black phase.

Specimens examined.—Two, from the type locality.

Marmosa mexicana savannarum, subsp. nov.

SAVANNA MARMOSA.

Type from Boqueron, Chiriqui, Panama. No. 18,915, ♂ subadult (molars slightly worn), American Museum of Natural History, collected by J. H. Batty, October 31, 1901. Original number 883.

General characters.—Allied to *Marmosa mexicana isthmica* and *Marmosa mexicana zeledoni*, but much smaller and paler than either; upperparts more ochraceous; fur on middle of throat and chest nearly pure white to roots, instead of light buffy as in *M. m. isthmica.*

Color.—Type: Upperparts between ochraceous—tawny and cinnamon-brown (Ridgway, 1912), darkest on top of head and over back, becoming more tawny on shoulders and outer sides of fore limbs, and lighter ochraceous-tawny on flanks and outer sides of hind limbs; chin, middle of throat, chest, and median line of abdomen nearly pure white to roots, rest of underparts near light ochraceous-buff; orbital areas black as usual in the group; feet (epidermis) yellowish, the hind feet clothed above with short whitish hairs; tail brownish, slightly darker above than below.

Skull.—Much smaller and more slender, but in general structure essentially like that of *M. m. isthmica.*

Measurements.—Type: Total length, 267; tail vertebræ, 147; hind foot, 20. *Skull* (type): Greatest length, 32; condylobasal length, 30.8; width of braincase over audital bullæ, 11.4; zygomatic breadth, 16.7; nasals, 19.5x3.9; interorbital breadth, 5; palatal length, 17.8; upper molariform toothrow, 12.1.

Remarks.—Contrasted with its geographic neighbors this small opossum is sufficiently distinguished by small size and pale coloration. The latter

character is shared with other mammals inhabiting the same generally open savanna region, and is evidently associated with environmental conditions.

On the assumption that the rufescent pigmy opossums of Middle America are referable to the Linnaean species "*murina*" this name was included by True in his "provisional List of the Mammals of North and Central America and the West Indian Islands,"* the animal being credited by him with a range from "Mexico to Brazil." The type region has since been fixed by Thomas as Surinam† and specimens regarded by him as cotypes are extant in the British Museum. Meanwhile numerous forms of the genus *Marmosa* have been described by various authors, most of which were treated as distinct species, but whose relationships are little known. Species apparently assignable to the same section of the genus inhabit Middle America, northern South America, and extend to some of the southern islands of the West Indies. The continental Middle American forms now known may confidently be referred to a single species which may prove to be typified by *murina* of Surinam; but until the Linnaean animal and other South American forms already named are better known it seems advisable to regard them as distinct.‡ These small opossums are not to be confused with the still smaller light gray members of the *Marmosa canescens* group which ranges in southern and western Mexico.

Specimens examined.—Total number, 5, all from southwestern Panama, as follows: Boqueron (type locality), 2§; Bugaba, 3‖.

Pecari angulatus bangsi,¶ subsp. nov.

BANGS COLLARED PECCARY.

Type from Boca de Cupe, eastern Panama (altitude 250 feet). No. 179,976, ♂ (posterior molars slightly worn), U. S. National Museum (Biological Survey collection), collected by E. A. Goldman, June 19, 1912. Original number 21,790.

General characters.—Similar to *Pecari angulatus crusnigrum*, but general color decidedly paler, the black less predominant and lighter element of pelage grayish or very pale buffy instead of tawny as in *crusnigrum;* shoulder stripe obsolescent (a broad tawny band present in *crusnigrum*). General color similar to that of *Pecari torvus*, of Colombia, but shoulder stripe much less distinct, and dentition indicating rather distant relationship.

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* Proc. U. S. Nat. Mus., VII (1884), 1885, p. 587.

† Proc. Zoöl. Soc. London, Mar., 1911, p. 144.

‡ On this basis Middle American forms may stand subspecifically as follows:

Marmosa mexicana mexicana Merriam . . . . . Juquila, Oaxaca, Mexico.
Marmosa mexicana mayensis Osgood . . . . . Izamal, Yucatan, Mexico.
Marmosa mexicana zeledoni Goldman . . . . . Navarro, Costa Rica.
Marmosa mexicana isthmica Goldman . . . . . Rio Indio, Canal Zone.
Marmosa mexicana savannarum Goldman . . . . . Boqueron, Panama.

§ Collection Amer. Mus. Nat. Hist.

‖ Collection Mus. Comp. Zoöl.

¶ Named for Mr. Outram Bangs, in recognition of his extensive work on the mammals of Panama.

Color.—Type: General body color coarsely mixed (grizzled) black and gray, the black most profuse along median line from top of head to rump and on middle of chest and abdomen; face more finely grizzled black and gray; limbs and feet black.

Skull.—About like that of *P. a. crusnigrum*, but rostrum rather slender and molariform toothrows rather short; posterior molars rather small and short as in other Middle American forms.

Measurements.—Type: Total length, 890; tail vertebræ, 20; hind foot, 185. *Skull:* Greatest length, 218.2; condylobasal length, 186.2; zygomatic breadth, 98.9; interorbital breadth, 47.2; breadth across postorbital processes, 64.2; palatal length, 132.3; maxillary toothrow, 59; mandibular toothrow, 65.3; alveolar length of posterior upper molar, 13.7.

Remarks.—The Darian collared peccary differs markedly in appearance from the dark, richly colored animal inhabiting western Panama, but along with that form seems clearly assignable to the single species known to occur in Middle America. Except for the indistinct collar it is externally not very unlike *Pecari torvus* Bangs, of the Santa Marta region of northern Colombia, but the posterior upper molar is less elongated owing to the absence of prominently developed and apparently important elements behind the hypocone and metacone. The metaconule is also smaller.

Specimens examined.—Total number, 13, as follows: Canal Zone: Gatun, 2. Panama: Boca de Cupe (type locality), 1.

Peromyscus eremicus papagensis,* subsp. nov.

PINACATE DESERT MOUSE.

Type from Pinacate Mountains, Sonora, Mexico. No. 210,698, ♀ adult, U. S. National Museum (Biological Survey collection), collected by Charles Sheldon in February, 1915.

General characters.—Similar in general to *Peromyscus eremicus eremicus* and *Peromyscus eremicus anthonyi*, but upperparts decidedly darker, the general tone vinaceous-buffy instead of ochraceous-buffy.

Color.—Type (fresh pelage): Upperparts vinaceous-buff, becoming somewhat tawny on flanks, the top of head and back strongly darkened by black hairs; underparts overlaid with white, the basal color plumbeous, except on chin and lips where the fur is pure white to roots; ears and orbital borders blackish; feet white; tail bicolor, blackish above, dull whitish below except near tip which is dark all around. *Young* (in first pelage): Upperparts near neutral gray, mixed with black.

Skull.—As in *P. e. anthonyi.*

Measurements.—Type (from dry skin): Total length, 196; tail vertebræ, 102; hind foot, 20.5. *Skull* (type): Greatest length, 25.5; zygomatic breadth, 13.3; interorbital breadth, 4; length of nasals, 8.9; length of anterior palatine foramina, 4.7; length of palatal bridge, 4.1; maxillary toothrow, 3.8.

* From Papago, the name of the tribe of Indians inhabiting the general region of the type locality.

Remarks.—The tawny suffusion of the flanks is variable in the Pinacate desert mouse, some examples exhibiting more of this tone than others; but the dark vinaceous-buffy general coloration of the upperparts is constant in the series of specimens available and sufficiently distinguishes the animal from *P. e. anthonyi* which is widely distributed in the region to the eastward and southward. Although the two differ rather strikingly in color they seem identical in size and cranial details and it seems advisable to treat the present form as a subspecies. Its peculiar color is paralleled by that of *Neotoma albigula sheldoni* from the same region, these locally associated subspecies representing different subfamilies which have yielded to similar environmental conditions. It is noteworthy, however, that specimens of *Perognatus baileyi* Merriam taken at the same locality and at the same time present no appreciable departure from the typical form. The discovery of the Pinacate desert mouse is one of the results of three expeditions to Sonora conducted by the hunter-naturalist Mr. Sheldon, each of which has added materially to our knowledge of the mammals of that interesting region.

Specimens examined.—12, all from the type locality.

Neotoma cinerea lucida, subsp. nov.

NEVADA BUSHY-TAILED WOOD RAT.

Type from Charleston Peak, Charleston Mountains, Nevada. No. 208,968, ♀ adult, U. S. National Museum (Biological Survey collection), collected by Luther J. Goldman, July 1, 1915. Original number 2282.

General characters.—Size smallest and color among the palest of the known forms of *Neotoma cinerea.* Most closely allied to *Neotoma cinerea cinerea,* but decidedly smaller and paler; skull differing in detail, but sphenopalatine vacuities absent as in *N. c. cinerea.* Similar in color to *N. c. arizonæ* and *N. c. rupicola,* but size smaller and skulls distinguished by absence of sphenopalatine vacuities present in those forms.

Color.—Upperparts between light buff and light ochraceous-buff, rather sparingly lined over top of head and back with black-tipped hairs; middle of face, sides of muzzle, cheeks and outer sides of limbs buffy grayish; underparts and feet white; ears clothed with mixed grayish and pale brownish hairs; tail grayish above, white below, except near base, which is more or less distinctly buffy all around. *Young* (in first pelage): Upperparts near pallid neutral gray, the back somewhat darkened by black-tipped hairs; tail very pale grayish above, edged with pure white.

Skull.—Decidedly smaller than those of the other forms of *N. cinerea,* with zygomata relatively broader anteriorly and narrower posteriorly, the sides therefore more nearly parallel; frontal region flatter, less depressed along median line; sphenopalatine vacuities absent as in *N. c. cinerea.*

Measurements.—Type: Total length, 324; tail vertebræ, 131; hind foot, 39. Average of three adult females, including type: 335 (324–352); 134 (130–141); 39.5 (39–40). *Skull* (type): Greatest length, 45.4; zygomatic breadth, 24; interorbital breadth, 5.5; length of nasals, 17.6; length of anterior palatine foramina, 9.9; length of palatal bridge, 7.9; maxillary toothrow, 9.1.

Remarks.—In small size and pale coloration, as well as cranial details, this bushy tailed woodrat contrasts strongly with *N. c. cinerea*, which includes the greater part of Nevada in its wide range. While adults are similar to *N. c. arizonæ* and *N. c. rupicola* in color, the young are much grayer and the cranial characters pointed out are distinctive. The audital bullæ are normally developed, not relatively enlarged as in the geographic neighbor, *N. c. arizonæ*. Like that of *N. c. arizonæ* the tail is reduced in bushy amplitude in comparison with the more northern subspecies.

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

Perodipus ordii luteolus, subsp. nov.

WYOMING KANGAROO RAT.

Type from Casper, Wyoming. No. 160,408, ♂ adult, U. S. National Museum (Biological Survey collection), collected by Merritt Cary, September 2, 1909. Original number 1690.

General characters.—A large, pallid, long-tailed subspecies with moderately developed maxillary arches, and mastoid and audital bullæ. Most closely allied to *Perodipus ordii richardsoni*, but general external dimensions greater; tail and hind foot longer; color paler; skull differing especially in reduction of maxillary arches. Closely resembling *Perodipus ordii longipes* in general size and color, but mastoid and audital bullæ much smaller.

Color.—Fresh pelage (September): Upperparts in general varying shades between light buff and light ochraceous-buff (Ridgway, 1912), purest on cheeks, shoulders and sides, inconspicuously lined with black over top of head and back; underparts, supraorbital and postauricular spots, forelimbs, upper surface of hind feet, sides of tail and the usual hip stripes pure white; top of nose, base of longer vibrissæ, narrow orbital rings, inner surface of ears, plantar surface of hind feet, and upper and under sides of tail more or less distinctly blackish. *Worn pelage:* Upperparts slightly darker, more ochraceous-buffy and dusky markings faded. *Young* (in first pelage): About like adults but dark markings, especially crested tip of tail, more distinctly blackish.

Skull.—General size and form much as in *P. o. richardsoni*, but maxillary arches less developed between lachrymals and jugals, the posterior angle less prominent; interparietal and superior surface of supraoccipital less depressed; braincase tending toward greater inflation and consequent expansion of the frontal region; mastoid and audital bullæ about as in *richardsoni*. Similar in size to that of *P. o. longipes*, but mastoid and audital bullæ decidedly smaller.

Measurements.—Type: Greatest length, 272; tail vertebræ, 154; hind foot, 42. Average of three adults, including type, from type locality: 263 (258–272); 150 (147–154); 41.5 (41–42). *Skull* (type): Greatest length on median line, 38.1; greatest breadth (between outer sides of audital bullæ), 24.3; breadth across maxillary arches, 21.2; least width of supraoccipital (near interparietal), 2.8; maxillary toothrow, 4.8.

Remarks.—The range of this subspecies includes Wyoming, southeastern

Montana and the upper part of the Green River Valley in northwestern Colorado. It is a rather well-marked geographic race of *Perodipus ordii* requiring close comparison only with subspecies *P. o. richardsoni*. The species to which it belongs occupies a great area in western North America from southern Washington, Idaho, and Montana southward including much of the Mexican plateau region. Differentiation of the various northern subspecific divisions is due to isolation and varying environmental conditions on the plains and in the valleys along both the eastern and western slopes of the Rocky Mountains. The material now available indicates nearly every stage of intergradation between several forms and the close agreement of the others in essential characters amply justifies their assignment to a single species.* The range of *P. o. luteolus* extends across to the headwaters of Green River and is approached by those of *P. o. columbianus*, *P. o. utahensis*, and *P. o. longipes* in the valleys of the western slope of the Rocky Mountains, but physical features near the continental divide appear to be insurmountable barriers.

Dasyprocta punctata nuchalis, subsp. nov.

BLACK-NAPED AGOUTI.

Type from Divala, Chiriqui, Panama. No. 10,081, ♀ adult, Museum of Comparative Zoölogy (Bangs collection), collected by W. W. Brown, Jr., November 30, 1900. Original number 17.

General characters.—Allied to *Dasyprocta punctata isthmica* and *Dasyprocta punctata dariensis*, but strikingly different in color from either, the nape distinctly blackish in contrast with shoulders, instead of nearly concolor with them, and underparts much more yellowish than in the other Panama forms. Pelage of back and rump without buffy basal rings or bands.

Color.—Top of head and nape strongly blackish, the nape nearly pure black; sides of neck and shoulders, anterior part of back and sides coarsely mixed black and varying shades near ochraceous-buff or ochraceous-orange (Ridgway, 1912); posterior part of back distinctly tawny, paling rather abruptly to warm buff on rump; long hairs of rump dusky below buffy tips; underparts in general warm buff, this color nearly pure and reaching to roots of fur on inner sides of limbs and median line of abdomen, but darkened on throat, chest, and sides of abdomen where the dusky basal color shows through; feet blackish.

Skull.—About as in *D. p. isthmica* and *D. p. dariensis*.

Measurements.—*Type:* Total length, 570; tail vertebræ, 20; hind foot,

* *Perodipus ordii* will therefore stand subspecifically as follows:

Perodipus ordii ordii (Woodhouse)	El Paso, Texas.
Perodipus ordii columbianus Merriam	Umatilla, Oregon.
Perodipus ordii utahensis Merriam	Ogden, Utah.
Perodipus ordii chapmani (Mearns)	Fort Verde, Arizona.
Perodipus ordii montanus (Baird)	Fort Garland, Colorado.
Perodipus ordii longipes Merriam	Echo Cliffs, Arizona.
Perodipus ordii luteolus Goldman	Casper, Wyoming.
Perodipus ordii richardsoni (Allen)	Beaver River, Oklahoma.
Perodipus ordii palmeri (Allen)	San Luis Potosi, Mexico.

125. An adult male and female from Bugaba, respectively: Total length, 550–600; hind foot, 120–125. *Skull:* Greatest length, 105; condylobasal length, 95; zygomatic breadth, 46.9; length of nasals, 39.3; interorbital breadth, 29.4; palatal length, 52; maxillary toothrow, 19.2.

Remarks.—The agouti inhabiting the savanna region near the Pacific coast of southwestern Panama is a handsome subspecies readily distinguished from its geographic neighbors by the contrasting colors of the upperparts. The black nape, tawny back and buffy rump present a color combination unusual in the group.

Specimens examined.—Total number, 5, all from Panama as follows: Bugaba, 2; Divala (type locality), 3.

Dasyprocta punctata richmondi, subsp. nov.*

RICHMOND'S AGOUTI.

Type from Escondido River, 50 miles above Bluefields, Nicaragua. No. 51,333, ♀ adult, U. S. National Museum (Biological Survey collection), collected by C. W. Richmond, November 16, 1892. Original number 156.

General characters.—A dark, richly colored form with concolor back and rump, and pelage banded or ringed to base. Similar in general to *Dasyprocta punctata yucatanica* and *Dasyprocta punctata isthmica*, but darker than the former and more rufescent than either.

Color.—Upperparts in general varying from rich tawny to near burnt sienna (Ridgway, 1912), coarsely mixed with black, the tawny or rufescent element predominating especially over back and rump; underparts in general overlaid with varying shades from warm-buff to ochraceous-buff, except along median line of abdomen, where the buffy color extends to roots of hairs; feet black.

Skull.—Similar in size to that of *D. p. isthmica*, but rostrum narrower; sphenopalatine vacuities usually larger; audital bullæ more inflated anteriorly. Closely resembling that of *D. p. yucatanica*, but audital bullæ usually smaller and less fully inflated.

Measurements.—Type: Total length, 490; tail vertebrae, 35; hind foot, 123. *Skull:* Greatest length, 110.7; condylobasal length, 101.4; zygomatic breadth, 49.4; nasals, 44.4; interorbital breadth, 28.4; palatal length, 57.4; maxillary toothrow, 17.9.

Remarks.—Dasyprocta punctata was originally assigned to South America, but according to Alston † the specimens forming the basis of Gray's ‡ short account were collected by Commanders Belcher and Kellett "probably on the west coast of Costa Rica or Nicaragua." Since Belcher's ship "Sulphur" made protracted visits to Realejo and vicinity in 1837, 1838 and 1839, but touched very briefly at other points on the Middle American coast the type region of *D. punctata* is most probably western Nicaragua. In *D. p. richmondi* the hairs of the back are ringed or banded to the base in accordance with Gray's description of the typi-

* Named for the collector, Dr. Charles W. Richmond, now Assistant Curator of Birds, U. S. National Museum.

† Biologia Centrali-Americana (Mammalia), 1879–1882, p. 172.

‡ Ann. Mag. Nat. Hist., X, p. 264, Dec., 1842.

cal form, but the "greenish yellow" color ascribed to the latter obviously could not apply to *richmondi*, which is characterized by intensely rufescent tones.

Specimens examined.—Total number, 21, as follows:

Costa Rica: San Juan, 1; Talamanca (probably near Sipurio), 5.

Nicaragua: Escondido River (type locality), 3 skins and skulls, and 12 additional skulls.

Vampyrus spectrum nelsoni, subsp. nov.

NELSON'S FALSE VAMPIRE.

Type from Coatzacoalcos, Vera Cruz, Mexico. No. 78,127, ♂ adult, U. S. National Museum (Biological Survey collection), collected by E. W. Nelson, May 14, 1896. Original number 9579.

General characters,—Similar to *Vampyrus spectrum spectrum*, but smaller; forearm shorter; skull differing in detail, especially the reduction of hypocone of posterior upper premolar.

Color.—Type in alcohol: General color of fur rusty-brownish, and not obviously different from that of *V. s. spectrum*.

Skull.—Rather decidedly smaller than that of *V. s. spectrum*; zygomata less abruptly spreading posteriorly, the sides more nearly parallel; hypocone of posterior upper molar less developed, the projecting shelf-like border less extended antero-posteriorly; large upper molars with posterior borders less deeply emarginate.

Measurements.—Type: Forearm, 106.9; tibia, 53.5; foot with claws, 31 (without claws, 25). *Skull* (type): Greatest length, 51; zygomatic breadth, 23.6; width of braincase at constriction over audital bullæ, 18; width of rostrum over anterior premolars, 8.1; width of palate at back of posterior molars, 4.8; maxillary toothrow (front of canine to back of posterior molar), 20.2; mandibular toothrow (front of canine to back of posterior molar), 22.4.

Remarks.—Vampyrus spectrum, the largest of American bats, was assigned by Linnæus to South America, but is now known to range north into the West Indies and Middle America. Two specimens from Trinidad, kindly loaned by the American Museum of Natural History, are assumed to be nearly typical of *V. spectrum* of Surinam* and have been used for comparison. On the basis of this material examples from Middle America are referred to *V. s. nelsoni* which, however, apparently reaches its greatest divergence from the South American form in Mexico. Specimens from Nicaragua and Panama, as might be expected for geographic reasons, are somewhat intermediate in general characters including size. In the posterior excavation of the large upper molars, they approximate the typical subspecies, but in the reduction of the hypocones of the posterior upper premolars agree closely with the type. In one of the Trinidad examples of *V. s. spectrum* an additional small upper premolar is present on one side at the postero-external base of the canine.

Vampyrus spectrum appears to be a rare species, at least in Middle

* Type region fixed by Thomas, Proc. Zool. Soc. London, Mar., 1911, p. 180.

America, comparatively few specimens having found their way into museum collections. The type of the new form here described flew one evening through the open door of the American Consulate at Coatzacoalcos where Mr. Nelson happened to be sitting, and was secured by him. The curiosity of the people was aroused by its capture, but none of those questioned had ever seen such a bat, and no other examples were met with by us in the course of our work in tropical Mexico.

Specimens examined.—Total number, 4, as follows:

Mexico: Coatzacoalcos (type locality), 1.

Nicaragua: Chinandega, 1.

Panama: Boqueron, 2.

Sturnira lilium parvidens, subsp. nov.

NORTHERN YELLOW-SHOULDERED BAT.

Type from Papayo (about 25 miles northwest of Acapulco), Guerrero, Mexico. No. 126,555, ♀ adult, U. S. National Museum (Biological Survey collection), collected by E. W. Nelson and E. A. Goldman, April 17, 1903. Original number 16,313.

General characters.—Similar in general to *Sturnira lilium lilium* of Paraguay, but forearm and tibia usually shorter; skull similar in length but narrower, with smaller molariform teeth.

Color.—Within the range of individual variation exhibited by examples of *S. l. lilium;* upperparts in the type (dry skin) overlaid with cinnamon-brown, the basal color of the fur near clay color; underparts tawny-olive. A younger example is drab brownish above and below.

Skull.—About like that of *S. l. lilium* in length, but narrower throughout; incisive foramina less widely open; molariform teeth smaller, the reduction in size mainly in transverse extent.

Measurements.—Type: Forearm, 41.9; tibia, 14.2; foot (calcaneum to end of claw), 13.3 (without claw), 12. *Skull* (type): Greatest length, 23.4; breadth of braincase (across paroccipital processes), 11.6; interorbital breadth, 6; maxillary toothrow (front of canine to back of posterior molar), 6.6; mandibular toothrow, 7.9; distance between outer sides of canines at cingulum, 5.9.

Remarks.—Sturnira lilium, undivided subspecifically, has been accorded a geographic range from Paraguay to Mexico, but comparison of Mexican material with 24 examples from Villa Rica and Sapucay, Paraguay, reveals the existence of a well-marked northern race. The forearm is shorter in most of the specimens available of the Mexican form, but in two from Mirador it is as long as in some of the Paraguayan examples. Characters more obviously distinguishing the Mexican form are the narrowness of the skull and molariform teeth. The skull of the specimen from La Tuxpana, Campeche, appears abnormally small (greatest length, 20.1) for a form of *S. lilium* and may represent that of a distinct species.

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

Campeche: La Tuxpana, 1.

Guerrero: Papayo (type locality), 1.

Vera Cruz: Mirador, 4.

Vol. 30, pp. 117–118 May 23, 1917

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW HONEY-EATER FROM THE MARIANNE ISLANDS.

BY ALEXANDER WETMORE.

Comparison of specimens of *Myzomela rubratra* (Lesson) from the Caroline and Marianne Islands, has shown that birds from the latter group represent a distinct form. As there is no name available for this subspecies, it may be known as:

Myzomela rubratra saffordi subsp. nov.*

Characters.—Similar to *Myzomela rubratra rubratra* (Lesson), but red of under parts, head, back, and rump distinctly paler.

Description.—Type No. 188,868, U. S. National Museum, male, from Guam, Marianne Islands, collected June 7, 1900, by A. Seale (collector's number, 1547). Wings, scapulars, an interrupted band across upper back, lores, axillary region, tail, under tail coverts, thighs, and lower abdomen black; rest of plumage scarlet.†

Measurements.—Males (9 specimens from Guam), wing, 73.3–75.0 mm. (73.9); tail, 50.0–54.0 (52.5); exposed culmen, 17.0–18.0 (17.5); tarsus, 21.3–23.0 (22.1).

Range.—Islands of Guam and Saipan. (Specimens from other islands in the Marianne Group not seen.)

Remarks.—*Myzomela r. saffordi* has the wing shorter than *Myzomela r. rubratra* from Kusaie (the type locality). The tail and culmen average a very little less than in the typical form. Only one specimen, a male, has been seen from Saipan in the Marianne Islands. This apparently is an immature bird that is just assuming adult plumage; it has the red of the underparts paler than the series examined from Guam. This difference may be due to age, but it is possible that with additional material the Honey-eaters from the two islands may be separated as distinct forms. For the present the bird from Saipan is considered identical with those from Guam.

* Named for Mr. W. E. Safford, in recognition of his work on the natural history of Guam.

† Ridgway, R., Color Standards and Nomenclature, 1912.

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Bonaparte, in 1854,* recognized that the Red Honey-eaters from the Marianne Islands differed from those found in the Carolines. However, he assigned *Myzomela rubratra* of Lesson to birds from the Marianne Group, and named the Caroline Islands birds *Myzomela major*. As Lessont described his *Cinnyris rubrater* from "Oualan," an old name for the island of Kusaie, in the eastern Carolines, *Myzomela major* of Bonaparte becomes a synonym of of *M. r. rubratra*.

* Compte Rendu, 1854, pp. 263-264.
† Dict. Sc. Nat., Vol. 50, 1827, p. 30.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW GENUS OF ANATIDAE.

BY HARRY C. OBERHOLSER.

The Laysan teal, *Anas laysanensis*, is a bird of considerable interest by reason of its rarity and its limited island distribution. It was originally described from the island of Laysan by Dr. Walter Rothschild in 1892;* and since then but few specimens have been obtained, and comparatively little concerning its life history has been made known.

This species has been commonly placed in the genus *Anas* Linnaeus, but recent examination of the specimens in the United States National Museum, including the Biological Survey collection, shows that it certainly does not belong in that group. As it is not referable to any other known genus, it becomes necessary to provide a new monotypic generic group for its reception, as follows:

Horizonetta, gen. nov.†

Chars. gen.—Similar to *Anas* Linnaeus, but bill more spatulate, decidedly wider terminally than at base, more depressed and slightly upturned; basal portion of culmen more elevated, narrower and more sharply ridged; nail of maxilla more triangular; lamellae of maxilla and mandible much less well developed, in places even obsolescent; and tertials relatively longer.

Type.—*Anas laysanensis* Rothschild.

Remarks.—Excepting *Anas* Linnaeus, the nearest ally of this peculiar genus is apparently *Querquedula* Stephens. From *Querquedula* it differs in having the bill much shorter, relatively broader, and somewhat more depressed, the lamellae on both maxilla and mandible very much shorter and less prominent, in some places almost obsolete; tertials longer and broader; tail double-rounded, the central pair of rectrices shorter than the adjoining pairs; middle toe without claw longer instead of shorter

* *Anas laysanensis*, Bulletin Brit. Ornith. Club, I, December 31, 1892, p. xvii (island of Laysan, Hawaiian Islands).

† From ὁρίζω, limito; νῆττα, anas.

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than the exposed culmen; and tarsus about equal to the length of the exposed culmen instead of much shorter. It is much more unlike *Nettion* Kaup, and may be distinguished at a glance by its very much broader, somewhat more depressed and more spatulate bill; more elevated, narrower, and more sharply ridged basal portion of the culmen; more triangular nail of maxilla; much less developed lamellae of maxilla and mandible; longer and broader tertials; double-rounded tail; and by having the middle toe without claw longer than the exposed culmen; and tarsus about equal to the length of the exposed culmen.

The only species of this new genus must, therefore, now bear the name *Horizonetta laysanensis* (Rothschild).

Vol. 30, pp. 121-124 July 27, 1917

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

A HOODED SEAL IN FLORIDA.

Mr. J. B. Butler, First Assistant Keeper, Cape Canaveral Light Station, has given the United States National Museum the skin and skull of an immature female Hooded Seal killed, during the winter of 1916, on the beach at Canaveral Florida. The back and sides have the plain gray type of coloration that characterizes the young; the skull has the basal suture open. Mr. Butler writes that the length was 6 feet, girth 34 inches, and weight 200 pounds.

As compared with northern skulls of immature *Cystophora cristata* this specimen shows no features that can be regarded as indicating a difference of race or species. The interorbital region is somewhat unusually wide, and the cheekteeth, both maxillary and mandibular, are slightly narrowed; but neither peculiarity seems beyond the range of individual variation. Measurements (those of a slightly younger skull from Baffin Bay in parentheses): condylo-basal length 210 (193); palatal length, 103 (94); zygomatic breadth, 151 (140); mastoid breadth 144 (138); breadth of braincase above zygomatic roots, 106 (106); depth of braincase at middle, 83 (76); fronto-palatal depth at posterior border of palate, 77 (67); nasal, 38.6 (41); greatest combined breadth of nasals, 22 (18.4); least distance from orbit to front of premaxillary, 65 (55); breadth of rostrum over bases of canines, 42 (37); mandible, 136 (124); maxillary toothrow exclusive of incisors (alveoli), 52 (49); mandibular toothrow exclusive of incisors (alveoli), 52 (48); third upper cheektooth, 6.8 x 4.2 (6.6 x 5.0); third lower cheektooth, 7.4 x 4.6 (7.0 x 5.4).

The capture of this animal in Florida has a double interest: nothing of the kind appears to have been recorded from any locality south of the Chesapeake Bay; and it may indicate that the occurrence of the genus *Cystophora* in the West Indies * is less improbable than has been generally supposed. —*Gerrit S. Miller, Jr.*

* For a discussion of the probable history of Gray's *Cystophora antillarum* see Allen, Hist. N. Amer. Pinnipeds, pp. 715-720. 1880.

AUTUMN WATER-BIRD RECORDS AT WASHINGTON, D. C.

The autumn of 1916 at Washington, D. C., was ornithologically most notable for the number of late shore-bird records. Dredging operations along the Anacostia River formed extensive artificial areas of mud-flats and ponds that proved exceedingly attractive to shore birds. For a month or more a flock varying from 50 to 100 birds of several species, the most numerous of which were the pectoral sandpiper (*Pisobia maculata*) and red-backed sandpiper (*Pelidna alpina pacifica*), frequented this place. On October 24 the writer saw here the killdeer (*Oxyechus vociferus vociferus*), one black-bellied plover (*Squatarola squatarola cynosurae*) (first record for the District of Columbia), least sandpiper (*Pisobia minutilla*), pectoral sandpiper (*Pisobia maculata*), red-backed sandpiper (*Pelidna alpina pacifica*), semipalmated sandpiper (*Ereunetes pusillus*), white-rumped sandpiper (*Pisobia fusciocollis*) (second record for the District of Columbia, the first having been made by Mr. Francis Harper on October 8, 1916, in the same locality), greater yellow-legs (*Totanus melanoleucus*), and lesser yellow-legs (*Totanus flavipes*). Other species of shore-birds subsequently seen were a stilt sandpiper (*Micropalama himantopus*), October 26, by Francis Harper (the only other District of Columbia record for which is September 8, 1885); wilson snipe (*Gallinago delicata*), October 26, by Francis Harper; and the solitary sandpiper (*Tringa solitaria solitaria*), October 28, by Mr. L. D. Miner.

The latest autumn occurrences of several species were extended by these observations to the dates below mentioned, the dates in parentheses being the latest previous records:

Lesser yellow-legs (*Totanus flavipes*), November 2 (October 2); greater yellow-legs (*Totanus melanoleucus*), October 26 (September 30); semipalmated sandpiper (*Ereunetes pusillus*), October 28 (October 26); solitary sandpiper (*Tringa solitaria solitaria*), October 28 (September 30); least sandpiper (*Pisobia minutilla*), November 2 (September 3); pectoral sandpiper (*Pisobia maculata*), November 2 (October 22).

The shoveller (*Spatula clypeata*), of which there were only three previous Washington records, was seen on October 25 and 26, and on November 5, 1916. —*Harry C. Oberholser.*

PIRANGA RUBRA RUBRA IN COLORADO.

The Cooper Tanager has for many years stood as a bird of Colorado, on the basis of a specimen taken by Mr. H. W. Henshaw and recorded by him in the Report upon Geographical and Geological Explorations and Surveys west of the 100th Meridian, V, 1875, p. 239. This specimen we have recently examined and found to be a perfectly typical immature male of the eastern Summer Tanager (*Piranga rubra rubra*). It was taken at Denver, Colorado, May 12, 1873, and is No. 72,085 of the United States National Museum collection. By reason of this discovery *Piranga rubra cooperi* must be removed from the list of Colorado birds, and *Piranga rubra rubra* added to the catalogue of the birds of this State.

—*Harry C. Oberholser.*

THE BLACK VULTURE IN THE DISTRICT OF COLUMBIA AND MARYLAND.

There are so few records of the black vulture (*Coragyps urubu*) in the District of Columbia and Maryland that the following notes will be of interest. On February 21, 1917, a black vulture appeared among the wild resident turkey vultures in the National Zoological Park, Washington, D. C. As commonly the case with birds of the species, it was quite tame; and curiously enough it soon found the large, open cage in which two black vultures from the South are kept. It remained in the Park until March 10, watering with the turkey vultures at a puddle in the elk pasture and spending a large portion of each day near the buildings about the black vulture cage, where food was provided for it. This record has an added interest because Dr. C. W. Richmond tells me that an adult female specimen of the black vulture was shot at Perryman, Harford County, Maryland, about February 8 or 9, and was received fresh at the United States National Museum February 10, 1917, from Mrs. John T. Lear of that place. —*N. Hollister.*

THE SALAMANDER GENUS RANODON IN NORTH AMERICA.

The discovery just announced by Miss Helen Thompson Gaige (Occ. Pap. Mus. Zool. Univ. Michigan, No. 40, May 30, 1917) of a new species of *Ranodon* occurring in the Olympic Mountains of Washington, almost rivals in interest that of *Ascaphus truei*, the only representative of the Old World bell-toad family, the Discoglossidae, in the same region eighteen years ago.

Ranodon belongs to the family Ambystomidae, which is so well represented in North America, but more particularly to the section typified by the genus *Hynobius*, which is almost confined to Eastern temperate Asia. The most startling circumstance, however, connected with this new American salamander which has received the name *Ranodon olympicus* is that the genus *Ranodon* in Asia, so far as known, is confined to the western part of that continent. It is in fact the most western genus of the family, if we except the more northern *Salamandrella* which occurs from the Ural to the Pacific coast, and *Hynobius* which is also represented in Turkestan by a species. I wish to emphasize and elaborate this point because the habitat of *Ranodon sibiricus* is generally, but quite erroneously, stated to be Eastern Siberia and Northeastern China. As far as I know, *Ranodon sibiricus* has not as yet been found east of 85° E. Long. Greenw., and seems to be confined to the western foothills of the Thian-Shan, Ala-tau and Altai mountain ranges, in one locality, at least, reaching an altitude of 6000 feet. Its center of distribution appears to be Semirietchensk, the "land of the seven rivers" between lakes Balkash and Issyk-kul. The type came from Semipalatinsk; Severzof records it from near Viernoye, Ballion from Kopal, and Kulagin from Tashkent, all in Russian Turkestan; Strauch and Nikolski mention specimens in the St. Petersburgh Academy from Kulja, in Chinese territory not far

from the Turkestan boundary. Thus, in spite of its name, it seems to belong rather to the Turanian than to the Siberian fauna.

The possibility that this species may be discovered further east is not to be denied, and no far-reaching conclusions should be drawn from its apparent absence in Eastern Asia. The fact that an *Onychodactylus* has recently been discovered on the mainland and an *Hynobius* in Turkestan as well as the finding of *Ranodon olympicus* in our own hemisphere ought to be warning enough.

As this genus has now obtained a place in the North American fauna, it is desirable to place on record its nomenclatorial status as well as that of its two species.

Ranodon KESSLER.

1866.—*Ranodon* KESSLER, Bull. Soc. Natural. Moscou, vol. 39, p. 130 (monotype, *R. sibiricus*).

1882.—*Ranidens* BOULENGER, Cat. Batr. Grad. Brit. Mus., p. 36 (emendation).

1. **Ranodon sibiricus** KESSLER.

1866.—*Ranodon* (*Triton*) *sibiricus* KESSLER, Bull. Soc. Natural. Moscou, vol. 39, pt. 1, p. 130, pl. 7 (type-locality, Semipalatinsk, western Siberia).

1868.—*Ranodon kessleri* BALLION, Bull. Soc. Natural. Moscou, vol. 41, pt. 1, p. 138 (type-locality, Kopal, Turkestan).

2. **Ranodon olympicus** GAIGE.

1917.—*Ranodon olympicus* GAIGE, Occ. Pap. Mus. Zool. Univ. Michigan, No. 40, May 30, 1917, p. 2, pl. 1 (type-locality, Lake Cushman, Olympic Mts., Washington). —*Leonhard Stejneger.*

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MUTANDA ORNITHOLOGICA.
II.

BY HARRY C. OBERHOLSER.

This is the second * of a series of papers treating of various necessary changes in the current technical names of birds. Like the first, the present paper relates chiefly to preoccupied specific terms.

FAMILY PSITTACIDAE.

Loriculus indicus.

The use of *Psittacus indicus* Gmelin † for the Ceylon *Loriculus* is interdicted by the anterior *Psittacus indicus* Gmelin, ‡ a synonym of *Eos histrio* (Müller). The next available name is *Psittacus asiaticus* Latham, § and the species should therefore stand as *Loriculus asiaticus* (Latham).

Polytelis barrabandii.

Swainson's *Psittacus barrabandii*, ‖ now known as *Polytelis barrabandii*, is ineligible for use on account of the prior *Psittacus barrabandi* Kuhl, ¶ which is *Pionopsittacus barrabandi* (Kuhl). Desmarest discovered this a few years after the publication of Swainson's name, and rechristened Swainson's bird *Psittacus swainsonii*; ** therefore the species should be called *Polytelis swainsonii* (Desmarest). ††

* For the first installment, cf. Proc. Biol. Soc. Wash., 30, March 31, 1917, pp. 75–76.

† Syst. Nat., I, i, 1788, p. 349 (India).

‡ Syst. Nat., I, i, 1788, p. 318 ("Amboina" [!]).

§ Index Ornith., I, 1790, p. 180 (India) (nom. nov. pro *Psittacus indicus* Gmelin).

‖ Zool. Illustr., I, 1820–21, pl. 59 (Australia).

¶ Consp. Psitt., 1820, p. 61 (Brazil).

** Dict. Sci. Nat. XXXIX, 1826, p. 39 (Australia).

†† Mr. G. M. Mathews has already indicated this change of name (Novit. Zool. XVIII, 1911, p. 18) but without detailed explanation.

Triclaria cyanogastris.

The name *Triclaria cyanogastris* for a South American parrot is untenable, because its original combination *Psittacus cyanogaster* Vieillot* is preoccupied by *Psittacus cyanogastra* Shaw,† a synonym of *Trichoglossus novaehollandiae* (Gmelin). The *Psittacus malachitaceus* of Spix,‡ the only synonym of *Triclaria cyanogastra*, should therefore be employed in its place and the species be called *Triclaria malachitacea* (Spix).

Pyrrhura vittata.

The *Psittacus vittatus* of Shaw,§ which is now employed for a Brazilian species as *Pyrrhura vittata*, is debarred by *Psittacus vittatus* Boddaert,‖ the present *Amazona vittata* (Boddaert), and must therefore be provided with another name. This is found in *Psittacus frontalis* Vieillot;¶ and the species should stand as *Pyrrhura frontalis* (Vieillot).

Nasiterna pygmea.

The generic name of the diminutive New Guinea parrot known commonly as *Nasiterna pygmea* has recently been altered to *Micropsitta* on grounds of priority.** The specific term†† needs now to be changed also, for it is preoccupied by *Psittacus pygmaeus* Gmelin,‡‡ which is *Hypocharmosyna pygmaea* (Gmelin). As no other name is available for *Nasiterna pygmea*, it may be known as **Micropsitta chloroxantha** nobis.

FAMILY BUCCONIDAE.

Malacoptila torquata.

This Brazilian species, the *Bucco torquatus* of Wagler,§§ needs another specific term, for its present one is preoccupied by *Bucco torquatus* Dumont,‖‖ which is *Melanobucco torquatus* (Dumont). The first synonym of *Malacoptila torquata* is apparently *Bucco fuscus* Lichtenstein,¶¶ but this is really not a new name, being merely a misidentification of Lichtenstein's bird with the *Bucco fuscus* of Gmelin,*** which is *Malacoptila fusca* (Gmelin). The first available name for *Malacoptila torquata* is therefore *Bucco striatus* Spix,††† and the species thus should stand as *Malacoptila striata* (Spix).

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* Nouv. Dict. d'Hist. Nat., XXV, 1817, p. 328 (South America [Rio de Janeiro, Brazil; *teste* Hellmayr]).

† Gen. Zool. VIII, 2, 1811, p. 413, pl. 59 (Australia).

‡ Av. Bras., I, 1824, p. 40, pl. XXVIII (Rio de Janeiro, Brazil).

§ Gen. Zool. VIII, 2, 1811, p. 404 (Brazil).

‖ Tabl. Planch. Enlum., 1783, p. 49 ("St. Domingo").

¶ Nouv. Dict. d'Hist. Nat., XXV, 1817, p. 361 ("Cayenne").

** Poche, Ornith. Monatsber., XII, 1904, p. 24.

†† *Psittacus* (*Psittacula*) *pygmeus* Quoy and Gaimard, Voy. de l'Astrolabe, Zool., I, 1830, p. 232, pl. 21, figs. 1, 2 (Dore, New Guinea).

‡‡ Syst. Nat., I, i, 1788, p. 330 (Tahiti I, Society Is.).

§§ *Bucco torquatus* Wagler, in Hahn, Vög. aus Asien, Lief. XIII, 1822, p. 2, t. 5 (Brazil).

‖‖ Dict. Sci. Nat., IV, 1816, p. 56 ("Brazil"! [= South Africa]).

¶¶ *Bucco fuscus* Lin. Gm., Lichtenstein, Verz. Doubl., 1823, p. 8 (Bahia, Brazil).

*** Syst. Nat., I, i, 1788, p. 408 (Cayenne).

††† Av. Spec. Nov. Bras., I, 1824, p. 52, pl. XL, fig. 2 (Rio de Janeiro; Bahia).

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NEW GENERA, SPECIES, AND SUBSPECIES OF SOUTH AMERICAN BIRDS.

BY W. E. CLYDE TODD.

The present paper, the sixth of the series to appear in these Proceedings, contains descriptions of a number of new neotropical forms discriminated by the writer in the past few months, together with diagnoses of two new generic groups which appear worthy of separation. Care has been taken in preparing these descriptions to make them sufficiently full and precise for all practical purposes, so that there may be no ambiguity in their application, without sacrificing conciseness. Critical remarks on the new forms will be deferred until a later date, when they will duly appear in a series of papers to be published by the Carnegie Museum of Pittsburgh. The names of colors are from Mr. Ridgway's "Color Standards and Color Nomenclature."

Idiospiza, genus novum.

Similar to *Catamenia* Bonaparte, but tail without any white spots, the rectrices narrow and acuminate; and wing more pointed, the ninth (outermost) primary shorter than the third. Type, *Linaria inornata* Lafresnaye.

Myospiza humeralis meridanus, subsp. nov.

Similar to *Myospiza humeralis humeralis* of Guiana, Brazil, Bolivia, etc., but general coloration darker, the pileum more heavily streaked with black, especially in front; gray edgings of the feathers of the back less prominent, with the brown more conspicuous; and breast and sides more heavily shaded with buffy grayish. Prevailing tone of upper parts brown, not black, as in *M. h. columbianus* Chapman.

Type, No. 36,753, Collection Carnegie Museum, adult female; Guarico, Lara, Venezuela, February 2, 1911; M. A. Carriker, Jr.

Sporophila lineola restricta, subsp. nov.

Adult male similar to *Sporophila lineola lineola* (Linnæus), and under parts without dark mottling as in that form, but forehead with only a few (mostly concealed) white feathers along the median line, as in *S. bouvronides* (Lesson).

Type, No. 54,316, Collection Carnegie Museum, adult male; Gamarra, Magdalena, Colombia, July 12, 1916; M. A. Carriker, Jr.

Sporathraupis cyanocephala hypophæa, subsp. nov.

Similar in color of upper parts to *Sporathraupis cyanocephala auricrissa* Sclater, but under parts strongly suffused with blue, especially anteriorly, approaching thus *S. olivicyanea* (Lafresnaye). Similar to *S. c. margaritæ* Chapman, but upper parts more greenish, less brownish; under parts darker, the blue color more extended; and flanks, crissum, and tibiæ brighter yellow.

Type, No. 37,318, Collection Carnegie Museum, adult male; Paramo de Rosas, Venezuela, March 18, 1911; M. A. Carriker, Jr.

Thlypopsis fulviceps intensa, subsp. nov.

Similar to *Thlypopsis fulviceps fulviceps* Cabanis, but upper parts much purer gray (dark neutral gray instead of deep grayish olive); head and neck (all around) chestnut rather than amber brown; and crissum deeper buffy.

Type, No. 54,863, Collection Carnegie Museum, adult male; La Palmita, Santander, Colombia, August 11, 1916; M. A. Carriker, Jr.

Tachyphonus luctuosus panamensis, subsp. nov.

Adult male not certainly distinguishable from the same sex of *Tachyphonus axillaris* Lawrence; adult female, however, with the pileum grayish rather than greenish, and the throat more distinctly white. Adult male similar to the same sex of *Tachyphonus luctuosus luctuosus* Lafresnaye and D'Orbigny, but white patch on the wing-coverts much more extended, usually reaching beyond the tips of the primary-coverts in the closed wing.

Type, No. 207,427, U. S. Nat. Mus., adult male; Gatun, Canal Zone, Panama, February 1, 1911; E. A. Goldman.

Diglossopis cærulescens saturata, subsp. nov.

Similar to *Diglossopis cærulescens cærulescens* Sclater, but upper parts, wings, etc., brighter blue (deep delft blue rather than delft blue or green-blue slate), and underparts darker, with more blue suffusion.

Type, No. 54,898, Collection Carnegie Museum, adult male; La Palmita, Santander, Colombia, August 12, 1916; M. A. Carriker, Jr.

Myrmeciza læmosticta palliata, subsp. nov.

Similar to *Myrmeciza læmosticta læmosticta* Salvin, but everywhere paler and duller; black of the under parts in the adult male confined to the throat; pileum and breast much lighter gray; and upper parts, flanks, crissum, etc., lighter brown. Adult female likewise paler and duller than the same sex of the typical race.

Type, No. 54,977, Collection Carnegie Museum, adult male; La Palmita, Santander, Colombia, August 15, 1916; M. A. Carriker, Jr.

Hylophylax nævioides subsimilis, subsp. nov.

Similar to *Hylophylax nævioides nævioides* (Lafresnaye), but more extensively white below, the gray shading of the sides and flanks more restricted; pileum dark slaty gray, with only a trace of brown; and tail grayish instead of brownish, the tips of the rectrices white, not tawny. (Description based on a comparison with Lafresnaye's type.)

Type, No. 52,742, Collection Carnegie Museum, adult male; Jaraquiel, Bolivar, Colombia, March 4, 1916; M. A. Carriker, Jr.

Pœcilurus, genus novum.

Similar to *Synallaxis* Vieillot, but tail composed of soft, closely webbed feathers, with broad, blunt tips. Type, *Synallaxis candæi* Lafresnaye.

Pœcilurus atrigularis, sp. nov.

Nearest apparently to *Pœcilurus candæi* (Lafresnaye), but back Dresden brown; supra-auricular region dull buffy brown like the pileum and hindneck; auriculars and throat black, separated from each other by a very narrow line of whitish-tipped feathers; wings externally, breast, and sides amber brown, passing into tawny olive on the flanks; middle of abdomen white; tail chestnut, all but the two outer pairs of rectrices dusky on the terminal third. Wing, 62; tail, 73; bill, 13; tarsus, 21 mm.

Type, No. 54,199, Collection Carnegie Museum, adult male; Gamarra, Magdalena, Colombia, July 8, 1916; M. A. Carriker, Jr.

Brotogeris jugularis exsul, subsp. nov.

Similar to *Brotogeris jugularis jugularis* (Müller) of Central America, Colombia, etc., but brownish wash on the back and wings deeper and more extensive; feathers of posterior under parts without any blue tinge whatever; and orange chin-spot smaller and paler.

Type, No. 47,723, Collection Carnegie Museum, adult female; Sierra de Carabobo, Venezuela, June 18, 1914; Samuel M. Klages.

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ADDITIONS TO THE HAITIAN AVIFAUNA.

BY PAUL BARTSCH.

During our recent trip to Haiti, which extended from April 1 to 29 of this year, collections of birds were made whenever time permitted, and a journal account of the species observed was kept, as usual. The notes secured will furnish the basis for a little paper which I hope shortly to submit to the "Auk" for publication.

In the mean time, I wish to bring a description of a new yellow rail and the occurrence of a number of other birds not heretofore listed for Haiti, on record.

I am deeply indebted to Dr. Charles W. Richmond, Assistant Curator of the Division of Birds, for a useful manuscript check list of the birds reported for Haiti, prior to our visit, which proved of excellent service in the field, and served as a splendid stimulus to our work.

Porzana flaviventris hendersoni, new subspecies.

Type, adult female, Cat. No. 253,731, U. S. N. M., from Trou Caiman, Haiti, April 4, 1917, collected by Paul Bartsch; original number 101.

This little rail is differentiated from the rest of the West Indian series in the United States National Museum by its smaller size and lighter coloration. Compared with the Cuban specimens, we may say that the Haitian bird is of lighter coloration both above and below. The buff, which is strong on the sides of the neck and chest in the Cuban specimens, is reduced to a mere suffusion in the Haitian bird. The Porto Rican bird in the United States National Museum is even darker than the Cuban specimens, while the Jamaican specimen has the buff of the side of the neck and chest more extended and the dark areas of the back more restricted. Measurements: wing, 65 mm.; tail, 20 mm.; culmen, 15 mm.; tarsus, 22.5; middle toe, 29.5 mm.

Three additional specimens of this little rail were seen in a two hours'

hunt on Trou Caiman, where they frequent the reedy patches. We also saw two specimens in the reedy patches of the north shore of Lake Assuai.

Dendroica petechia albicollis (Gmelin).

Motacilla albicollis Gmelin, Syst. Nat. I, pt. 2, p. 983, 1789.

Five alcoholic specimens secured during our trip, of the Haitian Golden Warbler, at Port au Prince, and skins of a pair in the United States National Museum from the same place, prove this to be distinct from the Jamaican form *Dendroica petechia petechia* with which it has been considered identical. It will therefore have to appear under the above designation.

Its dorsal coloration resembles that of the Jamaican bird, excepting that the crown does not appear as strongly tinged with orange as in the Jamaican form. The Haitian bird also has shorter wings and is longer in bill, tarsus and middle toe, as shown by the following measurements:

	Wing	Tail	Culmen	Tarsus	Middle toe
Jamaican*	65	50.3	10.6	20.5	11.1
Haitian†	61.9	49.6	12.5	21.4	12.5

The following forms appear to be new to the island:

✗	Pied-billed Grebe	(*Podilymbus podiceps antillarum*).
×	Least Bittern	(*Ixobrychus exilis*).
	Haitian Yellow Rail	(*Porzana flaviventris hendersoni*).
✗	Clapper Rail	(*Rallus longirostris* subsp.?).
×	Semipalmated Sandpiper	(*Ereunetes pusillus*).
1	Western Sandpiper	(*Ereunetes mauri*).
2	Least Sandpiper	(*Pisobia minutilla*).
3	Greater Yellow-legs	(*Totanus melanoleucus*).
4	Lesser Yellow-legs	(*Totanus flavipes*).
	Chimney Swift	(*Chaetura pelagica*).
5	Barn Swallow	(*Hirundo erythrogastra*).
	Chestnut-sided Warbler	(*Dendroica pensylvanica*).

* Mr. Ridgway's average of six males.

† Average of four males.

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ON SOME NORTH AMERICAN SPECIES OF MICRODON.

[DIPTERA: SYRPHIDAE.]

BY FREDERICK KNAB.

The genus Microdon is full of difficulties for the systematist. There has been considerable uncertainty as to the identity and specific limits of some of our forms, particularly in the group comprising *tristis* Loew and *bombiformis* Townsend. The rarity of the flies and their consequent scanty representation in most collections have added to the generally admitted difficulties of the group. Prof. Chas. W. Johnson has recently made the first important step in clarifying the subject by establishing the identity of Loew's *Microdon tristis*, which has been long misunderstood.*

Some time ago the writer worked over the material in the national collection with results that seem worth publishing. He is greatly indebted to Mr. V. A. E. Daecke of Harrisburg, Pa., who has kindly loaned him his entire *Microdon* material in the *tristis* group. This additional material has proved most useful in working out the results here presented. The following table should be helpful in separating the forms grouping around *tristis*; it is based on material before the writer and species not represented by specimens are excluded. Some additional species of *Microdon* not especially related are discussed or described at the end of this paper.

Table of species related to *Microdon tristis*.

1. Scutellum convex, its hind margin rounded, unarmed 2
   Scutellum with distinct, although often small, spines 5
2. Face clothed with coarse, black and pale hairs intermixed; abdomen wholly black . . . . . **senilis** n. sp.
   Not with this combination of characters 3

* Psyche, vol. 23, no. 3 (June, 1916), p. 75.

3. Face clothed with light colored pile 4
   Face clothed with black pile . . . . . **modestus** n. sp.
4. Abdomen wholly black beyond the second segment; antennæ slender . . . . . *bombiformis* Tnsd.
   Abdomen with patches or bands of light colored pile beyond second segment; antennæ much shorter, the third joint much thickened and tapered to a blunt point . *coloradensis* Ckll. & Andr.
5. Second abdominal segment dorsally with broad impressions at sides on anterior half, the lateral margin convex . . *ruficrus* Will.
   Second abdominal segment simple 6
6. Antennæ unusually long and slender, the third joint as long as the first, subcylindrical, nearly uniform throughout, the tip bluntly rounded . . . . . *tristis* Loew
   Antennæ normal, the third joint more or less thickened toward the middle 7
7. Pile on frons mostly black; body deep blue . . . . . **piperi** n. sp.
   Pile on frons wholly pale 8
8. Body color blackish . . . . . *cothurnatus* Big., eastern form.
   Body with cupreous or bluish reflections . *cothurnatus*, western form.

Microdon cothurnatus Bigot.

This is the species that has been treated by Williston and subsequent authors as *tristis*. In eastern specimens the general body color is black and without metallic coloration. The pile on the head is pale throughout. The antennæ are rather stout, the third joint subequal with the first or a trifle shorter. The third joint is thickened and compressed, thickest a short distance beyond base; when viewed in its broader aspect, it is broadly rounded at the tip. The scutellum is convex and shows hardly any trace of emargination, while the teeth are minute. In darkly colored specimens the legs are piceous, with but slightly lighter brownish shades at the bases of the femora and narrowly on the knees; the whitish pile is densest on the tibiæ and the hind tarsals have a cushion of dense short yellow hair ventrally. In poorly or incompletely pigmented specimens the legs are more or less ferruginous or yellowish brown, the tibiæ often lighter colored than the femora. In the male the hypopygium is more or less fully tinged with ferruginous. In the less deeply pigmented specimens of both sexes the same shade extends along the sides of the abdomen, as well as along the apical margins of the segments. The specimens before me that answer to the above description are from east of the Rockies. The localities represented are as follows:

New York, Connecticut (Williston collection); Springfield, Massachusetts (G. Dimmock); Mount Tom, Mass. (Knab); West Point, Nebraska (U. S. Bur. Ent. no. 1145½, reared from larvæ collected by L. Bruner); Eagle Harbor, Michigan (H. G. Hubbard).

Specimens from the Rocky Mountain region differ from the eastern ones in the dark coppery or metallic greenish blue color of the mesonotum and the bluish tinge of the abdomen, but agree in all other respects.

Bigot's description is from a specimen of the form with copper-tinted mesonotum which apparently had lost its abdomen. The specimens described by Cockerell and Andrews as a subspecies of *Microdon tristis* (Proc. U. S. Nat. Mus., vol. 51, 1916, p. 55) are of this form. The thoracic pile of all these western specimens is more yellow than in the eastern ones.

Originally described from Washington Territory. In addition to the two specimens from Boulder, Colorado, above mentioned, there are before me specimens from Kaslo and Ainsworth, British Columbia (R. P. Currie); Hoquiam, Washington (H. E. Burke); Lake Tahoe, California (Hubbard and Schwarz); North Cheyenne Canyon, El Paso County, Colorado (A. B. Champlain); Douglas County, Colo., reared by C. T. Greene from larvæ found with *Formica truncicola integroides* variety *haemorrhoidalis* Emery.* In these specimens the thoracic integument ranges in coloration from dull coppery to metallic blue. A nearly black specimen from Clyde, Colorado, 10,000 feet (Daecke collection), approaches the eastern form in coloration.†

There is a considerable number of puparia before me, in most cases associated with imagos. These puparia show characteristic reticulations, with rows of heavier ridges dorsally and at the sides. The puparia of the eastern and of the western forms of *cothurnatus* are indistinguishable, as is evident from the material before me.

Microdon tristis Loew.

This species resembles *cothurnatus* in general appearance, but differs markedly in the broader frons, the longer and more slender antennæ, the shape of the more prominent and strongly dentate scutellum, the elongate, narrower abdomen and the different arrangement of the white pile on the latter.

There are before me six specimens from Inglenook, Pennsylvania, collected by V. A. E. Daecke and W. S. Fisher; also a female from Lotell, Pa. (Daecke). The species has never been found in the vicinity of Washington and the type undoubtedly came from the mountainous portion of Virginia, probably Berkeley Springs (now in West Virginia), where Osten Sacken spent vacations. According to Johnson it ranges as far northward as Massachusetts.

Microdon ruficrus (Williston).

Microdon tristis var. *ruficrus* Williston, 1886, Synopsis No. Amer. Syrphidæ, p. 7.

This species, which was described as a varietal form of *cothurnatus* ("*tristis*" Williston), appears to have remained unrecognized by subsequent workers. Aside from its superficial resemblance, it is one of the most distinct species. This is not apparent from the original description,

* Determination S. A. Rohwer.

† Charles R. Jones describes a *Microdon similis*, from Colorado, in Annals Ent. Soc. Amer., vol. 10, No. 2, p. 219 (June, 1917). The description is wholly inadequate, but as far as it goes answers very well for one of the darker forms of *cothurnatus*. The length indicated, 14 mm., exceeds the largest specimen now before me by only one millimeter.

which dwells principally on unessential color differences. Characteristic for this species is a pair of rather large depressions on the dorsum of the second abdominal segment, laterally close to the margin; these leave the lateral margins raised and convex. In *tristis* and the other species of the group the dorsum of the second abdominal segment is simple, without depressions or raised lateral margins. The abdomen is distinctly narrower and more elongate than in *cothurnatus*. In addition, the scutellum of *ruficrus* is more elongate, less convex, distinctly emarginate apically and with a pair of large teeth. The body coloration is dark bluish, like some of the western specimens of *cothurnatus*, and the pile is pale throughout as in that species. However, the pile appears to be more sparse and shorter; on the abdominal segments it forms narrow apical bands, narrowly interrupted in the middle, rather than large patches. The coloration of the legs, as given by Williston, is not diagnostic and varies in the same manner as in *cothurnatus*.

The type, a male from Connecticut, and eight other specimens are before me. These latter are: a male taken in the vicinity of Chain Bridge near Washington, June 9, 1905 (D. H. Clemons); a male, Great Falls, Virginia, June 25, 1915 (C. T. Greene); a male, Bladensburg, Maryland, June 13, 1916 (F. R. Cole); a male and female, Hancock, Maryland, September 1, 1916 (Cole); a male and female collected by Mr. Daecke at Browns Mills Junction, New Jersey, June 22 and July 5, 1907; a male collected at Franconia, New Hampshire, July 18, 1915, by C. H. T. Townsend. The last mentioned specimen has the pile brassy yellow, but in all other respects agrees with the typical form. The specimens average appreciably smaller than *cothurnatus*.

This species, in the modification of the second abdominal segment, shows a distinct approach toward *coarctatus* Loew and *balliopterus* Loew, where this segment shows two deep depressions and strong lateral swellings. The genus *Omegasyrphus* Giglio-Tos, based upon this modification, like other genera segregated from *Microdon*, appears untenable in the light of more complete knowledge. In addition to the intergradient character of *M. ruficrus*, *M. laetus* Loew and *M. craigheadii* Walton show a swollen second abdominal segment, however without the depressions observed in the already mentioned forms.

Microdon piperi, new species.

Male.—Dark metallic blue, moderately shining, the mesonotum with slight greenish luster. Frons strongly convex on posterior two-thirds, roughened, posteriorly less than one-third the width of head, strongly narrowed to transverse impression, beyond which point the ocular margins again strongly diverge. Occiput and frons clothed wholly with dense short black pile, this reaching forward to insertion of antennæ. Face clothed wholly with dense recumbent creamy white pile. Antennæ black, long and slender, the first joint about as long as the second and third together, the third moderately thickened and broadly rounded at tip; arista a very stout bristle, shorter than third joint. Mesonotum with a

pair of indistinct narrow blackish longitudinal stripes; pile dirty yellowish gray, short and dense, longer and paler at lateral margins. Scutellum deep blue, broad and short, strongly convex, the hind margin rounded and with only a slight trace of median emargination, the spines rather small and remote from each other; pile yellow-gray, long and dense. Abdomen large, elongate-ovate, much broader than the thorax, broadest at hind angles of second segment and beyond this rounded off to the blunt apex; dorsum flattened anteriorly, convex on distal half; vestiture on second and third segments of creamy white pile, dense and longer at the sides, on the second covering the entire dorsum, on the third the sides and forming a broadly interrupted apical band; distal portion of abdomen with sparse and inconspicuous dark hairs. Legs black, the tibiæ basally tinged with dull ferruginous; vestiture short and inconspicuous, that on the femora black, that on the tibiæ with creamy yellow luster; tarsi ventrally with ferruginous yellow cushions; pulvilli ferruginous, with a fine white fringe. Wings moderately broad, tinged with gray, without distinct cloudings at the cross-veins; posterior angles of first posterior and discal cells roundedly produced, not appendiculate, a large spur projecting into middle of first posterior cell from third vein. Halteres yellowish. Length: Body about 12 mm., wing 9 mm.

Female.—Frons at posterior angles of eyes about one-third the width of head, the eye-margins straight and diverging very gradually to lower part of face; transverse furrow indistinct. Vestiture of mesonotum and scutellum much more dense than in the male. Wings on distal half with brown cloudings along the veins. Abdomen broader than in the male, more strongly tapered toward the tip. Length: Body about 13 mm., wing 10 mm.

Seattle, Washington, one male, issued June 27, 1901 (C. V. Piper); Oregon, one female, without indication of exact locality or collector; Mount Hood, Oregon, one female (Williston collection).

Type: Cat. no. 21,414, U. S. Nat. Mus.

The female from Mount Hood was included by Williston under *cothurnatus* in his "Synopsis of North American Syrphidæ," page 8; it is in a poor state of preservation. The male was reared by Prof. C. V. Piper. The puparium resembles that of *cothurnatus*, showing reticulations of a very similar character; these differ, however, in being more uniform, without the differentiated median and lateral series observable in *cothurnatus;* it is also slightly less convex.

Microdon bombiformis Townsend.

There are seventeen specimens of this very distinct species before me, one from Washington, District of Columbia, without indication of collector, four taken in Rock Creek Park, District of Columbia, by C. H. T. Townsend, the other twelve taken at Inglenook, Pennsylvania, by Mr. Daecke. Johnson has recently recorded the occurrence of this species in Massachusetts and Connecticut (Psyche, vol. 23, 1916, p. 76).

The series of both sexes before me is remarkably uniform in coloration.

All have the mesonotum, scutellum and second abdominal segment metallic green-blue covered with yellowish pile; the abdomen beyond the second segment is wholly deep black and clothed with short, inconspicuous black pile. The scutellum is convex and unarmed. In the male the frons is much narrower than the width of one eye and strongly narrowed toward the antennæ. Apparently this species is confined to the Appalachian region.

Aldrich has placed *Microdon bombiformis* as a synonym of *megalogaster* Snow, a species of uncertain origin;* in this he has been followed by Johnson,† Cockerell and Andrews,‡ and Banks, Greene, McAtee and Shannon.§ I am unable to concur in this synonymy, since Snow's description, although it corresponds as to general coloration, disagrees in important details. Thus, the scutellum is stated to be "gently emarginate, the small obtuse tubercles approximate." All the specimens of *bombiformis* examined by me have the posterior margin of the scutellum evenly rounded and convex, without the slightest trace of tubercles or emargination. I must consider this difference fundamental. Furthermore, Snow states that in *megalogaster* the front tibiæ and metatarsi are clothed on the inner side with short golden pile; in *bombiformis* the front tibiæ have a patch of dense yellow pile, visible only in certain lights and occupying slightly less than the distal half; similar pile occurs ventrally on the front metatarsi.‖

Microdon coloradensis Cockerell and Andrews.¶

This species, like the preceding one, resembles a bumble-bee in appearance and is further remarkable for its striking sexual dichroism. Prof. Cockerell informs me that he has procured additional specimens since the description was drawn up and that the sexual color differences prove to be constant. The female from Pecos, New Mexico, in the national collection belongs here, as already indicated by Cockerell and Andrews.

Along with the two following ones, this species is remarkable for the broad short frons, the antennæ being inserted unusually high upon the head. The male *coloradensis* has the frons considerably over one-third the width of the head and broadening regularly and very gradually toward the antennæ. In all three species the third antennal joint is short and very broad near the base, shortly lanceolate in outline.

* Cat. North Amer. Diptera, 1905, pp. 345, 346.

† Psyche, vol. 23, 1916, p. 76.

‡ Proc. U. S. Nat. Mus., vol. 51, 1916, p. 58.

§ Proc. Biol. Soc. Wash., vol. 29, 1916, p. 176.

‖ Since going to press I have been able to examine 15 additional specimens *M. bombiformis* taken by Mr. W. S. Fisher at Inglenook, Pa., June, 1917. In two of the males very minute tubercles are perceptible on the scutellum; a few other males show slight apical indentations on the scutellum. None of the five females show any modification of the scutellum. It should be noted that the pile of the scutellum is unusually long and dense in this species, so that very minute tubercles can hardly be detected without its removal. This leaves only the difference in the color of the pile on the front tibiæ to separate the species from *megalogaster*.

¶ Proc. U. S. Nat. Mus., vol. 51, 1916, p. 58.

Microdon modestus, new species.

Male.—Piceous black, without metallic luster. Frons broad, narrowing slightly and regularly to posterior angles of eyes, where it is distinctly more than one-third the width of the head; transverse furrow arcuate, indistinct, an elongate polished bare spot over insertion of antennæ; vestiture of frons of black hairs with dirty yellowish ones intermixed, particularly posteriorly and at the sides. Face clothed with black hairs, some pale ones at lower margin. Antennæ black; first joint long and slender, about equalling longitudinal diameter of head; second joint slightly more than half as long as first, much enlarged distally; third joint hardly as long as first, much thickened on basal third and beyond tapering to a sharp point; arista a coarse piceous bristle, about equal in length to third joint. Mesonotum piceous black, rather shining, clothed with dull yellow hair, rather sparse on the disk and becoming dense toward margins. Scutellum broadly rounded posteriorly, unarmed, concolorous with mesonotum and densely clothed with long dull yellow pile. Abdomen elongate-ovate, flattened, much broader than the thorax, broadest at third segment; color black, clothed dorsally with short but rather dense black pile, the posterior margin of the second segment narrowly yellow-haired and ending in patches of such hairs at posterior angles; third segment with similar patches of yellow hair at posterior angles; fourth segment with a series of coarse pale setæ at posterior margin. Genitalia piceous brown. Venter with scattered long pale hairs. Legs black and clothed mostly with short black pile, the tarsi ventrally with slightly paler hairs, on the hind legs their first two joints ventrally with a dense cushion of dull ferruginous pile; pulvilli dull ferruginous, claws black. Wings short, moderately broad, grayish hyaline, unspotted; posterior angles of first posterior and discal cells roundedly produced, in both with the vein-section closing the cell sinuate and bearing a very short spur projecting inward. Halteres ferruginous yellow. Tegulæ pale yellowish. Length: Body about 13 mm., wing 10 mm.

Female.—Frons similar to the male, still broader, the transverse furrow obsolete; vestiture of frons and face almost wholly black. Mesonotum clothed wholly with black hairs. Scutellum mostly black-haired, a few whitish hairs intermixed. Abdomen wholly black-haired. Legs wholly black, only the cushions of the tarsi indistinctly paler. Length: Body about 11 mm., wing 8.5 mm.

Elko, Nevada, 2 males, 1 female (no collector indicated).

Type: Cat. no. 21,415, U. S. Nat. Mus.

The type male has the hairs of the mesonotum and scutellum deep brownish yellow, while in the paratype male this pubescence is a very pale dirty yellow.

Microdon senilis, new species.

Female.—Black, without metallic luster. Frons at posterior angles of eyes fully one-third the width of head, broadening gradually and evenly to the face; transverse furrow obsolete, a narrow, smooth elevated stripe

medianly. Head-vestiture of black and pale yellowish hairs, the black ones predominating on middle of frons, the pale ones on lower half of face, occiput and orbits. Antennæ black; first joint moderately long and slender; second joint less than half the length of the first, much enlarged distally; third joint stout, distinctly shorter than the first, thickened to basal third and beyond tapered to a sharp point; arista coarse, black, about as long as the third joint. Mesonotum shining black, clothed throughout with short, coarse, black pile, densest towards margins. Scutellum short and broad, the posterior margin irregularly rounded, unarmed; vestiture of dull ochreous yellow pile. Abdomen elongate-ovate, flattened, much broader than the thorax, black, basally shining, beyond base of second segment rugose and clothed with very short black pile; a small patch of pale hairs at posterior angles of second segment. Venter wholly black. Legs black and black-haired, the tibiæ with pale yellowish hairs along the outer side; tarsi of all the legs ventrally with cushions of ferruginous pile. Pulvilli pale ferruginous; claws black. Wings broad, grayish hyaline; posterior angles of first posterior and discal cells roundedly produced, the former with a stump projecting at the location of the angle. Halteres pale yellow. Length: Body about 14 mm., wing 10.5 mm.

Claremont, California, one female (F. R. Cole).

Type: Cat. no. 21,416, U. S. Nat. Mus.

The specimen was generously presented to the national collection by Mr. Cole. The close relationship of this species with *modestus* and *coloradensis* is obvious through both structural and coloration characters; however, differences exist which leave no doubt that these forms are specifically distinct.

Microdon rufipes (Macquart).

Aphritis rufipes Macquart, 1842, Dipt. Exot., vol. 2, pt. 2, p. 11, pl. 2, fig. 3.

Microdon limbus Williston, 1886, Synopsis No. Amer. Syrphidæ, p. 8.

Williston's type, which is before me, agrees in every way with Macquart's description. In addition there are before me, a male from Jacksonville, Florida (W. H. Ashmead), and a female from Newport News, Virginia, taken September 3, 1910, by E. W. Wall. Macquart's specimen is stated to have come from Philadelphia.

Microdon fulgens Wiedemann.

This is a large, robust, brilliantly metallic colored species originally described from Georgia. The species figures in some collections under the name *aurifex*, but it would seem incorrectly. It may be that the Mexican specimens so reported really belong to *aurifex*; at all events, *M. trochilus* Walker, from Mexico, so referred, is stated to have the abdomen clothed with pale yellow hairs, as in a specimen from Pará, Brazil, reported under *aurifex* by Macquart. The original description of *aurifex*, unfortun-

ately, makes no mention of the abdominal vestiture, but states that the last two segments of the abdomen are nearly pure golden, which is hardly in agreement with our specimens.

Microdon fulgens has the hairs of the abdomen, which are very short and do not obscure the body-color, for the most part black; only at the sides slight patches of pale yellow hairs can be detected. The body-color varies considerably in different specimens, on the thorax from brilliant metallic blue and violet to blue-green; on the abdomen from blue-green through golden green to brilliant red and nearly golden.

Eleven specimens are before me: Okefenokee Swamp, Georgia, June, 1912, 2 males, 1 female (Cornell expedition); Enterprise, Florida, May 13, 1 female (H. G. Hubbard); Miami, Florida, October 22, 1 female (C. H. T. Townsend); "Florida," 1 male, 1 female; Dade County, Florida, 1 male, 1 female (E. A. Schwarz); Fort Meyers, Florida, May 7, 1916, 1 female (J. C. Bradley); Springfield, Missouri, July 16, 1912, 1 female (H. H. Knight). The two specimens last mentioned and the three from Georgia belong to the Cornell collection.

One of the males from Georgia has on the abdomen, close to the base of the third segment, a velvet-black fascia; this is slightly arcuate, doubly emarginate in front, and stops considerably short of the lateral margins. Elongate patches of similar character appear on the lateral lobes of the second segment. These velvet-black markings are not due to pubescence, but apparently to a modification of the integument itself. The three other males before me show medianly on the third abdominal segment very faint indications of the beginning of such a fascia, but there is no trace of it in the females.

With some doubt I refer here a male from Tehuantepec, Mexico (Sumichrast), and mention it only on account of the presence of the velvety fascia of the third abdominal segment. This differs from that in the specimen above described in being medianly produced posteriorly as well as anteriorly. Otherwise, the only appreciable differences from typical *fulgens* are the somewhat smaller size and less robust abdomen, as well as paler wings.

Microdon scutifer, new species.

Female.—Moderately stout. Head black. Frons over one-third the width of the head, the eye margins parallel to level of antennæ; surface rather densely covered with setigerous punctures except about ocelli and above antennæ; pile short, black on occiput, white in front of the obsolescent transverse furrow. Face moderately convex, narrowing very slightly toward the mouth; pubescence black in the middle, broadly yellowish white at the sides and beneath. Proboscis bright ferruginous. Antennæ blackish, stout, moderately long, the first and third joints subequal; third joint ochreous at base, moderately stout, nearly uniform throughout, bluntly rounded at apex; arista very stout, much shorter than the third joint. Mesonotum bronzy black on the disk, the humeri, lateral and posterior margins broadly light ocher-yellow, posteriorly

forming two deep wedge-shaped indentations into the dark color and slighter ones at the transverse suture; vestiture very short and blackish on the disk, yellowish white and longer on the yellow portions. Scutellum light ocher-yellow, moderately prominent, inflated, with two rather closely approximated but distinct and stout spines; vestiture rather sparse, inconspicuous, yellowish gray, that on the spines whitish. Pleuræ ocher-yellow spotted with brown, the sternopleuræ dark brown and with a patch of pale golden hair. Abdomen elongate, broader than the thorax, broadest at the apex of second segment, tapered very gradually to apex of fourth, the fifth segment tapered to a blunt point and having the form of a nearly equilateral triangle; color dorsally ocher-yellow and blackish brown, the dark color broad on the middle of the first segment and base of second, continued over the third segment in a narrow median stripe, on the fourth and fifth segments spreading out over most of the surface, leaving only the angles broadly ochreous; vestiture of short yellowish white hairs, anteriorly confined to the margins, on third and fourth segments tending to form interrupted posterior bands, on the fifth covering nearly the entire segment; venter ocher-yellow spotted with piceous. Legs stout, piceous black including the coxæ, the knees narrowly ferruginous; tibæ densely clothed with appressed pile with yellowish white silky luster; tarsi ventrally with bright ferruginous cushions; pulvilli dull ferruginous; claws large and black. Wings broad, tinted with smoky gray, the veins brown; posterior angles of first posterior and discal cells roundedly produced, the former with distinct appendices, the latter with mere trace of stump; middle of first posterior cell with the usual spur from third vein. Halteres pale yellow. Length: Body about 9 mm., wings 7 mm.

Willis, Texas, one female (J. C. Bridwell).

Type: Cat. no. 21,417, U. S. Nat. Mus.

This species is closely related to *Microdon falcatus* Will. from the Isthmus of Tehuantepec. It differs in the much larger size, wholly black head, very different proportion of the antennal joints, as well as in many minor details. In *falcatus* the third antennal joint is nearly twice as long as the first, the scutellar spines are obsolete and the body vestiture is black.

Microdon remotus, new species.

Male.—Head short, broader than the thorax, piceous black, stained with dull yellow-brown about the mouth, along the sides of the face and upward to transverse suture, also on occiput; frons short, slightly over one-third the width of the head, with distinct transverse suture; ocelli on a distinct callosity; vestiture dirty gray on the occiput, before transverse suture yellowish white. Face moderately prominent, parallel-sided, clothed with dense pile with yellow-white silky luster. Eyes bare. Antennæ with the first and second joints ferruginous yellow, the third greatly elongated, dull black, its base and the arista ferruginous yellow; first and second joints of normal structure, the first about as long as

longitudinal diameter of head; third joint over one-and-a-half times the length of the first, nearly parallel-sided, slightly compressed, the end bluntly rounded off, the surface clothed with very fine and dense pubescence; arista consisting of a ferruginous yellow thickened portion which is stoutest at its middle and about half the length of the third joint, and a fine white bristle about two-thirds the length of proximal portion. Mesonotum piceous, shading to dark reddish brown at the sides; vestiture rather long, moderately dense, of pale yellow hairs. Scutellum concolorous with mesonotum, rather prominent, depressed distally, at tip truncate and with thickened margin, unarmed; vestiture of rather dense and long yellow-brown hairs. Postnotum black, shining. Pleuræ piceous, shining, brownish yellow at the sutures, with a few patches of yellow hair. Abdomen elongate-ovate, broadest at apex of second segment, then tapering gently to the broadly rounded tip; integument dull brownish black stained with brown, an ill-defined median stripe visible on third and fourth segments; vestiture of rather dense, long fine hairs with pale yellow silky luster, nearly evenly distributed but visible only in some lights and therefore giving the appearance of large bare areas. Legs rather stout, the coxæ and femora yellowish brown, the latter broadly yellow at the apices; tibiæ deep ocher-yellow, with a narrow brown ring at middle; tarsi ferruginous yellow; vestiture of rather dense yellow shining hairs, the tarsi ventrally with cushions of golden pile. Pulvilli ocher-yellow. Claws black on distal half. Wings broad, the integument smoky and distinctly hairy, extreme base brown, some brown cloudings in the costal region and on the cross-veins; first posterior and discal cells with the posterior angles blunt and somewhat produced, each with a distinct spur, the usual spur projecting from third vein into middle of first posterior cell. Tegulæ and halteres ocher-yellow. Length: Body about 8 mm., wing 6 mm.

Baracoa, Cuba, September, 1901, one male (A. Busck).

Type: Cat. no. 21,418, U. S. Nat. Mus.

The specimen just described appears to enter very well into the genus *Ceratophya* as originally defined by Wiedemann. In the light of our present knowledge the genus seems hardly tenable; it connects with typical *Microdon* through species having the different characters variously developed and modified, so that no line can be drawn between them.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW GENERA OF DEEP-WATER GURNARDS (PERISTEDIIDAE) FROM THE PHILIPPINE ISLANDS.

BY HUGH M. SMITH.

The Philippine collections of the "Albatross" are very rich in peristedioid fishes as regards both individuals and species. The most interesting specimens are those representing two hitherto undescribed genera which necessitate a modification of the definition of the Peristediidae.

The new genera have been named **Gargariscus** and **Heminodus,** and their outstanding differential character is that the upper jaw is toothed, whereas *Peristedion* is edentulate in both jaws. The following key shows the relationships of the three genera:

A. Both jaws toothless . . . . *Peristedion.*

AA. Only lower jaw toothless.

b. Cephalic shield much expanded, flattened, the margin crenate; rostral processes long and flat; barbels very highly developed; mouth moderate; teeth on premaxillaries in a broad band extending half distance to angle of mouth . . . . *Gargariscus.*

bb. Cephalic shield little expanded, the margin entire; rostral processes short and spine-like, not flattened; barbels short and few; mouth very large; teeth on premaxillaries in a broad band extending to angle of mouth . . . . *Heminodus.*

Gargariscus, new genus.

Similar to *Peristedion* in general appearance, but with cephalic shield more expanded and its edge deeply crenated; premaxillaries bearing a broad band of fine teeth extending from symphysis half way to angle of mouth.

A

Type of the genus.—The genus contains only one known species, **Gargariscus semidentatus**, new species.

Type of the species.—The type is 22.7 cm. long, from a depth of 169 fathoms in the Mindanao Sea, on a bottom of globigerina ooze ("Albatross" station 5517). U. S. Nat. Mus. No. 78,249.

The collection contains 12 examples obtained from dredging stations between northern Mindanao and Verde Island Passage, in depths of 118 to 805 fathoms. The specimens range from 6.5 to 25.0 cm. in length.

Heminodus, new genus.

The differential characters are shown in the above key.

Type of the genus.—The genus contains a single known species, **Heminodus philippinus**, new species.

Type of the species.—The type is 16.8 cm. long, from the Mindanao Sea off Tawi-tawi ("Albatross" station 5517). U. S. Nat. Mus. No. 78,250.

The collection contains two other specimens from two other stations in the same region, the deepest dredge haul being in 277 fathoms.

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PROCEEDINGS
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TWO NEW POCKET MICE FROM WYOMING.

BY E. A. GOLDMAN.

In determining the status of pocket mice obtained in the course of biological investigations in Wyoming, two undescribed subspecies have been detected. One of these is a pallid representative of *Perognathus parvus;* the other a large, light-colored form of *Perognathus flavus*, by whose discovery in the State the known range of the species is materially extended northward.

They are characterized as follows:

Perognathus parvus clarus, subsp. nov.

Type from Cumberland, Wyoming. No. 178,939, ♂ adult, U. S. National Museum (Biological Survey Collection), collected by S. G. Jewett, May 18, 1912. Original number 976.

Geographic distribution.—Green River Valley in southwestern Wyoming, and upper part of Snake River Valley in southeastern Idaho.

General characters.—Similar to *Perognathus parvus parvus* but somewhat larger; skull more massive; color paler. Size and proportions about as in *P. p. olivaceus*, but upperparts light buffy instead of light ochraceous buffy; lateral line less distinct.

Color.—Upperparts in general light-buff, finely and rather inconspicuously lined with black; buffy lateral line faint; white subauricular spots prominent as in *P. p. olivaceus;* feet and underparts white; tail brownish along a narrow line above; white below.

Skull.—As in *P. p. olivaceus;* larger, broader and more massive than that of *P. p. parvus*, with mastoids distinctly larger and rostrum broader.

Measurements.—Type: Total length, 181; tail vertebræ, 84; hind foot, 22. Average of 7 adult topotypes: 172 (160–186); 91 (83–97); 22 (21–23).

Skull (type): Greatest length, 25.4; greatest mastoid breadth, 13.4; interorbital breadth, 5.6; nasals, 10; interparietal, 5.6 x 3; maxillary toothrow, 3.9.

Remarks.—The pallid coloration of *Perognathus parvus clarus*, shared with *Perognathus fasciatus litus*, *Perognathus callistus*, *Perodipus ordii*

A

futvolus and other small mammals inhabiting southwestern Wyoming, suggests that all have been similarly affected by local environmental conditions. Specimens from Bear River, near the Utah border, are comparatively dark in color and apparently grade toward *P. p. olivaceus*. Those from southeastern Idaho are somewhat intermediate, as they combine the color of typical *P. p. clarus* with the smaller average size and more slender skull of *P. p. parvus* which inhabits the Snake River Valley in southwestern Idaho.

Specimens examined.—Total number, 34, as follows:

Idaho: American Falls, 8; Big Butte, 1; Birch Creek, 3; Blackfoot, 2; Dickey, 2; Lemhi, 1; Pahsimeroi River, 1; Pahsimeroi Valley, 2.

Wyoming: Bear River (14 miles north of Evanston), 2; Cumberland, 9 (type and topotypes); Fort Bridger, 1; Mountainview, 2.

Perognathus flavus piperi, subsp. nov.

Type from 23 miles southwest of Newcastle, Wyoming. No. 168,650, ♂ adult, U. S. National Museum (Biological Survey Collection); collected by S. E. Piper, May 25, 1910. Original number 283.

Geographic distribution. Known only from the type locality, but probably ranging at low elevations throughout eastern Wyoming and western South Dakota.

General characters.—Most closely allied to *Perognathus flavus flavus* but larger; upperparts less intense ochraceous buffy; skull larger and differing in detail. Similar to *P. f. bimaculatus*, but smaller and paler colored.

Color.—Upperparts between light buff and light ochraceous-buff, finely mixed or overlaid with black; lateral line and postauricular spots pale but distinct; feet and underparts white as usual in the group; tail whitish all around.

Skull.—Essentially like that of *P. f. flavus* in general form, but larger throughout; nasals longer, reaching anterior plane of orbits (not normally reaching this plane in typical *flavus*); mastoids decidedly larger; interparietal quadrate in outline, the posterior border more deeply emarginate. Differing from that of *P. f. bimaculatus* in decidedly smaller size.

Measurements.—Type: Total length, 113; tail vertebræ, 51; hind foot, 17. Two adult topotypes, respectively: 116, 115; 49, 50; 17, 17. Skull (type): Greatest length, 22; greatest mastoid breadth, 12.4; interorbital breadth, 4.6; nasals, 8.1; width of interparietal, 2.7; length of interparietal on median line (between anterior border and posterior emargination), 1.6; maxillary toothrow, 3.4.

Remarks.—Perognathus flavus piperi is readily distinguished by the combination of color and cranial characters pointed out. Its geographic range marks the northern limit of the species, which on the south reaches the Valley of Mexico. Specimens from eastern Colorado are assignable to *P. f. flavus*, but in less buffy coloration apparently grade toward the present form.

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

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PROCEEDINGS

OF THE

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A NEW SHREW FROM NOVA SCOTIA.

BY HARTLEY H. T. JACKSON.

In the process of a monographic revision of the American Soricidae, being made for the U. S. Biological Survey, it becomes necessary to name an unrecognized form of the *Sorex fumeus* group. It may be known by the following diagnosis:

Sorex fumeus umbrosus, subsp. nov.

Type-specimen.—Adult ♂, skin and skull, No. 150,065, U. S. National Museum, Biological Survey Collection; from James River, Antigonish County, Nova Scotia; collected July 29, 1907, by W. H. Osgood. Original number 3140.

Geographic range.—Nova Scotia, New Brunswick, southeastern Quebec and Maine.

General characters.—Similar to *Sorex fumeus fumeus* but averaging slightly larger, and in summer pelage distinctly less reddish brown (more grayish) on upperparts.

Color.—Winter pelage: Distinctly grayish. Upperparts in general effect either mouse gray * or deep mouse gray, more or less finely flecked with whitish hair-tips. Underparts a trifle paler than upperparts, mouse gray, frequently silvery in certain lights. Tail distinctly bicolor, fuscous above, chamois or honey yellow below nearly to tip; feet and tarsi chamois, the outer edges dusky. *Summer pelage:* Brown of the upperparts noticeably less reddish than in *S. f. fumeus*. Upperparts fuscous-black mixed with grayish; underparts drab mixed with deep neutral gray of base of hairs; tail bicolor, fuscous-black above, honey yellow, cinnamon-buff, or chamois below nearly to tip; feet and tarsi as in winter.

Skull.—Similar to that of *S. f. fumeus*, possibly averaging slightly larger. Medium in size, relatively short and broad, with short rostrum, and relatively short and broad interorbital region; braincase moderately flattened; infraorbital foramen large and placed well back: dentition

* Ridgway, R., Color standards and color nomenclature, 1912.

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moderately heavy, molariform teeth rather deeply emarginate posteriorly; third unicuspid larger than fourth.

Measurements.—Type (adult male): Total length, 127; tail vertebrae, 52; hind foot, 14. *Skull:* Type (adult male; teeth slightly worn): Condylobasal length, 24.0; palatal length, 7.2; breadth of cranium, 9.3; interorbital breadth, 3.9; maxillary breadth, 5.3; maxillary tooth row (anterior edge of second upper incisor to posterior edge of last upper molar measured at alveolar border), 6.8.

Remarks.—Specimens typically representative of *S. f. umbrosus* have been examined only from Nova Scotia and the coast region of New Brunswick (Hampton). Intergradation with *S. f. fumeus* is indicated in specimens of *umbrosus* from Maine and western New Brunswick, while certain specimens referred to the subspecies *fumeus* from New Hampshire, Vermont, western Massachusetts, and even the Adirondacks of New York, show an approach towards *umbrosus*.

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PROCEEDINGS
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THREE NEW STARFISH AND ONE NEW BRITTLE-STAR FROM CHILE.

BY AUSTIN H. CLARK.*

While working off the coast of Chile from the ninth to the twelfth of February, 1888, the "Albatross" brought to light three new starfish and a new ophiuran, the descriptions of which follow.

FAMILY ASTROPECTINIDÆ Gray.

Plutonaster sirius, new species.

Five arms; R=33 mm.; r=11 mm.; R:r=3:1; superomarginals 24 to 26.

The cœca extend to the fourth superomarginal.

The gonads are not developed.

The ampullæ are conical with the base (the actinal end) hemispherical; the pedicel is attached near the base. They may thus be described as single, with a slight actinal swelling.

The abactinal skeleton is composed of irregular rounded plates.

The abactinal surface is covered with closely set, though not crowded, paxillæ; these are very uniform in size, but are smaller on the center of the disk and on the outer part of the arms than elsewhere. At the sides of the arms and around the interbrachial arc they are arranged in transverse rows; in the center of the disk and in a band down the center of each arm their arrangement is irregular. The paxillæ have a low tabulate base, rarely so high as broad at the convex summit, bearing in the larger from twelve to sixteen spinelets which are longer than the height of the tabulate base, of which the peripheral make a slight angle with the vertical axis.

The surface of the large compound madreporite is concealed by five or six much enlarged paxillæ, most of which are situated around its border.

The papulæ, which are small and regularly arranged about the bases

* Published with the permission of the Secretary of the Smithsonian Institution.

of the paxillæ, are absent from the center of the disk and from the median portion of the arms.

The first superomarginals are slightly wedge-shaped, twice as broad as the abactinal length; the second are more oblong, twice as broad as long; the following gradually decrease in height so that those beyond the seventh are only very slightly broader than long. In abactinal view the width of the superomarginals remains uniform until the outer third of the arm, whence it slowly decreases to the tip. In one specimen the decrease in width begins at the base of the arm, while in the smallest it begins at the center of the interbrachial arc. On the arms the superomarginals are always less than half as broad as the paxillar area between them.

The superomarginals are evenly convex dorso-ventrally, with the outer surface nearly flat; they are covered with short, truncated, round-tipped spinelets which are not crowded; these become smaller toward the abactinal margin, longer and more slender along the lateral borders, and still more slender in the fasciolar grooves.

The inferomarginals correspond with the superomarginals; they are laterally of the same height and are similar to them. Actinally they form a border of about the same width and relative proportions. Their armature is similar, but they bear on the actinolateral border a stout conical spine which is small and short on the first, slightly longer on the second, and longest on the third or fourth, where it reaches 1.25 mm. in length, thence remaining uniform for some distance and slowly decreasing in length toward the end of the arm.

The actinal intermediate plates are arranged in regular rows between the inferomarginals and the adambulacrals, the rows corresponding to the latter but not to the former. The individual plates imbricate more or less over those preceding. The rows extend as far as the fifth, or proximal part of the sixth, inferomarginal, there being in this distance nine columns, the first of five or six plates, the second of four or five, the third of three or four, the fourth of three, the fifth of two or three, the sixth and seventh usually of two, and the remainder of one. The plates are elevated in the center and bear, on the largest, from fifteen to seventeen short round-tipped spinelets. Each of these groups of spinelets is separated from those on the plates in the adjacent columns by conspicuous bare channels, and from those of the plates in the same series by similar, but much narrower, channels.

The adambulacral plates are at first rhombic; on the arms they become oblong, about twice as long as broad, flattened on the side adjoining the inferomarginals, projecting into the ambulacral furrow in a rounded angle. On the earlier plates the angle in the furrow margin is not central, but situated near the adoral border; it gradually moves distally, becoming almost central in the plates in the outer half of the arm. The armature consists of six long subequal slender furrow spines; on the earlier plates the second of these from the adoral end lies at the apex of the angle; later the third occupies this position, and on the arms the third and fourth; beyond these there are two rows of four well spaced

shorter spines; rarely there is an enlarged spine on the distal portion of the actinal surface of the plate.

The mouth plates have twelve short spines along the median border which decrease slowly in length distally; on the furrow margin there are four or five long spines continuing into a similar series of from five to seven more slender spines similar to those on the adambulacrals, one or two of which stand on the edge bordering the first adambulacral; the most proximal of these arises between the most distal spine of the furrow series and the furrow. A few additional spines similar to those in the central rows occur on the free surface of the plates.

The color in alcohol is grayish white.

Type.—Cat. No. 36,949, U. S. N. M., from "Albatross" Station 2788, off the coast of Chile, in 1050 fathoms.

Family LUIDIIDÆ Verrill.

Luidia porteri, new species.

Five arms; R=98 mm.; r=11 mm.; R:r=8.9:1; width of arms at base 12 mm.; superomarginal paxillæ 70.

Arms long and unusually narrow, slowly and regularly tapering from the base to the tip; upper surface flat, not especially depressed, the first row of paxillæ beyond the superomarginals defining the border of the dorsal surface.

The paxillæ are exceedingly delicate, with a short central spinule and several long and very slender radial spinules; they are everywhere in contact with their neighbors through the long radial spinules.

The superomarginal paxillæ correspond to the inferomarginals; they are more or less oval in shape, mostly about twice as long as wide, and carry about twenty long radial spinules, some of which are almost hair-like, and from five to ten somewhat shorter spinules on the summit; at the base of the arm they bear from one to five (usually from one to three) pedicellariæ of different sizes, but after the middle of the arm pedicellariæ become very rare.

Within the superomarginal paxillæ is a row of much smaller paxillæ, five of which correspond to three superomarginals; these have about ten long radial spinules and from three to five shorter central ones, and are approximately circular in outline. Within this row the paxillæ decrease almost imperceptibly in size and in regularity of arrangement to the mid-line of the ray, where they have most commonly eight slender radial spinules, and a single short median spinule.

Occasional paxillæ in the center of the disk and in the central portion of the ray bear prominent granuliform pedicellariæ, but these are not very abundant, and are almost entirely absent from the distal half of the arms.

In the actinal half of the interbrachial arc and on the adjacent arm bases pedicellariæ are extraordinarily abundant, occurring on all the paxillæ, sometimes as many as five on one paxilla.

The superomarginals are narrow, their ridges being about as wide as the deep channels between them; the armature differs on alternate plates, as follows: (1) just beneath the superomarginal paxilla there is a long prominent spine 5 mm. in length, directed outward and obliquely upward; just below the ambitus there is a slightly smaller spine, directed outward and slightly downward; half way between this and the actinal border of the plate there is a much smaller, though similar, spine; (2) slightly above the ambitus there is a long spine directed outward and very slightly upward; slightly below the ambitus there is a similar, usually very slightly smaller, spine, directed outward and slightly downward; otherwise the plate is as in the preceding type. At the base of the arm each inferomarginal bears on its actinal surface from one to five (usually two or three) pedicellariæ, which vary all the way from granuliform to forcipiform, but these soon disappear; there are a few scattered spinules on the outer surface, and the sides are abundantly supplied with capilliform spinelets. The two inferomarginals in the center of the interbrachial arc bear numerous short spines and spinules, or several conspicuous pedicellariæ and spinules.

The alternation of two and three long spines on the inferomarginals, and especially the occurrence of long spines just below the superomarginal paxillæ only on alternate plates, is a striking feature of the species.

The actinal intermediate plates are narrow, with a knife-like crest which bears a large and prominent pedicellaria of the forcipiform type with usually one or two fine spinules near it.

The adambulacral plates bear just within the furrow a sabre-shaped flattened spine; just beyond this there is a much longer and stouter spine, curved at the base; just behind this, so close to it as to arise almost from a common base, there is a shorter straight spine. These spines are situated slightly beyond the median line of the plate, and proximal (adoral) to them are usually from one to four slender spinules situated toward the outer edge of the plate.

The mouth plates have a long stout spine at the inner angle which stands at the head of a series of seven spines arranged along the median suture; these decrease gradually in length for the first four; the remainder are much smaller; on each pair of mouth plates, below and more or less to one side of one of the spines of the central pair there is a large forcipiform pedicellaria; on the side opposite to that on which this pedicellaria occurs there are two spines of rapidly decreasing length; these spines, with the median, stand almost in a straight line across the inner end of the pair of mouth plates; at right angles to them, along the sides of the individual plates, is a series of three slender spines, and along the side bordering the first adambulacral many capillary spinelets.

The color, in alcohol, is yellowish white.

Type.—Cat. No. 36,947, U. S. N. M., from "Albatross" Station 2787, off the coast of Chile, in 61 fathoms.

I take great pleasure in naming this species for my friend Dr. Carlos Porter of Santiago de Chile.

FAMILY BENTHOPECTINIDÆ Verrill.

Pectinaster robustus, new species.

Five arms; R=55 mm. to the distal border of the twentieth superomarginal, beyond which point none of the arms are preserved; r=15 mm.

General form stellate, with narrow pointed rays, very astropectinoid.

The gonads do not extend into the arms.

The pedicels have very small sucking disks; the ampullæ are double.

There are no superambulacral plates.

The abactinal surface is covered with low paxillæ which are very slightly larger just within the arm bases than elsewhere; on the arms they become smaller and more widely spaced, and show a more or less regular arrangement in diagonal rows in the lateral portions. There are about twelve paxillæ across the arm at the third superomarginal, and about nine at the twentieth.

The typical paxillæ consist of a prominent central spinelet surrounded by from eight to ten shorter and more slender spinelets, usually between one-third and one-half of its length; some paxillæ have two central spinelets and more numerous lateral spinelets, while others lack the former. In the center of the disk a few of the paxillæ have the central spinelet much elongated, up to about 1 mm. in length, and a similar elongation of the central spinelet occurs on scattered paxillæ on the arms, becoming more frequent distally.

The papulæ are few, single, confined to a limited, but undifferentiated, area at the base of the rays.

The two interradial superomarginals are high, narrow, triangular, converging actinally; the second superomarginal is nearly twice as broad, approximately oblong, somewhat over twice as high as long; the third resembles the second, but is lower, twice as high as long; the following gradually decrease in height so that the sixth is about as high as long; the remainder are similar, becoming slightly longer than high at the broken end of the arm (the twentieth); the lower border of the superomarginals is strongly curved so that the seventh and following are almost semicircular in outline, slightly flattened where they adjoin the inferomarginals; the superomarginals are tumid, with deep grooves between them. The first superomarginal bears a vertical column of four or five spines of which the uppermost is about 1.5 mm. in length, and the following progressively shorter; the second superomarginal bears a column of three spines which are larger and stouter than those on the first; the third has one large spine, slightly smaller than the spines on the following superomarginals, and one or two very small spines below it; on the fourth and following there is a single large stout spine situated in the center of the semicircle formed by the lower border; this reaches a maximum size on the sixth, where it is about 4 mm. in length. The superomarginals are bordered, and their surface is covered, with long well spaced spinules which are longest along the lower border; usually two or three of these below and proximal to the large spine are especially elongated.

The interradial inferomarginals are considerably broader than the cor-

responding superomarginals, and the following inferomarginals are situated considerably beyond the corresponding superomarginals, though not enough so as regularly to alternate with them. In general the inferomarginals agree approximately in size and in shape to the corresponding superomarginals. They bear a large stout spine situated near the upper border, somewhat stouter than the spine on the superomarginals, and reaching 5 mm. in length; below this is another spine, about half as long and correspondingly less stout, and below this another, shorter and still more slender. The sides of the inferomarginals are armed with long scattered spinules a few of which occur also on the outer surface; one or more of these may be more or less enlarged. The interradial inferomarginals bear a column of five or six approximately equal spines, resembling the longest spines in the similar corresponding superomarginal series; the first inferomarginal bears three spines of which the uppermost is the longest and the others decrease in length; the second and third are similar, but with progressively greater difference between the elongate uppermost and shorter lower spines. The lower borders of the inferomarginals in the interbrachial arc are prominent, raised above the surface of the actinal intermediate plates, and spineless.

Pectinate pedicellariæ occur between the interradial pair of superomarginals, or between one of these and the adjacent superomarginal, in one case in both situations; there are no other pedicellariæ in the superomarginal series.

In three cases I found small pectinate pedicellariæ between the inferomarginals; one was between the two interradial inferomarginals, one between one of these and a second inferomarginal, and the third between a third and fourth inferomarginal.

On the disk pectinate pedicellariæ may replace the central spine in the paxillæ, but these are relatively rare; more frequently pectinate pedicellariæ are formed by the modification of the borders of two adjacent paxillæ; this type occurs also on the arms.

The actinal intermediate area is covered with about thirty crowded plates which decrease rapidly in size from the adambulacrals to the marginals; these are armed with one, or in some of the larger two, long spines, and from one to six scattered elongate spinules. One or two pectinate pedicellariæ occur between these plates, in the angle near the mouth plates. There are from eight to ten actinal intermediate plates adjoining the adambulacrals; these correspond to seven adambulacrals, and the series ends at the proximal border of the fourth inferomarginal. Most of these plates have pectinate pedicellariæ between them.

The adambulacral plates are at first about as long as broad, the inner half projecting into the ambulacral groove in a right angle; further out on the arm they gradually become broader than long, and the projecting angle gradually becomes more acute. The armature consists of seven or eight long furrow spines, the two central the longest and stoutest; on the actinal surface there are two long stout spines, much longer than the furrow spines, resembling the lower spines on the inferomarginals, of which the inner is usually slightly stouter and longer than the outer;

there are three or four slender well spaced spines on the lateral borders, which resemble the outer furrow spines.

The mouth plates are short, with the inner half broadly rounded, and the surface tumid, bearing a few rather long spines: the furrow series consists of nine graduated spines of which the inner three are at right angles to, and the outer four or five parallel to, the median border.

The color in alcohol is dull yellow.

Type.—Cat. No. 36,945, U. S. N. M., from "Albatross" Station 2789, off the coast of Chile, in 1342 fathoms.

Family OPHIOLEPIDIDÆ.

Ophiocten squamosum, sp. nov.

The disk is circular, thin, strongly overlapping the arm bases, 10.5 mm. in diameter; the arms at the base are 1.75 mm. across.

The radial shields are moderate in size, triangular to ovate, usually triangular with the outer angle broadly rounded, not much longer than the maximum (distal) breadth, which is about as great as the diameter of the arm base. The inner distal portion of the radial shields is slightly raised, and the inner distal angle is broadly rounded, sometimes slightly produced. The radial shields of each pair are separated interiorly by a squamous band with nearly parallel sides which in width is equal to about half the diameter of the arm bases.

The central portion of the disk is covered by six circular primary plates situated close together and separated by rather narrow lines of small rounded plates arranged in single rows; the remainder of the disk (excepting the radial shields) is covered by overlapping plates of very varied sizes, usually scattered larger plates separated by numerous smaller plates, though there is no regular arrangement. All of the plates of the disk are extremely thin.

The interbrachial areas below are covered with rather small rounded overlapping scales of approximately uniform size.

There are usually no papillæ of any sort about or on the arm bases; but occasionally from one to three small papillæ are found representing a rudimentary arm comb.

The oral shields are very low, pentagonal, nearly or quite twice as broad as long, with a very obtuse proximal angle, slightly converging lateral edges, and a straight distal edge.

The side mouth shields are very narrow, at the first arm tentacle pore almost entirely covered by the oral shield, the proximal lateral angles of which they surround.

The mouth papillæ are five in number; the innermost is triangular, sharp pointed; the next is of about the same length, but slightly longer and less pointed; the third is similar to the second, but slightly longer and less pointed; the fourth is longer than the third, with a nearly or quite straight outer edge; the fifth is as long as the three preceding, very narrow, with a straight distal edge.

The arm spines are three; the uppermost is slightly longer than an arm segment; the central is slightly shorter than an arm segment; the lowest on the proximal part of the arm is slightly shorter than the central, but on the outer portion of the arm is equal to it.

The tentacle scale is single, small, more or less pointed; just within it is a production of the border of the side arm plate which appears like a second low tentacle scale.

The under arm plates are small, low, triangular, with three straight sides and an obtuse distal angle.

Type.—Cat. No. 39,017, U. S. N. M., from "Albatross" Station 2789, off the coast of Chile, in 1342 fathoms.

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PROCEEDINGS

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NOTES ON MAINE MAMMALS.

BY MANTON COPELAND AND ALTON S. POPE.

For several years the writers have trapped small mammals in a number of different localities in Maine, and during that time certain rare or interesting species, infrequently recorded from the State, have come to light. It seems desirable to make some of these records available to those who are interested in the mammalian fauna of New England.

Synaptomys cooperi fatuus.

Brassua Lake. Two specimens were trapped by E. C. Pope, October 27 and 29, 1913, in a clearing overgrown by raspberry bushes in runs frequented by *Evotomys* and *Microtus*.

Grafton. On September 10, 1915, a female, containing three embryos measuring about 6 mm. in length, was taken in a sphagnum bog under the roots of a small spruce tree. Dr. G. M. Allen, who has kindly examined the skin and skull, makes the following report: "I have compared your *Synaptomys* carefully with the type series of *S. fatuus* and with Massachusetts specimens considered typical of *S. cooperi*, and should call the Grafton specimen *S. cooperi fatuus*. It is not quite adult, and it is peculiar in having the skull rather shorter in proportion to its breadth than what seems normal. In some respects it is intermediate between the two forms, but on the whole it is nearer *fatuus*. Its skull is not quite so narrow in proportion to the total length as in typical *fatuus*, yet not so wide as in *cooperi*; the postorbital margin is more like *fatuus*, *i. e.*, not so nearly at right angles to the axis of the skull. The audital bullae seem small as in *fatuus*. The upper incisors, while not quite so narrow as in typical *fatuus*, are not so broad as in *cooperi*, and the same is true of the lower incisors. Altogether, the skull is much more as in the smaller form." This conclusion is in accord with that reached by B. H. Dutcher, who records a specimen from Mt. Katahdin "that seems, on comparison with material in the Biological Survey Col-

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lection, to be intermediate between *S. cooperi* and *S. fatuus*." * That *S. fatuus* really represents a northern subspecies of *S. cooperi* rather than a distinct species as originally described, appears to be unquestionable.

Microsorex hoyi.

Brunswick. Seven specimens of this shrew have been taken on the following dates: December 9, 1907; January 11, 1908 (two); April 27 and 28, 1912; May 4, 1912; May 12, 1917. They were trapped in damp woods near streams, and by holes in a bank bordering a brook in an open field.

Topsham. One secured by a dog May 5, 1917, and examined through the kindness of F. E. Noyes.

East Andover. Two specimens taken December 17 and 30, 1915, by G. Akers and M. A. Howard.

Brassua Lake. One trapped May 7, 1916, under a stump in a clearing in moist woods.

Holden. We are indebted to W. M. Hardy for three additional records of Microsorex from Holden. Two were secured by him in January 1908, and one September 16, 1916.

As there appear to be but three published instances of the capture of the least shrew in New England, the fourteen specimens noted above are of considerable interest.

Neosorex palustris albibarbis.

Although the water shrew is not so rare as the preceding species, there are few records of its occurrence in Maine.

Brunswick. Eight specimens have been taken on the following dates: October 22 and November 20, 1907; April 11 (three), April 20, May 4 and October 31, 1909. Several individuals of this series have been examined by Dr. G. M. Allen, who writes as follows in regard to their status: "The *Neosorex* are, as I had expected, a little intermediate, yet I should refer them unhesitatingly to *albibarbis*, with which they agree in their coal black coat, dark bellies, and in most cases the tail mostly or entirely black. Two, however, have the underside of the tail whitish nearly as much as in *acadicus*, and in two others the extreme base is whitish underneath."

Upton. One procured by Dr. W. C. Kendall and presented to the Lee Museum of Biology, Bowdoin College. Date unknown.

Brewer. W. M. Hardy informs us of the capture of a specimen by P. F. Eckstorm, March 3, 1909.

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* Proc. Biol. Soc. Wash., Vol. 16, 1903, p. 68.

Vol. 30, pp. 161-162 October 10, 1917

PROCEEDINGS

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SELAGINELLA FUNIFORMIS, A NEW SPECIES IN THE S. RUPESTRIS GROUP.

BY G. P. VAN ESELTINE.

Inasmuch as data concerning certain specimens that are included in this species are desired for immediate publication, it becomes necessary to publish a preliminary diagnosis. A more complete discussion will follow in a later paper.

Selaginella funiformis, new species.

Plants erect, cespitose, rigid, up to 12 cm. in height; rhizophores abundant at the base of shoots, sparse along the older portions of the stem; stems (including leaves) up to 1.2 mm. thick, rigid, sparsely branches at intervals of 7 to 10 mm.; primary branches few, 5 to 8 cm. long, these bearing few secondary branches (up to 20 mm. long); ultimate branchlets occurring throughout, up to 5 mm. long, simple, closely ascending; leaves 8 to 12 ranked, very closely appressed, imbricate, in the younger stages olive-green, in age becoming dull brown, thickish, chartaceous, slightly concave above, convex beneath, narrowly sulcate dorsally in a median line up to the acute apex, narrowly deltoid from a short broadly obdeltoid base, 6 to 10 ciliate on the margins, occasionally minutely 4 to 8 ciliate along the edges of the dorsal suture; longest leaves 1.25 mm. long, 0.4 mm. wide at the base; cilia 0.03 to 0.06 mm. long; setae white with a reddish base, scabrous, up to 1 mm. long; spikes nearly quadrangular, up to 15 mm. long, 1 mm. thick; sporophylls 1.5 mm. long, 0.8 mm. wide at the base, narrowly sulcate dorsally in a median line up to the acute apex, auriculate, minutely 10 to 20 ciliate on the margin, occasionally 4 to 8 ciliate on the edges of the dorsal suture near the base; auricles broadly obdeltoid, ciliate; cilia more minute and setae slightly shorter than on the stem leaves; megasporangia yellowish, 0.6 mm. in widest diameter; megaspores rugose on the commissural side, nearly smooth on the opposite side, 0.3 mm. in diameter; microsporangia 0.6 mm. in widest diameter, reniform, orange or brownish; microspores abundant, bright orange, 0.03 mm. in diameter.

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Type in the U. S. National Herbarium, No. 723,895, collected on "hillocks of loose sand in shade of scrubby oaks" near Carrabelle, Florida, March 15, 1898, by Charles Mohr.

Closely agreeing with the type are the following specimens, all from Florida:

"Chapman" (Biltmore distribution No. 3432b). Dry sandy ridges in the pine barrens, Carrabelle; A. M. Huger, Clearwater, January-February, 1902; Small, Carter, and Small, No. 3349, Fort Laudervale to Miami, February, 1911; Small and Carter, No. 1013, Fort Lauderdale, November 19 and 25, 1903; Small and Wilson, No. 1762, Fort Lauderdale, May 20, 1904.

This species is somewhat closely allied to the rather common *S. arenicola* of the southeastern states, but differs in having the megaspores somewhat rugose on the commissural side, a great number of ranks of leaves, and a shorter leaf base. If differs from other forms in the group in that the cilia of the dorsal suture are either very minute, or, more commonly, entirely lacking. Moreover, the stiff cordlike appearance of *S. funiformis* furnishes a striking character that easily distinguishes it from any of its allies.

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PROCEEDINGS
OF THE
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A NEW ANTILLEAN SPHAERODACTYLUS.

BY THOMAS BARBOUR.

Not long since Dr. Don W. Griswold, in charge of the hookworm campaign in the West Indies for the Rockefeller Board, sent me some additional reptiles from Antigua. His previous findings there included the interesting *Ameiva griswoldi* Barbour (Proc. Biol. Soc. Wash. 29, 1916, p. 216). The beautiful little creature which is the subject of this notice may be called

Sphaerodactylus elegantulus, sp. nov.

Type: M. C. Z. No. 12,084, from the island of Antigua, British West Indies, collected by Don W. Griswold, M. D., in 1917.

Snout rather short but acute, the distance from tip of snout to eye being about equal to distance of eye from ear opening, and nearly three times the diameter of the eye, which is rather small; rostral rather large with a long median cleft behind; nostril between rostral, first supralabial, two (?) small postnasals and a somewhat enlarged supranasal which is separated from its fellow on the opposite side by a single scale, which is slightly smaller than one of the supranasals; these three scales border the rostral posteriorly; three large supralabials to the center of the eye; above the middle of the eye the usual supraciliary spine is indicated by a single slightly prominent tubercle on each side; head and body, except belly covered with tiny round granular scales, those of crown of head by far the smallest, belly scales smooth, round, slightly imbricate; mental large, as large as rostral, followed by a very large, a medium sized and a very small infralabial; two small squarish postmentals slightly enlarged, scales of throat and chest granular; scales of limbs, round, flat or slightly swollen, not imbricate; scales on tail in whorls, squarish, flat, not imbricate, and larger on the lower than on the upper surface or sides.

Color: rich mahogany brown, the head lighter than the body; very narrow pure white cross bands arranged as follows, one on nape, one just anterior to and another just behind fore limbs, two across mid body region, one just before and another just behind hind limbs, four on tail the two distal rings more or less broken into dots. All of these rings are

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sharply defined, of the same width and are all equidistant from each other. The belly is grayish and the rings do not extend beyond the brown area.

This species is similar in many respects to *S. elegans* MacLeay and *S. torrei* Barbour from Cuba, in fact I believe the species are all three somewhat closely related. It is markedly different from the Sphaerodactyli inhabiting the Virgin Islands and the Lesser Antilles and apparently also from the little known *S. sputator* from St. Eustatius, for in writing of the types, Andersson (Bihang till K. Svenska Vet.-Akad. Handl., 26, 4, 1900, p. 27) speaks of "the large keeled scales of the back" which indicates a species of a wholly different series.

Size: in general appearance, *i. e.*, with regard to size and habit especially, the type now described recalls at once *S. elegans*. It is a tiny species unless the little creature before me is immature. Additional specimens will be awaited with much interest. The type is 28 mm. in total length, and but 14 mm. from snout to vent.

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TWO UNDESCRIBED WEST INDIAN BATS.

BY GLOVER M. ALLEN.

Zoological explorations undertaken by the Museum of Comparative Zoölogy in recent years have greatly enriched its collection of West Indian bats and provided adequate material for a comparative study of sundry species which are represented in several of the islands by slightly differentiated races. Two of these latter are here described and named. The first is an Erophylla, one of the subfamily Phyllonycterinae, from the island of Jamaica, where it had not been previously reported; the second is a race of the large *Chilonycteris parnelli* from Santo Domingo, an island whence the species was likewise previously unrecorded. These two records now establish the presence of both Erophylla and the large Chilonycteris on all four of the Greater Antillean islands. The former is also represented in the Bahama group. The chief point of interest is that the Jamaican and Cuban forms of each species are closely similar to each other, and the Porto Rican and Santo Domingan representatives likewise are very similar to each other, but the races from the first two islands differ much less from each other than they do from their congeners on the other two islands.

The genus Erophylla is apparently confined to the Greater Antilles, where it has hitherto been known from Cuba (*E. sezekorni*), the Bahamas (*E. planifrons*), Santo Domingo (*E. santacristobalensis*), and Porto Rico (*E. bombifrons*). Its presence in Jamaica, though to be expected, had not been confirmed until 1912, when Dr. Joseph A. Cushman captured a small series at Montego Bay. These specimens, which are now for the first time recorded, I have compared carefully with the other known

forms of the genus, including the type and only known specimen of *E. santa-cristobalensis*, kindly loaned by the Field Museum of Natural History.

Gundlach, in 1861, was the first to describe a bat of this genus, which he discovered in Cuba, and named *Phyllonycteris sezekorni*. This has proved to be a rather rare or local species of which few specimens have been available for study. It is small wonder therefore that some confusion has existed as to its characters. Two additional species were described in 1899, by Miller: *planifrons* from New Providence, Bahamas, and *bombifrons* from Bayamon, Porto Rico. In 1905, a single specimen from Santo Domingo, previously recorded by Elliot as *Phyllonycteris poeyi* was named by him *P. santa-cristobalensis* (later, 1907, p. 534, emended to *sancta-cristobalensis*). Miller, in 1906, erected the genus Erophylla to include these four forms, leaving Phyllonycteris with the single species *poeyi*, of Cuba.

In external characters, apart from color, all the described species of Erophylla are remarkably alike. They show slight individual variation in the length of tail, form of nose pad and tragus, but nothing that may be used to distinguish geographical races with certainty. Unfortunately a sufficient series of skins is not available to determine what color characters are present, though it seems probable that there are marked color differences separating some of the forms.

An examination of the skulls, however, shows that they fall into two readily distinguishable groups: the one has a high rounded brain case with a relatively short tapering rostrum; the other has a low profile with longer and less narrowed rostrum. To the former belong *bombifrons* and *santa-cristobalensis*; to the latter *sezekorni*, *planifrons*, and the Jamaican representative described below. Although all four described forms have been accredited with specific rank, this hardly represents their true status. Each of the two groups just defined has perhaps nearly the value of a species, but the differences separating the island forms within each group are hardly sufficient to accord them more than subspecific rank. The distribution of the two groups is of probable significance; the *sezekorni* forms at the western end of the Antillean chain, the *bombifrons* group farther to the eastward in Santo Domingo and Porto Rico.

The Jamaican race may be known as

Erophylla sezekorni syops, subsp. nov.

Type, an adult male (alcoholic with dry skull), 13,713 M. C. Z., collected at Montego Bay, Jamaica, March 14, 1912, by Joseph A. Cushman.

General characters.—Structurally similar to *E. sezekorni* and *E. s. planifrons,* but the skull differing conspicuously in its wider rostrum with molar rows nearly parallel instead of converging anteriorly; profile very little less elevated than in *sezekorni,* but lachrymal region more swollen; the palate narrower; teeth slightly broader throughout.

Measurements.—The type measures: forearm, 48 mm.; tibia, 23; foot, 14.6; tail from anus, 14.5; ear from meatus, 17. Skull: greatest length, 24.7; basal length, 20; palatal length, 11; zygomatic width, 11.6; width outside m^2, 6.5; upper tooth row (front of canine to back of m^3), 8; lower tooth row (front of canine to back of m_3), 9.

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

Remarks.—The Jamaican Erophylla is only slightly different from that of Cuba and the Bahamas, but more closely resembles the former. The Bahaman race has an even flatter profile and a more pointed rostrum. Dry skins are not available to show if there are color differences. The specimen of *E. sezekorni* from which Miller in 1899 made his diagnosis must have been somewhat abnormal, for he says the "crown of the first lower molar is only slightly longer than that of the first premolar," whereas in normal specimens it is as in other forms, about twice the length of the first premolar.

The interesting genus Chilonycteris is found in tropical America from Brazil to Mexico on the mainland, but in the West Indies is as yet known from the Greater Antillean islands only. Three distinct species occur here, a smaller, an intermediate, and a larger, distinguished not only by size but by various slight structural peculiarities. While representatives of all three species have been found only in Cuba so far, it is likely that future exploration will discover the three species on the other large islands of the group as well. At the present time, *Chilonycteris macleayii,* the first of the West Indian forms to be named, is known from the typical form in Cuba, and a closely allied subspecies, *C. m. grisea,* in Jamaica. Possibly the Porto Rican *inflata* of Rehn is a representative of this species, but I have as yet seen no specimens of it.

The next Antillean species to be described is *C. fuliginosa* of Haiti and Santo Domingo. This is the smallest of the three, and apart from its small size is readily distinguished from the *macleayii* group by the small tubercles rimming the nose pad, which in *macleayii* is surmounted by a plain-edged angular projection.

The type of *fuliginosa* is still in the British Museum and I am indebted to Mr. Oldfield Thomas of that institution for notes and a figure of the nose pad, which prove its relationship is not with *macleayii*. A representative of this small species is found in Cuba, and was lately described by the writer (1916) as *torrei*; it should best be considered as a subspecies of *fuliginosa*. No corresponding form has as yet been discovered in Jamaica, nor in Porto Rico unless *C. inflata* eventually proves to be of this group rather than a form of *macleayii*.

The third species is the largest of the three, and was first described from Jamaica as *Phyllodia* [=*C.*] *parnellii* by Gray in 1843. Gundlach, in 1861, found a very similar form in Cuba, to which he gave the name *boothi*, very properly made by Rehn (1904) a subspecies of the Jamaican animal, *C. parnellii boothi*. A third form, smaller than either of the others, was described by Miller, in 1902, from Porto Rico, as *portoricensis*. This author gives a key to the forms of *parnellii*, based on the relations of the small second lower premolar, which he states in the typical subspecies does not appear in profile view from the external side, since the first and second premolars meet and crowd it inward from the tooth row. This condition I did not find in the two Jamaican specimens I examined. In both there was a small space between the first and third premolars, in which the small second tooth was visible.

It is of much interest to record the discovery of a form of *C. parnellii* from Santo Domingo, where in his expedition of 1916, Mr. J. L. Peters captured three in a cave. These prove to be very different from the forms of the other islands. They are much less in size, with smaller ears, in these respects resembling more the Porto Rican form, but are even smaller. It seems therefore of particular significance that, as in case of the Erophyllas, the Porto Rican and Santo Domingan races more nearly resemble each other than they do those of Cuba and Jamaica, which latter again are closely similar.

A description of the Santo Domingan bat follows:

Chilonycteris parnellii pusillus, subsp. nov.

Type, female, skin and skull, 16,468 M. C. Z., collected at Arroyo Salado, Santo Domingo, March 7, 1916, by James L. Peters.

General characters.—Smallest of the *parnellii* group, even smaller than

portoricensis. Color of upperparts slightly darker than in the latter, the bases of the hairs almost without the silvery appearance seen in the Jamaican and Cuban races. Skull very small in proportion compared to that of *portoricensis*.

Description.—Color above, uniform dark hair brown, the hairs at the nape with silvery bases; below drab, becoming much darkened on the abdomen where the hairs are dark brown basally.

Compared with other races of *parnellii*, all the proportions are much reduced so that it is markedly smaller even than *portoricensis*, with noticeably slender narrowed ears and weak thumbs.

The skull is small, with rather more abruptly elevated forehead as compared with the other races, the end of the muzzle is less upturned, and the postpalatal notch is less narrowed anteriorly. The teeth are quite as in *portoricensis* except for their smaller size; the small second lower premolar stands more nearly in the tooth row than it does in the Jamaican and Cuban races, in which the first and third lower premolars tend to meet exteriorly so as to crowd the second tooth inward.

Measurements.—The forearm of the type measures 50.5 mm.; the collector's measurements are: total length, 80 mm.; tail, 22; hind foot, 12.

The skull of the type shows the following dimensions (with those of a specimen of *portoricensis* in parentheses): greatest length, 19 mm. (20.5); basal length, 16.5 (18.2); palatal length 9 (10.4); width outside m^3, 6.5 (7.5); interorbital constriction, 3.7 (4); zygomatic width, 10.1 (11.5); mastoid width, 9 (10); upper tooth row (front of canine to back of m^3), 8 (9); lower tooth row (front of canine to back of m_3), 8.5 (9.5).

An alcoholic specimen (16,600 M. C. Z.) measures as follows (with, in parentheses, the measurements of a specimen of *portoricensis*): forearm, 49 (50); tibia and foot, 26 (28); ear from meatus, 17 (19); third finger, metacarpal, 41 (42.5); first phalanx, 9 (9.3); second phalanx, 14 (14.5).

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

Acknowledgments are due the United States National Museum and the Field Museum of Natural History for the loan of important specimens.

References to Literature.

Allen, G. M.

1916. A third species of Chilonycteris from Cuba. Proc. New England Zool. Club, vol. 6, pp. 1–7, plate 1. (*C. torrei* described.)

Elliot, D. G.

1905. Descriptions of apparently new species and subspecies of mammals from Mexico and San Domingo. Proc. Biol. Soc. Washington, vol. 18, pp. 233–236. (*Phyllonycteris* [=*Erophylla*] *santa-cristobalensis* described.)

1907. A catalogue of the collection of mammals in the Field Columbian Museum. Field Col. Mus., Zool. Ser., vol. 8, viii+694 pp. (Corrects spelling of *santa-cristobalensis* to *sancta-cristobalensis*.)

Miller, G. S., Jr.

1899. Two new Glossophagine bats from the West Indies. Proc. Biol. Soc. Washington, vol. 13, pp. 33–37. (Describes *Phyllonycteris* [=*Erophylla*] *planifrons* and *bombifrons*.)

1902. Twenty new American bats. Proc. Acad. Nat. Sci. Phila., pp. 389–412. (Describes *Chilonycteris portoricensis*, p. 400.)

1906. Twelve new genera of bats. Proc. Biol. Soc. Washington, vol. 19, pp. 83–86. (Genus Erophylla erected, p. 84.)

Rehn, J. A. G.

1904. A study of the mammalian genus Chilonycteris. Proc. Acad. Nat. Sci. Phila., pp. 181–207.

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TWO NEW ASTRORADIATE ECHINODERMS FROM THE PACIFIC COAST OF COLOMBIA, AND ECUADOR.

BY AUSTIN H. CLARK.*

On her voyage from the Atlantic to the north Pacific in 1887–1888 the *Albatross* dredged off northwestern South America a magnificent new starfish of the genus *Luidia*, and a very interesting new species of the ophiuran genus *Ophiosteira*, which are described below.

Luidia superba, new species.

Six arms; R=205 mm.; r=30 mm.; R:r=6.8:1; width of arms at base, 30 mm.; superomarginal paxillæ, 100.

Arms relatively stout, very gradually tapering to a blunt extremity; interbrachial arcs very acute; general form depressed; no pedicellariæ.

The paxillæ, though massive, are in rather open order, especially along the sides of the rays.

The superomarginal paxillæ correspond to the inferomarginals and are closely crowded against them; in shape they are approximately square; they bear centrally seven or eight prominent high rounded tubercles, surrounded by about twice as many similar but more slender tubercles, beyond which are very numerous slender spinelets.

Within this superomarginal row is another regular row of similar, but smaller, paxillæ, five of which correspond to four superomarginals; these are mostly transversely oblong, becoming squarish toward the end of the ray; each of these paxillæ is entirely independent of those on either side, and the series is separated from the superomarginal series by a conspicuous channel.

Within these again is a third regular series of similar spaced paxillæ, corresponding exactly to those in the second row, from which they are separated by a somewhat broader channel than that separating the second row from the superomarginals; every third or fourth of these paxillæ (on

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the average) is much enlarged and bears a stout conical central spine about 3 mm. long.

The next row is not so regular as those preceding, and is composed of slightly smaller paxillæ, which are more rounded; many of them bear spines like those in the preceding row.

Within this fourth row the paxillæ decrease rapidly in size and in regularity, so that the central third of the arm is occupied by small, irregular, closely placed, though not crowded, rounded paxillæ, many of which are enlarged and bear a conical spine, especially in the outer part of the arm.

On the disk the paxillæ in the center, continuing thence along the midradial region of the arms, are small and rounded; toward the interbrachial arcs and the margins of the arms they rapidly become larger, more oblong or quadrate, more spaced, and more regular in arrangement. Only one or two of the paxillæ on the disk bear spines, and these spines are small; on the arms the spines appear first along the sides, and it is only in the outer half that they become as abundant in the median as in the lateral areas.

The inferomarginal plates bear three long stout spines, of which the lowest, situated just below the ambitus, is the longest, 9 mm. in length; the second, situated at the ambitus, is similar, but slightly shorter; the third, situated on the abactinal surface, is the shortest, usually about 4 mm. long; on the actinal surface below the first spine in the preceding series the inferomarginals bear from three to five spines of considerable length, though much shorter than those in the upper series, which decrease in size toward the ambulacral groove; the sides of the inferomarginals are bordered with very numerous capillary spinelets.

The actinal intermediate plates have usually a single prominent median spine; their proximal and distal borders bear numerous capillary spinelets.

The adambulacral plates are slightly narrower than the actinal intermediate plates, which in turn are slightly narrower than the inferomarginals; they bear a sabre-shaped spine in the furrow, followed by a similar, but longer, stouter and less curved spine, beyond which are two slightly shorter straight spines, the distal the smaller; the inner half of the plate is bare; the proximal and distal borders are fringed with numerous capillary spines.

The mouth plates are narrow, with eleven gradually descreasing spines situated along the median suture, and four similar spines situated along the furrow margin; the mouth spines proper may be said to consist of the first spines in these two series (the inner being the larger) and a third, more or less widely spaced from these and making a considerable angle with them, situated deep in the groove on the aboral edge of the plate; the border adjoining the first adambulacral is fringed with capillary spinelets.

The color in alcohol is a very dark brown above, the crowns of the paxillæ white except for the bordering spinelets, which are dark brown; the enlarged spine-bearing paxillæ and the abactinal surface of the inferomarginals are deep brown; the spines are white, except for those included

in the two upper rows on the inferomarginals, which have brown bases; beneath, straw yellow.

Type.—Cat. No. 36,948, U. S. N. M., from "Albatross" Station 2797, off the coast of Colombia, in 33 fathoms.

Ophiosteira kœhleri, new species.

The disk is 5 mm. in diameter; the arms are very slender, evenly tapering, 40 mm. long.

The plates of the disk are few, large, greatly swollen; the radial areas are strongly elevated, the narrowly triangular interradial areas strongly depressed.

The dorsal surface of the disk is overlaid by a thin semi-transparent membrane with an approximately plane surface which conceals the underlying plates. In drying this membrane may cling tightly to the surface of the plates, or it may stretch, drum-head like, between the more elevated plates more or less concealing the others from view.

The radial shields are large, rather narrow, greatly swollen, extending from the base of the arms half way to the center of the disk, in apposition for the distal half.

An oval, greatly swollen, plate occupies the area between the inner halves of adjacent radial shields; just within this are two or three similar, but much smaller, oval plates, radially elongated, beyond which is the nearly circular primary radial plate, which is of about the same area as the plate between the inner halves of the radial shields of each pair, and also as the rounded-pentagonal central plate. The radial primary plates are separated from this last by a ring of small transversely oval plates, and from each other, in their basal halves, by similar, but slightly larger, plates.

The triangular interradial areas, embracing on the border of the disk the region between the radial shields as a base, and extending inward to an apex between the primary radial plates, are occupied by a large kidney-shaped, much swollen, plate situated on the border of the disk between the radial shields, in area about equal to the plate between the distal halves of the radial shields of each pair; beyond this on either side is a small hemispherical plate attached immediately below the radial shields, just within which is a transversely oval, much smaller, though similar, plate, bridging the gap between the inner ends of the radial shields, and within this one or two smaller plates.

In lateral view the interradial areas of the disk are seen to be occupied by about six irregularly rounded swollen plates. Along the genital slit there are about ten prominent well separated conical papillæ, distal to which are two or three larger, more robust, papillæ, forming the rudimentary arm comb which is entirely hidden from dorsal view by the extension over it of the produced distal border of the radial shields.

The oral shields have a broadly heart-shaped inner portion, occupying about two-thirds of their radial length, and a smaller transversely oval outer portion, the two portions separated by deep lateral notches.

The side mouth shields are about four times as long as broad, with parallel sides, in apposition inwardly.

The mouth frames are similar to, and not much larger than, the side mouth shields.

The mouth papillæ are five in number, the first two relatively long, and conical, the third of about the same basal length, but lower with a rounded outer border, the fourth of the same height as the third but twice as long with a straight outer margin, the fifth similar but nearly three times as long as the fourth, with a straight outer margin.

The first arm tentacle lies in a tube consisting of four rounded tentacle scales inwardly, and three outwardly, the two tentacle slits in each interradial area being parallel and not connected with the mouth slits.

The first upper arm plate is small, transversely oval, from two to three times as broad as long; the second is much larger, reaching almost entirely across the arm as viewed dorsally, twice as broad as long, the proximal and distal borders strongly curved and parallel, the lateral edges converging slightly; the following upper arm plates become rapidly narrower, the fifth being an elongate triangle, twice as long as the distal width, the apex resting on the distal border of the preceding; beyond the fifth the upper arm plates, becoming progressively smaller, are more and more widely separated from each other by the apposition of the side arm plates, on the outer portion of the arm being small and inconspicuous quadrilateral plates with the proximal angle more produced than the distal, inserted between the distal inner borders of the apposed side arm plates.

The arm spines are three, extremely short, well spaced, the uppermost slightly further from the middle than the latter is from the lowest.

The first under arm plate is triangular with very broadly rounded angles and a somewhat abrupt rounded extension occupying the central quarter of the distal edge; the second is slightly broader than long, fan-shaped, with a truncated proximal angle, with a strongly and evenly convex distal border and strongly concave sides forming the inner borders of two broad diverging slits which accommodate the tentacles, protected by three tentacle scales; the third is more broadly fan-shaped than the preceding, and is excluded from contact with it by the apposition of the side arm plates for a distance of half its length; the following under arm plates rapidly become smaller and relatively broader.

Type.—Cat. No. 38,670 U. S. N. M., from "Albatross" Station 2792, off the coast of Ecuador, in 401 fathoms.

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NOTES ON CANAVALIA WITH THE DESCRIPTIONS OF NEW SPECIES.

BY CHARLES V. PIPER.

For several years past various species and varieties of Canavalia, a genus of Leguminosae, have been under test at various places in the Southern States to determine their possible agronomic value. In the course of this work it was found necessary to determine critically the identities of the species. Two of these are clearly undescribed while another requires some nomenclatorial modification. All of the species here mentioned belong to the section Eucanavalia which includes such well known species as *C. ensiformis* (L.) DC.; *C. gladiata* (Jacq.) DC.; and *C. lineata* (Thunb.) DC. (*C. obtusifolia* of most authors). Several of the species in this group are distinguishable only by the characters of the mature pods and seeds. The original spelling of the generic name is Canavali but most botanists have used Canavalia, a spelling approved by the International Code of Nomenclature.

Canavalia campylocarpa, n. sp.

Herbaceous, annual, or under tropical conditions perhaps longer enduring; stems twining, green, branching, minutely and sparsely appressed puberulent with white hairs, growing to a height of 2 to 4 meters; leaves trifoliolate; petioles about as long as the leaflets, shallowly channelled above, sparsely puberulent; petiolules dark green, densely white puberulent, somewhat swollen; leaflets membranaceous, ovate to oblong-ovate, short acuminate, sparsely puberulent especially on the margins and the veins beneath, in age nearly glabrous, 10–18 cm. long; stipules triangular, acuminate, ciliate, 3 mm. long, quickly fugacious, but the base of each developing into a persistent green protuberance; stipels linear, the minute

swollen base of each persistent; peduncles exceeding the subtending leaves; racemes 5–10 flowered; pedicels very short, a group of swollen nectaries at the base of each; calyx green, sparsely puberulent, 10–12 mm. long, the upper lobes rounded at apex and united except for a small emargination, the three lower lobes small, subequal, triangular, acute; corolla pink; standard erect, broadly oval, deeply notched at apex, white in the center, the sides recurved, 2 cm. long; wings closely enveloping the keel, 1.5 cm. long; keel blunt at apex; pods much compressed, curved into a semicircle, 6–10 cm. long, 2.5 cm. broad, wax-yellow when immature, brown when ripe, finely white puberulent, the longitudinal ridges small, the two posterior close to the dorsal suture, the other two parallel and distant one-fifth of the width of the pod; seeds oval in outline, compressed, 12–18 mm. long, wax-brown, the linear black hilum four-fifths as long.

The peculiar pods well distinguish it from any other species as yet described.

The seed of this plant was sent to the U. S. Department of Agriculture by John R. Bovell, Esq., Department of Agriculture, Bridgetown, Barbados, under the name "Babricou bean." In Antigua it has been used as a green manure crop. Presumably it is native to the West Indian region. It has been tested at various places in Florida and Mississippi, but has shown little promise of having value in those States.

Type specimen in the Economic Herbarium, United States Department of Agriculture.

Canavalia microcarpa, (DC.) n. comb.

Lablab microcarpus DC. Prodr. 2:402.1825.

Canavalia turgida GRAHAM; Gray in U. S. Expl. Exped. 15:440.1854.

Lablab microcarpus De Candolle is based on Plate 141, Fig. 1, of Rumphius' "Herbarium Amboinense," which illustration and the accompanying description apply well to the species usually known as *C. turgida* Graham.

Canavalia obtusifolia (Lam.) DC. Prodr. 2:404.1825.

Dolichos obtusifolius LAM. Enc. 2:295.1786.

Lamarck's description is based primarily on a plant from the island of "St. Domingue" that is *Santo Domingo*, of which he had specimens. In addition he cites as synonymous several earlier descriptions of Tournefort, Plumier and Plukenet, and doubtfully includes the "Katu-tjandi" of Rheede, Hort. Mal. 8:83. tab. 43.

De Candolle's name is based on that of Lamarck, but after a brief description of the plant he adds "in Malabaria.—Rheed. mal. 8. t. 43," indicating apparently that he regarded Rheede's plant as the type of the species. Rheede's plant is in reality the same as *Canavalia turgida* Graham, a species that does not occur in the West Indies, whence Lamarck's type was derived. There is consequently no justification for considering *C. obtusifolia* and *C. turgida* synonymous as has been done by King (Journ. Asiatic Soc. Bengal 662:63.1898).

Whether the West Indies species is identical with *C. lineata DC.* Prodromus 2:404.1825 based on *Dolichos lineatus* Thunb. Fl. Jap. 280.1784 described from Nagasaki, Japan, is not certain. The variations of the seashore forms of Canavalia, especially the pod and seeds, indicate that there may be several closely related species that have been referred to by most botanists either as *C. obtusifolia* or *C. lineata.*

Canavalia luzonica, n. sp.

Herbaceous, annual; stems climbing to a length of 3 to 5 meters, terete, sparsely appressed puberulent; petioles shorter than the leaflets, channelled above; petiolules somewhat fleshy, very short, densely puberulent; leaflets membranaceous, elliptic to ovate, rounded or broadly angled at base, mostly abruptly acuminate at apex, reticulate-veined, densely and loosely puberulent beneath, glabrous or nearly so above except on the veins, 5 to 10 cm. long; peduncles stout; racemes 10 to 20-flowered; pedicels very short, thick; bractlets suborbicular, fugacious, as long as the pedicels; calyx appressed-puberulent, 15 mm. long, the upper lip broad and emarginate, the lower of three minute ovate acutish teeth; corolla pink 3 to 4 cm. long; pods 10 to 17 cm. long and 2 to 2.5 cm. broad, somewhat compressed, brownish, finely appressed-puberulent, the two longitudinal ridges very close to the ventral suture, each pod with ten to 15 seeds; seeds oblong, somewhat compressed, dark brown, not shiny, 10 to 15 mm. long, the narrow black linear hilum somewhat curved and nearly as long as the seed.

This species occurs so far as known only in Luzon and the neighboring island of Lubang. In Merrill's Flora of Manila it is referred to *C. ensiformis* (L.) DC. from which it is abundantly distinct. It can not be matched by any of the species native to India.

The herbarium material is somewhat variable but represents probably a single species. The form above described as typical is represented in the following specimens from

Los Banos, Laguna, *C. F. Baker,* Nos. 553 and 2791 (type in herbarium, Philippine Bureau of Science); *L. Clements,* Jan. 9, 1913; and *G. C. Santos,* Jan. 18, 1913;

Manila, *E. D. Merrill,* No. 4094.

Most of the herbarium material differs in having the leaflets rather firmer in texture and sparsely appressed-puberulent beneath, and the calyx sparsely puberulent to glabrous. Forms with ovate or elliptic ovate leaflets include:

Manila, *Merrill* No. 2050; Antipolo, Rizal, *Ramos* Nos. 90 and 1596; Union Province, *E. Fenix* No. 12; Norzagaray, Bulacan, *Foxworthy* Jan. 1911; *Tuguegarao,* Cagayan, *Bolster* No. 188; Limay, Bataan, *Curran* Dec., 1909; Bataan, *Robinson,* Dec. 31, 1909; Mt. Mariveles, *Elmer* No. 6870; Lamao, Bataan, *Merrill* No. 3811; Lubang Island, *Merrill* No. 963.

Forms with small elliptic or elliptic-ovate, obtuse to acutish leaflets in-

clude Mt. Mariveles, *Williams* No. 532; Nueva Viscaya, *MacGregor*; Taal Volcano, *Subit*, Dec. 22, 1913; Benguet Prov., *Bacani*, Dec., 1908; Amburayan, *Vanoverbergh* No. 4028; Bontoc, *Vanoverbergh* No. 856; Bauco, Bontoc, *Vanoverbergh* No. 1526; Bontoc, *Curran & Merritt* Jan., 1909; Zambales Prov. *Ramos*, Dec., 1907; Dinalupihan, Bataan, *Merrill* Nos. 1602 and 1485; Susong Dalaga, *Loher* No. 2293.

Forms with narrowly elliptic-lanceolate leaflets attenuately acute or acuminate include Mt. Maquiling *Robinson & Foxworthy* Feb., 1913; Antipolo, *Ramos* Nov., 1914; Rizal Prov. *Foxworthy* Jan., 1906; Mt. Abu, Pampanga, *Foxworthy* Jan., 1907; Montalban, *Merrill* No. 9638 with notably lanceolate leaflets.

It is possible that with mature pods and seeds two species may be differentiated in the above material, a matter that can only be cleared up by further field work. Seeds from Luzon have several times been planted at Biloxi, Miss., but the plants did not even reach the blooming stage.

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PROCEEDINGS

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NOTES ON WESTERN SPECIES OF PELLAEA.*

BY WILLIAM R. MAXON.

The following notes relate chiefly to the taxonomy of the southwestern ferns for many years loosely associated under the name *Pellaea Wrightiana* Hook., to which Christensen† has recently assigned the name *Pellaea mucronata* D. C. Eaton, in error. It is necessary to apply the name *mucronata* to a quite different plant, namely the California species long passing as *P. ornithopus* Hook., and to recognize three distinct species in the *Pellaea Wrightiana* of recent writers.

The name *mucronata*, as applied to any species of the genus Pellaea, dates from 1856, with the publication of *Allosorus mucronatus* D. C. Eaton, based wholly on small specimens collected "in the hills near the bay of San Francisco, California," by Major A. B. Eaton. This material, recently examined, clearly bears out Eaton's later statement‡ that his "original *Allosorus mucronatus* was founded on small specimens of *P. ornithopus*, of Hooker" (1858). In the Botany of the Mexican Boundary Survey (1859), however, Eaton had transferred *A. mucronatus* to Pellaea, making *Pellaea mucronata* include (in addition to *P. ornithopus* Hook.) the two southwestern forms described in 1858 as *Pellaea Wrightiana* Hook. and *P. longimucronata* Hook. Recognizing subsequently the error of associating the distinctively Californian plant with the new southwestern plants, and objecting (loc. cit.) to Baker's use of the name *mucronata* for the latter, Eaton yet failed to take up the name *mucronata* for the Californian plant, and on the contrary wrote *Allosorus mucro-*

* Published with the permission of the Secretary of the Smithsonian Institution.

† Ind. Fil. 481. 1906.

‡ Ferns N. Amer. 2 : 8. 1880.

A

natus as a straight synonym of *Pellaea ornithopus* Hook.* The latter name, though singularly appropriate, must evidently give way to *Pellaea mucronata*, limited to the abundant California plant.

Not much attention appears to have been given to the *Pellaea Wrightiana* and *P. longimucronata* of Hooker, founded respectively on nos. 2130 and 2131 of Charles Wright's New Mexican collections of 1851–52. They have been regarded as forms of a single species, *P. Wrightiana*. Actually they represent two species, and the characters by which they may be distinguished are those given originally by Hooker and restated by Davenport,† the latter recognizing *longimucronata* only varietally, however. Davenport's variety *compacta* appears to be a valid species, allied to *P. mucronata* (*P. ornithopus*).

The synonymy and range, and some of the distinctive characters of the four species, are given below. The rhizome scales exhibit such pronounced variation in nearly all respects as to be of far less importance than is usual, and characters drawn from them are purposely omitted.

Pellaea mucronata (D. C. Eaton) D. C. Eaton in Torr. U. S. & Mex. Bound. Bot. 233. 1859.

Allosorus mucronatus D. C. Eaton, Amer. Journ. Sci. II. **22**: 138. 1856.
Pellaea ornithopus Hook. Sp. Fil. **2**: 143. *pl. 116. A.* 1858.
Allosorus ornithopus Kuntze, Rev. Gen. Pl. **2**: 806. 1891.

Type.—Collected on "hills near the bay of San Francisco, California," by *Major A. B. Eaton*. The label accompanying the specimen gives the additional locality "Monte Diablo."

Distribution.—Widely distributed in California, occurring from Mendocino County southward in the Coast Ranges to San Diego County and Lower California, and from Shasta and Lassen Counties southward through the foothills of the Sierra Nevada, ascending to 1,650 meters in El Dorado County, or possibly higher.‡

An extremely variable species, showing the utmost diversity in size, number, and spacing of segments, according to season, habitat, and geographical position. What may be regarded as the normal form is that figured by D. C. Eaton in Ferns of North America,§ but there are many departures from this, the more noteworthy being (1) extremely luxuriant specimens from Los Angeles County, with pinnae alternate, many of

* Op. cit, **2**: 12.

† Cat. Davenp. Herb. Suppl. 45, 46. 1883.

‡ Reported by Watkins (Fern Bull. **10**: 70. 1902) to ascend to 9,000 feet in the Sierra Nevada.

§ **2**: *pl. 47, figs. 7–10.*

them more than 10 cm. long; (2) specimens from the vicinity of Tehachapi, in Kern County, with exceedingly small, numerous, close-set segments; (3) long-stalked fronds from Lassen County (*Austin* 1367) which suggest *P. brachyptera* but are readily distinguished from that by their very much longer secondary rachises and shorter, smaller pinnules. The northern specimens show a tendency toward simple pinnules (secondary pinnae); whereas in specimens from Whitewater (*G. R. Vasey*) the larger secondary pinnae consist of as many as 9 to 11 sessile segments. Entirely characteristic specimens are at hand from northern Lower California (*Mearns* 3493, 3791); also from Santa Catalina Island, where the plant is called "tea-fern," from its use for tea. According to A. A. Eaton, who has discussed this species very interestingly,* it is called also "black fern" and "poison-fern," the latter name indicating its reputed poisonous effect upon sheep.

The fronds of *P. mucronata* are almost invariably fertile. The segments are thick, sharply mucronulate, revolute to the middle at all stages of growth, and often transversely corrugate at maturity, with the margins closely repand and finely sinuate-dentate. The more subdivided lamina and the absence of sterile fronds will at once distinguish this species from the occasional fronds of *P. longimucronata* with small segments. The relationship with *P. compacta* is decidedly closer.

Pellaea Wrightiana Hook. Sp. Fil. **2**: 142. *pl. 115. B.* 1858.

Pellaea mucronata D. C. Eaton in Torr. U. S. & Mex. Bound. Bot. 233. 1859, in part; not *Allosorus mucronatus* D. C. Eaton, 1856.

Type.—Collected in New Mexico, in 1851, by Charles Wright (no. 2130), the exact locality not stated. According to data in the Gray Herbarium† it was collected on "mountains around the Cobre. On rocky ledges, October 20." "Cobre" is one of the names for Santa Rita, a mining camp in Grant County, altitude 1900 meters, about 15 miles east of Silver City.‡ A specimen of *Wright* 2130, agreeing closely with Hooker's figure, is in the U. S. National Herbarium.

Distribution.—Southwestern Oklahoma and central Texas to Arizona and Lower California.

Fronds mostly fertile, at least in the upper half or two-thirds, occasionally wholly sterile; lamina linear or in large well developed specimens sometimes lanceolate or narrowly triangular, the basal pinnae reduced or not; pinnae short, in some plants all but the upper one trifoliolate (these gradually simpler), in others the middle and sometimes the basal pinnae with 2 or occasionally 3 pairs of pinnules besides the large terminal one, the upper pinnae trifoliolate, finally simple; pinnules distant, nearly equal, relatively large, semiadnate or sessile, the fertile ones closely revolute one-half to one-third the distance to the middle, flattish, the margin entire or nearly so, slightly altered, evident at the apex as a

* Fern Bull. **12**: 113, 114. 1904.

† See Standley, Contr. U. S. Nat. Herb. **13**: 175. 1910.

‡ Op. cit. 170.

narrow cartilaginous border to the short mucro; sterile pinnules similar but broader, plane, the margin pale, thinnish; leaf tissue coriaceous, light green, slightly glaucous.

Readily distinguished from *P. longimucronata* Hook., with which it is contrasted below. It has sometimes been distributed mixed with *P. longimucronata* and apparently grows in company with that in several localities, but the ranges though similar do not coincide, *P. Wrightiana* extending farther to the east. The Oklahoma record is of specimens collected at Quanah Mountain in 1891 by C. S. Sheldon (no. 192), listed* as *P. ternifolia*. The central Texas specimens are from Llano and Gillespie Counties (*Bray* 303, *Reverchon* 1216, *Jermy* 351), and the other Texas plants are from the Chenate and Cornudas Mountains (*Havard*). In New Mexico it has been collected in the Burro Mountains by Rusby and in the Organ Mountains by Wooton and Standley, and has been recollected at the type locality by J. M. Holzinger, August 27–September 12, 1911. There are numerous Arizona specimens, coming from several parts of the State but largely from the mountain ranges of Pima and Cochise Counties, and there is a single specimen from Lower California (El Rancho Viejo, April 29, 1889, *T. S. Brandegee*). The species ascends to at least 2,400 meters in the Chiricahua range (*Blumer* 1867).

Pellaea longimucronata Hook. Sp. Fil. 2: 143. *pl. 115. A.* 1858.

Pellaea Wrightiana longimucronata Davenp. Cat. Davenp. Herb. Suppl. 46. 1883.

Pellaea truncata Goodding, Muhlenbergia 8: 94. 1912.

Type.—Collected in New Mexico, in 1851, by Charles Wright (no. 2131), the precise locality not given. According to a note by Wooton, accompanying a specimen of this number in the National Herbarium, it was collected on "mountain sides near Conde's Camp, Sept. 1, 1851," Conde's Camp being in the western part of Grant County, near the Arizona boundary. The specimen accords with Hooker's description and illustration.

Distribution.—Southwestern New Mexico to southern Utah, extreme southern Nevada, and western Arizona; also in south-central Colorado.

Fronds mostly fertile, but sterile fronds much commoner than in *P. Wrightiana*, partially fertile ones less common; lamina triangular-ovate, fully bipinnate almost to the acuminate simply pinnate apex; middle and basal pinnae of fertile fronds the largest, the pinnules (6 to 10 pairs) rigidly divaricate, small, usually decreasing in size toward the reduced apical segment, all sessile or short-petiolate, articulate, many of them deciduous after maturity; fertile pinnules sharply mucronate, very strongly revolute (the edges frequently meeting), the margins slightly modified, paler, usually somewhat erose-denticulate; sterile pinnules fewer, larger, relatively broader, often truncate, conspicuously long-mucronate, the margins plane or repand, erose-denticulate or sometimes

* Contr. U. S. Nat. Herb. 1: 201. 1892.

irregularly short-spinulose; leaf tissue extremely coriaceous, grayish green, pruinose.

Pellaea longimucronata differs from *P. Wrightiana* in having the lamina broader and truly bipinnate nearly throughout, trifoliolate pinnae mostly wanting; in its smaller and more numerous pinnules, these more rigid, more slenderly mucronate, and distinctly articulate, being more or less deciduous with age from the short knob-like petiolules; and in its harsher, much more coriaceous texture, the pinnules more strongly revolute and having an altogether characteristic grayish-pruinose appearance. These characters, though previously noted, have not recently been regarded as of importance. Yet they were regarded as sufficient for the establishment of two new species by so conservative a botanist as Hooker, who had, moreover, only very scant material; and in the great number of specimens now at hand they are so easily made out and so unmistakable as to leave no doubt of the specific distinctness of the two forms. The supposed intermediate states mentioned by Eaton have not been seen and certainly are not found in his own herbarium, his specimens being definitely referable to one species or the other in about equal number.

Pellaea longimucronata is apparently very much commoner than *P. Wrightiana*. It is abundantly represented from New Mexico in the collections of Wooton and Standley in the Organ Mountains, and of Rusby in the Burro Mountains. It is widely distributed in Arizona, being especially common apparently in the Santa Catalina Mountains, here as in the Organ Mountains and elsewhere occurring in association with *P. Wrightiana;* the type of *P. truncata* is from the Mule Mountains. The Colorado record is of specimens collected at Canyon City, Fremont County, by Brandegee,* and this is the only locality given in Rydberg's Flora of Colorado; it is substantiated by a specimen in the Eaton Herbarium. The single Utah specimen at hand is from Silver Reef, altitude about 1,050 meters, *Jones* 5,149 aq. The Nevada specimens are two: Virgin River, Bunkerville, *Goodding* 737; Mica Spring, altitude 1,200 meters, *Jones* 5,055. The last cited specimen includes a frond showing the proximal basal pinnule of the basal pinnae fully pinnate, with three distinct segments.

Pellaea compacta (Davenp.) Maxon, sp. nov.

Pellaea Wrightiana compacta Davenp. Cat. Davenp. Herb. Suppl. 46. 1883.

Rhizome woody, multicipital, the branches nodose, short-creeping, 1 to 2 cm. long, about 1 cm. thick, freely radicose beneath, densely paleaceous, the scales dark brown in mass, forming a close tufted covering, linear, long-attenuate, falcate or straight, the characteristic larger ones 5 to 7 mm. long, 0.5 to 0.7 mm. broad, with a broad, thick, strongly sclerotic, dark brown, lustrous median band, the borders thin, pale, transparent, plane or distinctly repand, conspicuously and irregularly denticulate; fronds numerous, closely fasciculate, mostly fertile, 20 to 35

* Port. & Coult. Syn. Fl. Colo. 158. 1874.

cm. long, the thick glossy dark brown flexuous stipes mostly much longer than the lamina, glabrous; lamina narrowly oblong, acuminate, 9 to 13 cm. long, 2.5 to 4.5 cm. broad, bipinnate; pinnae about 15 pairs, usually oblique in drying, the basal pair distant, those above gradually closer, those of the apical portion contiguous or imbricate, gradually or abruptly simple; pinnules of the larger pinnae 5 to 7 pairs, simple, nearly uniform, mostly close, sessile or very short-stalked, with a short cartilaginous mucro, the sterile ones oval or oblong, plane, punctate beneath and with the margins minutely erose; fertile pinnules narrower, broadly revolute, often conduplicate and falcate with age, transversely wrinkled, the slightly thinner margins repand and finely sinuate-dentate; sporangia borne in a broad marginal zone, almost wholly concealed; leaf tissue rigidly spongiose-herbaceous, the surfaces light or grayish green.

Described originally by Davenport as "a remarkable distinct form with long stipites and densely crowded compact pinnules, collected in the San Bernardino Mts. of California by W. G. Wright." This collection is not represented in the National Herbarium, but there is a specimen in the Eaton Herbarium, collected in 1879 and ticketed in Wright's hand as "gathered on Mt. San Bernardino at an altitude of 7,000 ft.," which is undoubtedly typical. It is marked by Eaton "var. *californica* Lemmon," a name apparently unpublished, and agrees with another Eaton specimen, under the same name, marked "San Jacinto Mt., Parish brothers, 1880." According to Parish* the plant is "frequent in the San Bernardino and San Jacinto Mts., growing in stony soil on dry slopes at 6,000 to 8,000 ft. altitude," and "has been collected by Brandegee in the Providence Mts., in the Mojave Desert."

The following specimens are in the National Herbarium: Among rocks on steep sides of San Jacinto Mountain, July, 1881, *S. B. & W. F. Parish* 511; Snow Canyon, San Bernardino Co., alt. 1,800 meters, June 20, 1901, *S. B. Parish* 5050; stony ridges, San Antonio Mountains, July 11, 1902, *Abrams* 2684; south slope, Sugarloaf, San Bernardino Mts., alt. 2,400 meters, forming "dense low clumps in slides," July 11, 1906, *J. & H. W. Grinnell* 215.

Pellaea compacta is allied to *P. mucronata*, agreeing in most general characters, but differing sufficiently in its simple, less sharply mucronate pinnules, its congested habit, its long-stipitate fronds, and its more broadly striped rhizome scales. With *P. Wrightiana* it has no close connection whatever, and from *P. longimucronata* it differs widely in its lesser size, its congested pinnae, and its close, very short-pointed fertile pinnules, these not only revolute to the middle but commonly conduplicate and distally falcate. Apparently *P. compacta* grows in company with *P. mucronata*, and it would be interesting to study their relationship in the field.

* Fern Bull. 12: 8. 1904.

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PROCEEDINGS

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DESCRIPTION OF A NEW SUBSPECIES OF PERISOREUS OBSCURUS.

BY HARRY C. OBERHOLSER.

Mr. S. F. Rathbun, of Seattle, Washington, some time since directed the writer's attention to apparent subspecific differences in the Oregon jays from northwestern Washington. A series of 20 specimens from the vicinity of Puget Sound and Lake Crescent, Washington, has now been brought together, largely through the efforts of Mr. Rathbun. For the loan of one specimen we are further indebted to Mr. F. S. Wright. This material confirms the existence in this region of a well marked geographic race which has apparently no available name. As Mr. Rathbun very generously insists that I shall describe this new subspecies, and has presented the type and three other specimens of his series to the Biological Survey collection in the United States National Museum, I take pleasure in complimenting him by calling it

Perisoreus obscurus rathbuni, subsp. nov.

Chars. subsp.—Similar to *Perisoreus obscurus obscurus*, but somewhat larger; upper parts, posterior to the cervix, darker, much more slaty (less brownish); light nuchal collar averaging broader and more whitish; and cap darker, much more blackish (less brownish).

Description.—Type, adult male, No. 828, collection of S. F. Rathbun; Lake Crescent, Clallam County, Washington, April 21, 1916; S. F. Rathbun, original number, 828. Forehead and nasal plumes, creamy white; center of crown dull creamy white, the feathers tipped with fuscous; sides of crown to the middle of eyes, occiput, supra-auricular region, and crescent reaching half way down on the sides of the neck, brownish black; a broad nuchal collar brownish white; back and scapulars, fuscous, somewhat mixed with mouse gray, the feathers with dull whitish

shafts; rump and upper tail-coverts, between mouse gray and neutral gray; tail between mouse gray and deep neutral gray, the outer vanes deep mouse gray, the tips of the rectrices brownish white; wings fuscous, the quills, together with the greater and median coverts and a few of the lesser coverts, narrowly tipped with brownish white; lores dull creamy white, mixed with a few blackish hairs; cheeks, auriculars, and sides of the neck not occupied by the brownish black crescent, together with all the lower parts, including the lining of the wings, brownish white, but the sides, flanks, and crissum heavily washed with brownish gray.

Measurements.—Male:* wing, 133–144 (average, 139.3) mm.; tail, 124–137 (132.3); exposed culmen, 13–16 (14.8);† tarsus, 32–34 (33.5); middle toe without claw, 17–19.5 (18.1).

Female:‡ wing, 130.5–140 (average, 136.3) mm.; tail, 126–132 (129.4); exposed culmen, 13.5–17.5 (15.7);† tarsus, 32–34.5 (33.3); middle toe without claw, 16.5–18 (17.3).

Geographic distribution.—Resident in northwestern Washington north to Snohomish County and Strait of Juan de Fuca; west to western Clallam County; south to Clallam County and King County; and east to central King County and western Snohomish County.

Remarks.—This interesting new subspecies differs from *Perisoreus obscurus griseus* in its smaller size, much darker upperparts, broader, more whitish, nuchal collar; and thus, while intermediate in size between *Perisoreus obscurus obscurus* and *Perisoreus obscurus griseus*, is in coloration decidedly darker than either. Our series of *Perisoreus obscurus rathbuni* is very uniform. A juvenile from Port Townsend, Washington, is in poor condition, but apparently belongs to this race. One specimen, No. 230,604, U. S. Nat. Mus., from Kirkland, Washington, is rather lighter and more brownish than typical birds; and another from Edmunds, Washington (No. 53, collection of S. F. Rathbun), is considerably more brownish and somewhat lighter, but both are undoubtedly referable to this new form.

A single specimen in the United States National Museum from Port Gamble, Kitsap County, Washington, taken on December 16, 1880, is apparently referable to *Perisoreus obscurus obscurus*, although it may be only a winter wanderer in this locality. By courtesy of Dr. Joseph Grinnell, the four adult and four juvenile birds of this species from Vancouver Island, recorded by Mr. H. S. Swarth§ as *Perisoreus obscurus obscurus*, have been examined in the present connection. A careful comparison of these specimens with a series of both *Perisoreus obscurus obscurus* and *Perisoreus obscurus griseus* shows that they are in color absolutely the same as *Perisoreus obscurus griseus*, although in size somewhat smaller, about like *Perisoreus obscurus rathbuni*, and show thus

* Ten specimens, from northwestern Washington.

† It is of importance here to note that measurements of "exposed culmen" in Mr. R. Ridgway's recent account of this species (Bull. U. S. Nat. Mus., No. 50, part III, 1904, pp. 372–374) are really those of the total culmen inadvertently given as exposed culmen.

‡ Nine specimens, from northwestern Washington.

§ Univ. Calif. Pub. Zool., X, No. 1, February 13, 1912, pp. 48–50.

some vergence toward that form. Two of the adults in this Vancouver Island series (Nos. 15,830 and 15,831, Mus. Vert. Zool.) are in worn summer plumage; two other adults (15,832 and 15,833, Mus. Vert. Zool.) are badly worn, but on the interscapulum have acquired new plumage which exhibits the true color of the upper parts. In faded plumage *Perisoreus obscurus griseus* sometimes closely resembles *Perisoreus obscurus obscurus*, and unless absolutely comparable specimens are available for comparison, is liable to be misleading.

The type of *Perisoreus obscurus obscurus** came from Shoalwater Bay, Washington, and is typical of the race inhabiting the coast of middle and southern Washington south to northwestern California. The type of *Perisoreus obscurus griseus*† was obtained at Keechelus Lake, Kittitas County, Washington, and is a good example of the gray interior race. This makes it clear that the bird from Clallam County, here described as *Perisoreus griseus rathbuni*, is the unnamed form.

With the addition of this new subspecies, the races of *Perisoreus obscurus* number three. The ranges of the two hitherto recognized, after the revision made necessary by the subtraction of *Perisoreus obscurus rathbuni*, will stand as follows:

Perisoreus obscurus obscurus.—Pacific Coast region of the northwestern United States, east to the coast ranges, from Humboldt County, California, north through western Oregon and western Washington to northern Chehalis County, central western Washington, and, at least in winter, to Kitsap County, Washington.

Perisoreus obscurus griseus.—Northwestern United States, east of the coast ranges, from central northern California, north through the Cascade region of west central Oregon (west to Washington County) and central Washington (except Puget Sound region), to southwestern British Columbia, including Vancouver Island.

Detailed measurements of the adult specimens of *Perisoreus obscurus rathbuni* examined in the present connection are included in the following table:

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* *Perisoreus canadensis* var. *obscurus* Ridgway, Bull. Essex Inst., V, November, 1873, pp. 194, 199.

† *Perisoreus obscurus griseus* Ridgway, Auk, XVI, No. 3, July, 1899, p. 255.

Museum and No.	Sex.	Locality.	Date.	Collector.	Wing.	Tail.	Exposed culmen.	Tarsus.	Middle toe without claw.
S. F. Rathbun, 535	♂	Edmonds, Wash. . . .	Feb. 23, 1892	S. F. Rathbun	133.0	124.0	14.0	34.0	17.0
S. F. Rathbun, 72	♂	North Fork of Snoqualmie R. at Sunda Creek, King Co., Wash.	Oct. 23, 1914	S. F. Rathbun	138.0	130.5	15.0	33.5	18.0
S. F. Rathbun, 828	♂	Lake Crescent, Wash.* . .	April 21, 1916	S. F. Rathbun	140.5	134.0	13.0	34.0	19.0
S. F. Rathbun, 830	♂	Lake Crescent, Wash. . .	April 21, 1916	S. F. Rathbun	137.0	134.0	15.5	33.0	18.5
F. S. Wright, 2064	♂	Lake Crescent, Wash. . .	April 22, 1916	S. F. Rathbun	137.0	133.0	14.0	32.0	17.5
S. F. Rathbun, 999	♂	Lake Crescent, Wash. . .	April 19, 1917	S. F. Rathbun	138.0	128.5	15.0	33.5	18.0
S. F. Rathbun, 996	♂	Lake Crescent, Wash. . .	April 19, 1917	S. F. Rathbun	144.0	136.5	14.5	33.5	17.0
S. F. Rathbun, 1000	♂	Lake Crescent, Wash. . .	April 20, 1917	S. F. Rathbun	141.0	131.0	15.0	34.0	17.0
S. F. Rathbun, 1005	♂	Lake Crescent, Wash. . .	April 23, 1917	S. F. Rathbun	142.0	137.0	15.5	33.0	19.5
S. F. Rathbun, 1007	♂	Lake Crescent, Wash. . .	April 24, 1917	S. F. Rathbun	142.0	135.0	16.0	34.0	19.0
U. S. N. M., 156640	♀	Beaver, Clallam Co., Wash.	Sept. 12, 1897	A. K. Fisher .	133.5	131.0	17.5	34.0	17.0
U. S. N. M., 230604	♀	Kirkland, Wash.	May 18, 1911	A. Wetmore .	138.0	131.0	17.0	33.5	17.5
S. F. Rathbun, 992	♀	Lake Crescent, Wash. . .	April 17, 1917	S. F. Rathbun	134.5	129.0	13.5	32.0	16.5
S. F. Rathbun, 993	♀	Lake Crescent, Wash. . .	April 17, 1917	S. F. Rathbun	130.5	126.0	16.0	33.5	17.0
S. F. Rathbun, 997	♀	Lake Crescent, Wash. . .	April 19, 1917	S. F. Rathbun	140.0	132.0	15.0	34.5	18.0
S. F. Rathbun, 998	♀	Lake Crescent, Wash. . .	April 19, 1917	S. F. Rathbun	138.0	132.0	14.8	32.0	17.0
S. F. Rathbun, 995	♀	Lake Crescent, Wash. . .	April 19, 1917	S. F. Rathbun	134.0	127.0	15.8	32.0	18.0
S. F. Rathbun, 827	♀	Lake Crescent, Wash. .	April 21, 1917	S. F. Rathbun	140.0	129.0	16.5	34.0	17.0
S. F. Rathbun, 829	♀	Lake Crescent, Wash. . .	April 22, 1917	S. F. Rathbun	138.0	128.0	14.8	34.0	17.5

*Type.

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GENERA OF THE DIPTEROUS TRIBE SARCOPHAGINI.

BY CHARLES H. T. TOWNSEND.

The *Sarcophaga* type is most nearly related on the one hand with the Muscidae (Calliphoridae) and on the other hand with the *Miltogramma* and *Metopia* types. Through the Muscidae it is next related with the Stomoxydidae (Muscinae auct.) and through the *Miltogramma* type with the Calirrhoidae (Dexiinae auct.) and the Dexiidae (Pseudodexiidae BB). *Brachicoma*, *Amobia* and *Tephromyia* are types of tribes which belong in the family with *Sarcophaga*, and it is probably taxonomically expedient to include the *Miltogramma* and *Metopia* types in the same family.

Sarcophaga has long functioned as a catch-all generic name. As such, it means little. A genus can not be conceded by elimination, but must be recognized by definition. *Sarcophaga* has thus grown to be a taxonomic complex which demands untangling. The genitalic method of distinguishing the species has worked well in Europe, where the forms have been under observation long enough to link both sexes in most cases. In attacking the mass of comparatively unknown species in America, however, the task of separating them is better begun at the female end. Gravid females, captured in the open, will furnish larvae for the study of the three stages and rearing to the adults of both sexes. At one stroke this plan yields characters of all stages and both sexes. Study of the total characters for the species shows natural groups of species in this tangled mass of unlike forms.

The real problem which confronts us in the *Sarcophaga* complex is the elucidation of species groups or genera. It is first

all-important to know what species belong together. When these groups are properly segregated, the species can be studied to advantage. The elucidation of the genera carries with it a knowledge of both sexes of the component species, which is the necessary antecedent to the male genitalic separation of the forms. In the light of such study it is found that the complex has lodged many forms which can not be admitted to the tribe Sarcophagini.

Genera of Sarcophagini.

Males.

Abdomen absolutely devoid of pollinose covering, polished and shining . . . . . *Peckia* RD.
Abdomen always with more or less pollinose covering, not wholly shining 2
2—One pair of proclinate fronto-orbitals 3
No proclinate fronto-orbitals 4
3—Parafacialia with at most a single row of fine hairs . *Sarcophagula* Wp.
Parafacialia with two or more irregular rows of fine hairs . . *Sarothromyia* BB.
4—All tibiae long-villous 5
None of tibiae long-villous 6
At least the hind tibiae long-villous, either thickly or thinly, but the front ones not 25
5—First vein bare . . . . . *Paraphrissopoda* T.
First vein bristled about half way . . . . **Tulaeopoda**, gen. nov.
6—First vein bristled about half way 7
First vein bare 12
7—Frontals not divergent, stopping practically at base of antennae 8
Frontals diverging at least one bristle below base of antennae 10
8—No median marginal macrochaetae on segment III . . . . . **Andinoravinia**, gen. nov.
Median marginals present on segment III 9
9—Parafacialia as broad as clypeus . . . . . **Argoravinia**, gen. nov.
Parafacialia not as broad as clypeus . . . **Chaetoravinia**, gen. nov.
10—Strong, long, erect median marginals on segment II (patch of thickly-placed hairs on edge of scutellum on each side in genotype) . . . . . *Titanogrypa* T.
No median marginals on segment II 11
11—Outer vertical developed . . . . . **Sarcodexiopsis**, gen. nov.
Outer vertical not sufficiently developed to contrast with occipito-orbital fringe . . . . . *Helicobia* Coq.
12—Frontals stopping practically at base of antennae, not divergent except as they follow frontalia 13
Frontals diverging at least one bristle below base of antennae 17

13—Frontalia much narrowed posteriorly . . . . . *Agria* RD.
Frontalia not or but very slightly narrowed posteriorly . . . 14
14—Vertex as wide as eye . . . . . **Miltoravinia**, gen. nov.
Vertex at most scarcely over two-thirds as wide as eye . . 15
15—Postsuturals three . . . . . *Ravinia* RD.
Postsuturals four 16
16—Median marginals absent or vestigial on segment III . . . .
Punasarcophaga T.
Median marginals present on segment III . **Euravinia**, gen. nov.
17—Postsuturals three 18
Postsuturals four, the front two more or less reduced 19
18—Fifth sternite swollen and projected in profile like a button
Hypopelta Ald.
Fifth sternite normal . . . . . **Fletcherimyia**, gen. nov.
19—Outer verticals well developed; forceps minute (hind femora and tibiae normally specialized for grasping the female in the genotype) . . . . . *Thelylepticocnema* T.
Outer verticals not well differentiated from occipito-orbital fringe 20
20—Preacrostichals well developed, strong . . . . **Kellymyia**, gen. nov.
Preacrostichals not well developed, at most very small or vestigial 21
21—Frontalia not narrowed posteriorly 22
Frontalia more or less narrowed posteriorly 23
22—Strong median marginals on segment III . . . **Peltopyga**, gen. nov.
No median marginals on segment III . . . . . *Spirobolomyia* T.
23—Cheeks over two-fifths of eye-length . . **Trixosarcophaga**, gen. nov.
Cheeks not over one-fourth of eye-length 24
24—Hypopygium small; forceps elongate and tapering . . *Sarcodexia* T.
Hypopygium rather large; forceps shortened and broadened apically, usually with a dorsal preapical spur . . . . . **Oxysarcodexia**, gen. nov.
25—Preacrostichals present, well developed 26
Preacrostichals not well developed, at most very weak, small or vestigial 30
26—Frontals not divergent, stopping close to base of antennae . **Sarothromyiops**, gen. nov.
Frontals diverging at least one bristle below base of antennae 27
27—Hypopygium wide, flattened, boxlike, the second segment very elongate; forceps very short . . . **Zygastropyga**, gen. nov.
Hypopygium not flattened and boxlike, the second segment not unusually long 28
28—Strong erect median marginals on segment II . . . *Mulsantia* RD.
No median marginals on segment II 29
29—Facio-orbital row including 3 to 5 strong bristles below; vertex about one-half eye; cheeks about one-third eye-length, parafacialia about one-half width of clypeus; long strong macrochaetae in median longitudinal row on outside of hind femora . . . . . *Boettcheria* Pkr.

Facio-orbital row consisting of a bristle or two without hairs above; vertex but little over one-fourth eye-width; cheeks about one-fourth eye-length; parafacialia not one-third width of clypeus; at most a few median macrochaetae distally on hind femora exteriorly . . . . **Parasarcodexia**, gen. nov.

30—Postsuturals three 31

Postsuturals two, with or without two more or less developed additional ones in front 33

31—Strong median marginals on segment II (the front side of middle femora with a patch of yellow hairs distally in the genotype) . . . . . *Sarcotachinella* T.

No median marginals on segment II 32

32—Outer verticals developed, strong . . . . . *Bellieria* RD.

Outer verticals not developed . . . . **Bercaeopsis**, gen. nov.

33—Parafacialia broader than clypeus; no facio-orbital row to be distinguished from the other hairs . . . . . *Wohlfahrtiopsis* T.

Parafacialia not as wide as clypeus 34

34—Facio-orbital row including several strong bristles below . . 35

Facio-orbital row consisting only of hairs at the most . . . 36

35—Vibrissal axis nearly equalling head-height; epistoma well projected beyond vibrissae; facialia bristled about half-way at most; cheeks over one-half eye-length . *Sarcophaga* Mg.

Vibrissal axis not over three-fourths of head-height; epistoma only slightly projected: facialia normally bristled well over half-way; cheeks little over two-fifths eye-length . . . . **Sarracenlomyia**, gen. nov.

36—Vertex about two-thirds as wide as eye . . . . . *Bercaea* RD.

Vertex at most but little exceeding one-half eye-width . . . 37

37—Outer vertical strong . . . . . **Prosthetocirca**, gen. nov.

Outer vertical not developed, vestigial . . **Gigantotheca**, gen. nov.

FEMALES.

Abdomen wholly shining and without pollen . . . . . *Peckia* RD.

Abdomen more or less pollinose 2

2—Only one pair of proclinate fronto-orbitals 3

Two or more pairs of proclinate fronto-orbitals 4

3—First hypopygial tergite retractile . . . . . *Sarcophagula* Wp.

First hypopygial tergite modified into a non-retractile permanent fifth visible segment of the abdomen **Prosthetocirca**, gen. nov.

4—No reclinate fronto-orbitals, usually three proclinates . . *Agria* RD.

At least one reclinate fronto-orbital always present, proclinates two 5

5—First vein bristled about half way 6

First vein bare 12

6—Strong, long and erect median marginals on segment II (sides of scutellum with thick patches of hairs on edge between lateral bristles in genotype) . . . . . *Titanogrypa* T.

Median marginals absent, vestigial or weak on segment II . 7

7—Frontals not divergent, stopping practically at base of antennae 8
Frontals diverging at least one bristle below base of antennae 10
8—First hypopygial tergite incised on median line posteriorly, the hind edge of segment forming a wide vertical slit bordered with partly decussate bristles; parafacialia rather broader than clypeus . . . . . **Argoravinia**, gen. nov.
First hypopygial tergite entire, not forming a vertical slit, parafacialia not as broad as clypeus 9
9—Vibrissal axis not over two-thirds of head-height . . . . . **Chaetoravinia**, gen. nov.
Vibrissal axis fully three-fourths of head-height . . . . . **Andinoravinia**, gen. nov.
10—Vibrissal axis only a little shorter than head-height . . . . . **Tuiaeopoda**, gen. nov.
Vibrissal axis about or but little over two-thirds of head-height 11
11—Two reclinate fronto-orbitals . . . . . *Helicobia* Coq.
Only one reclinate fronto-orbital . . . . **Sarcodexiopsis**, gen. nov.
12—Postsuturals three 13
Postsuturals two or four 20
13—Frontals not divergent, stopping practically at base of antennae 14
Frontals diverging at least one or two bristles below base of antennae 15
14—Costal spine strong . . . . . *Sarothromyia* BB.
Costal spine absent . . . . . *Ravinia* RD.
15—First hypopygial tergite excised or scooped out on disk . . . 16
First hypopygial tergite not excised or scooped out on disk . 17
16—Strong median marginals on segment II (yellow hair patch on outside of middle femora distally in genotype) *Sarcotachinella* T.
No median marginals on segment II . . . . . *Bellieria* RD.
17—Two reclinate fronto-orbitals; costal spine strong, longer than small crossvein . . . . . *Hypopelta* Ald.
Only one reclinate fronto-orbital; costal spine weak, short or vestigial, not as long as small crossvein 18
18—First hypopygial tergite incised on median line posteriorly, the hind edge of segment forming a vertical slit bordered with partly decussate bristles . . . . . **Bercaeopsis**, gen. nov.
First hypopygial tergite entire 19
19—Facio-orbitals consisting of row of fine hairs; lateral scutellars two; median longitudinal row of macrochaetae on outside of hind femora reduced to small bristles on basal half . . . . . **Fletcherimyia**, gen. nov.
Facio-orbital row including several strong bristles below; lateral scutellars three; normally a median longitudinal row of long strong macrochaetae on outside of hind femora for most of its length . . . . . *Boettcheria* Park.
20—Preacrostichals present, well developed 21
Preacrostichals absent or vestigial, not well developed . . . 24

21—Frontals not diverging, stopping practically at base of antennae 22
Frontals diverging at least one bristle below base of antennae 23
22—Cheeks well over one-half eye-length in breadth . . . . .
Miltoravinia, gen. nov.
Cheeks less than one-half eye-length in breadth . . . . . .
Euravinia, gen. nov.
23—First hypopygial tergite entire, the disk with a double impression as though scooped out on each side of median line in a subtransverse oval . . . . . **Kellymyia**, gen. nov.
First hypopygial tergite incised on median line posteriorly, without discal excavation or impression **Zygastropyga**, gen. nov.
24—First hypopygial tergite entire, neither incised nor excised . 25
First hypypygial tergite either incised or excised 30
25—Facio-orbital row including coarse strong hairs or weak bristles below, contrasted with the hairs in line above them . .
Spirobolomyia T.
Facio-orbital row consisting entirely of short or weak hairs, or vestigial 26
26—First hypopygial tergite transversely dished like a wide shallow groove 27
First hypopygial tergite not dished 28
27—Theca immensely broad as well as elongate, nearly as broad basally as long; palpi greatly swollen apically . . . . . .
Gigantotheca, gen. nov.
Theca not unusually broad; palpi normal . . **Umbelusia**, gen. nov.
28—Strong median marginals on segment III; first hypopygial tergite shield-like, broad, with disk directed posteriorly . .
Peltopyga, gen. nov.
Median marginals absent or vestigial on segment III 29
29—Parafacialia about or nearly as wide as clypeus; first hypopygial tergite strongly crescentic in outline, not flattened
Trixosarcophaga, gen. nov.
Parafacialia only a little over half as wide as clypeus; first hypopygial tergite more or less flattened and concealed .
Oxysarcodexia, gen. nov.
30—Parafacialia broader than clypeus . . . . . *Wohlfahrtiopsis* T.
Parafacialia not as wide as clypeus 31
31—Arista long-plumose nearly or practically to tip; or, if sometimes short of tip, the eyes large and cheeks scarcely exceeding at most one-fourth eye-length in breadth 32
Arista plumose not over three-fourths way, the cheeks fully or over one-third eye-length 33
32—Frontalia broader than parafrontalia in middle; cheeks nearly one-half eye-length in width; first hypopygial tergite showing posteriorly a vertical slit bordered with partly decussate spines, its disk broadly scooped out . *Paraphrissopoda* T.
Frontalia scarcely as wide as parafrontalia in middle; cheeks about one-fourth eye-length; first hypopygial tergite folded but not slit on median line . . . . . *Sarcodexia* T.

33—Facio-orbital row consisting only of hairs . . . . . *Bercaea* RD.
Facio-orbital row including three to five strong bristles below 34
34—Vibrissal axis nearly equal to head-height; epistoma well projected beyond vibrissae; cheeks over one-half eye-length; parafacialia only a little narrower than clypeus . *Sarcophaga* Mg.
Vibrissal axis not over three-fourths of head-height; epistoma but little projected; cheeks only about one-third of eye-length; parafacialia at most little over half width of clypeus **Sarraceniomyia**, gen. nov.

GENOTYPES OF THE NEW GENERA.

Andinoravinia, *A. rufipes*, n. sp.
Argoravinia, *Sarcophaga argentea* T., Proc. U. S. N. M., vol. 43, 358 (1912).
Bercaeopsis, *Sarcophaga tetra* Ald., Sarc. & Allies, 89 (1916).
Chaetoravinia, *Helicobia quadrisetosa* Coq., Ent. News, XII, 17 (1901).
Euravinia, *Ravinia communis* Park., Proc. Bost. Soc. N. H., vol. 35, 55 (1914).
Fletcherimyia, *Sarcophaga fletcheri* Ald., Sarc. & Allies, 96 (1916).
Gigantotheca, *G. galapagensis*, n. sp.
Kellymyia, *Sarcophaga kellyi* Ald., Jn. Ag. Res., II, 443.
Miltoravinia, *Sarcophaga planifrons* Ald., Sarc. & Allies, 249 (1916).
Oxysarcodexia, *Sarcophaga peltata* Ald., Sarc. & Allies, 216 (1916).
Parasarcodexia, *Sarcophaga parkeri* Ald., Sarc. & Allies, 78 (1916).
Peltopyga, *Sarcophaga celarata* Ald., Sarc. & Allies, 242 (1916).
Prosthetocirca, *P. cana*, n. sp.
Sarcodexiopsis, *Sarcophaga biseriata* Ald., Sarc. & Allies, 153 (1916).
Sarothromyiops, *S. cinctus*, n. sp.
Sarraceniomyia, *Sarcophaga sarraceniae* Riley, Tr. Ac. Sc. St. L., III, 238.
Trixosarcophaga, *Sarcophaga aurigena* T., Proc. U. S. N. M., vol. 43, 357–8 (1912).
Tuiaeopoda, *Sarcophaga pervillosa* Ald., Sarc. & Allies, 92 (1916).
Umbelusia, *U. analis*, n. sp.
Zygastropyga, *Z. aurea*, n. sp.

DESCRIPTIONS OF THE NEW SPECIES.

Zygastropyga aurea, new species.

Length of body, 8 to 9 mm.; of wing, 6.75 to 7 mm. One male and one female. Tempe, Arizona; Webster, No. 11,942 (V. L. Wildermuth). The female bears label "Allotype No. 20,550 U. S. N. M.," referred to by Aldrich as single female of S. sulculata Ald. from Kansas (Sarc. & Allies, 225). Holotype, No. 21,574 U. S. N. M., male.

Differs from sulculata Ald. by the broader abdomen; broader male hypopygium, the deeper median fossa of second hypopygial segment; the distinctly golden pollen of head, and the brassy shade to pollen of rest of body.

Andinoravinia rufipes, new species.

Length of body, 8 to 9 mm.; of wing, 7.5 to 8 mm. One female, Huariaca, canyon of the Rio Huallaga, Peru, 10,750 ft., December 20, 1913 (Townsend). One male and one female, Matucana, Peru, 8,000 ft., May 1, 1914 (Townsend). Holotype, No. 21,575 U. S. N. M., being the female from Huariaca.

Blackish; rather densely clothed with old-gold pollen, except the tarsi, head appendages, frontalia and abdominal marmoration. Legs rufous, except the black tarsi. Frontalia black, parafrontals blackish posteriorly. Antennae blackish, first two joints rufous. Palpi rufous-yellow. Thoracic vittae brown, changing to brownish-gold when their pollinose covering is viewed from the front. Marmorate markings of abdomen black, in form of broken narrow median vitta and oblique curved marks on each side. Hypopygium rufous. Tegulae whitish-tawny, faintly yellowish infuscate. In the male the median abdominal vitta is entire.

Prosthetocirca cana, new species.

Length of body, 5 to 8.5 mm.; of wing, 4 to 7 mm. One male and one female, Narborough Is., Galapagos, January 13 and 26, 1899; two males and two females, Albemarle Is., Galapagos, January 1 to 18, 1899. Holotype, No. 21,576 U. S. N. M., female from Narborough Is. Allotype, male from Albemarle Is.

Blackish, densely ash-silvery pollinose. Frontalia and thoracic vittae black to brown. Antennae blackish. Palpi rufous, shaded with black. Hind edge of abdominal segments black, rather shining; in the male the black shows a median vitta, and a linking of the lateral markings on last two segments. Hypopygium black. Tegulae rather infuscate, the front scale whitish.

Gigantotheca galapagensis, new species.

Length of body, 6.5 to 9.5 mm.; of wing, 5.5 to 8.5 mm. Two males and two females, Albemarle Is., Galapagos, January 18, 1899. Holotype, No. 21,577 U. S. N. M.; female.

Coloring very similar in general effect to the preceding species, differing as follows: Palpi black, the extreme base rufous. Hypopygium rufous. Tegulae white. The lateral abdominal markings are more distinctly linked up into lateral vittae of irregular outline, the curved links especially definite in male.

Sarothromyiops cinctus, new species.

Length of body, 10 mm.; of wing, 8.5 mm. One male, Culpepper Is., Galapagos, December 10, 1898. Holotype, No. 21,578 U. S. N. M.

Black; densely silvery pollinose, the pollen with less of an ashy shade. Palpi faintly rufous. Antennae and frontalia blackish. Thoracic vittae black to brown. Hind margins of abdominal segments and narrow

median vitta black, brown pollinose. Hypopygium black, silvery pollinose, tawny at base of forceps and in middle of hind margin of first segment. No linking of marginal black into lateral abdominal vitta, but a faint darker shade shows laterally under the thick silvery pollen. Tegulae white.

I can identify none of the above Galapagos forms with *Sarcophaga inoa* Walker, List IV, 832.

Umbelusia analis, new species.

Length of body, 10.5 mm.; of wing, 9 mm. One female, Umbelusi, East Africa, "5. 3. 09" (C. W. Howard). Holotype. No. 21,579 U. S. N. M.

Black, including antennae, palpi, frontalia, vittae, abdominal markings, and legs. Hypopygium reddish-yellow. Pollen silvery-ashy. Besides the abdominal marmorations, deep black shows in narrow median vitta and in heavy broken lateral vittae. Parafrontals blackish posteriorly. Parafacials transversely corrugated. Tegulae white.

Mar 7, 1918

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New names are printed in **heavy type.**

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