PROCEEDINGS

OF THE

Biological Society of Washington

VOLUME XXIX

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For 1916

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*Lester F. Ward, 1889, 1890
C. Hart Merriam, 1891, 1892
*C. V. Riley, 1893, 1894
*Geo. M. Sternberg, 1895, 1896
L. O. Howard, 1897, 1898
Frederick V. Coville, 1899, 1900
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B. W. Evermann, 1903, 1904
F. H. Knowlton, 1905, 1906
L. Stejneger, 1907, 1908
T. S. Palmer, 1909, 1910
David White, 1911
E. W. Nelson, 1912, 1913
Paul Bartsch, 1914, 1915

* Deceased.

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Vol. XXIX, pp. ix–xiv

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 15, 1916—548th Meeting.*

President W. P. Hay in the chair and 40 persons present.

Mr. Wm. Palmer exhibited a specimen of seahorse and the collector's sketch of a pipefish.

The regular program consisted of a single paper, as follows:

"Notes on Labrador Birds"; W. W. Cooke.

January 29, 1916—549th Meeting.†

President Hay in the chair and 30 persons present.

Dr. L. O. Howard spoke of some of the published anecdotes regarding the entomologist General Dejean; Doctor Howard also exhibited a photographic lantern slide of Orsini's statue, *Proximus Tuus*, representing a malarial stricken Italian peasant; also a group of healthy children on the formerly malaria-infested Roman Campagna.

Dr. H. M. Smith called attention to the successful introduction of the tilefish into the markets, restaurants and homes of the United States.

Mr. Wm. Palmer exhibited several bones of extinct cetaceans.

The regular program consisted of a single paper as follows:

"Fur Farming in Alaska"; Ned Dearborn.

*Abstracts of papers in Journ. Washington Acad. Sci., Vol. 6, p. 104, February 19, 1916; and in Science, N. S., Vol. 43, p. 401, March 17, 1916.

†Abstracts in Science, N. S., Vol. 43, pp. 401–402, March 17, 1916; and in Journ. Washington Acad. Sci., Vol. 6, p. 159, March 19,. 1916.

February 12, 1916—550th Meeting.*

President Hay in the chair and 50 persons present.

Dr. L. O. Howard called attention to the work done by Dr. W. V. King in demonstrating that *Anopheles punctipennis* was a carrier of both tertian and estivo-autumnal malaria parasites and exhibited lantern slides of this mosquito and photomicrographs of the stages of the malaria organism in this species of mosquito.

W. L. McAtee gave recent observations on the vegetation in Virginia south of Washington.

The regular program consisted of two communications, as follows:

"Nepigon"; Henry Talbott.

"Game and Other Mammals of the Yellowstone Park Region"; Vernon Bailey.

February 26, 1916—551st Meeting.†

President Hay in the chair and 50 persons present.

The regular program consisted of two communications, as follows:

"An Early Seventeenth Century Mammalogist"; D. E. Lantz.

"A Talk on the Extinct Animal Life of North America"; J. W. Gidley.

March 11, 1916—552d Meeting.‡

President Hay in the chair and 28 persons present.

Dr. R. W. Shufeldt exhibited lantern slide views of aquatic and terrestrial vertebrates of the District of Columbia and vicinity.

Mr. Wm. Palmer exhibited the bones of a hitherto unknown cetacean.

The regular program consisted of two communications, as follows:

"Hemolysis and Complement Fixation"; M. W. Lyon, Jr.

"A Study of Malarial Mosquitoes in their Relation to Agriculture"; D. L. Van Dine.

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*Abstracts in Journ. Washington Acad. Sci., Vol. 6, p. 160, March 19, 1916; and in Science, N. S., Vol. 43, p. 438, March 24, 1916.

†Abstracts in Science, N. S., Vol. 43, p. 474, March 31, 1916; and in Journ. Washington Acad. Sci., Vol. 6, p. 228, April 19, 1916.

‡Abstracts in Science, N. S., Vol. 43, pp. 581-582, April 21, 1916; and in Journ. Washington Acad. Sci., Vol. 6, pp. 256-258, May 4, 1916.

March 25, 1916—553d Meeting.*

President Hay in the chair and 40 persons present.

Gen. T. E. Wilcox exhibited lantern slide views of the country along the Mexican border of the United States.

Mr. A. A. Doolittle exhibited a specimen of *Ambystoma punctatum* from the District of Columbia.

Dr. O. P. Hay exhibited a mutilated braincase of an elk and a skull of an extinct horse.

President W. P. Hay exhibited lantern slides of aquatic animals in the vicinity of Beaufort, North Carolina.

Medical Inspector Ames asked for positive knowledge as to the ability of camels to swim, and as to a South American animal with dorsally placed mammæ.

Dr. M. W. Lyon, Jr., exhibited a microscopic preparation of a living embryo of *Filaria bancrofti*.

The regular program consisted of three communications, as follows:

"Notes on the Growth of the Loggerhead Turtle"; W. P. Hay.

"The Restoration of the Dinosaur, *Podokesaurus holyokensis*"; R. W. Shufeldt.

"A Biological and Fish Cultural Experiment Station"; R. E. Coker.

April 8, 1916—554th Meeting.†

President Hay in the chair and 65 persons present.

Dr. R. W. Shufeldt exhibited specimens of a Japanese salamander, *Diemictylus pyrrhogaster*.

Dr. Paul Bartsch called attention to the introduction of the European agate snail, *Rumina decollata*, and to the publication by J. B. Henderson of "The Cruise of the *Tomas Barrera*."

Dr. M. W. Lyon, Jr., remarked on the history of the *Filaria bancrofti* embryos exhibited at the 553d meeting.

Mr. F. Knab discussed the mosquito host of *Filaria bancrofti*.

The regular program consisted of a single paper, as follows:

"Hunting in the Peruvian Andes"; Edmund Heller.

*Abstracts in Journ. Washington Acad. Sci., Vol. 6, pp. 258–259, May 4, 1916; and in Science, N. S., Vol. 43, pp. 761–762, May 26, 1916.

†Abstracts in Journ. Washington Acad. Sci., Vol. 6, p. 311, May 19, 1916; and in Science, N. S., Vol. 43, p. 834, June 9, 1916.

April 22, 1916—555th Meeting.*

President Hay in the chair and 24 persons present.

Dr. Howard E. Ames commented on a South American mammal (*Myocastor coypu*) having mammæ on the dorsal surface of the body and answered the previous question as to the ability of camels to swim in the affirmative.

Dr. H. F. Blodgett discussed the embryology of the duck weed *Lemna*, exhibited seeds and showed diagrams.

The regular program consisted of two communications, as follows:

"Native Plants as Indicators of the Agricultural Value of Land"; T. H. Kearney.

"Comparative Study of Certain Cranial Sutures in the Primates"; R. W. Shufeldt.

May 6, 1916—556th Meeting.†

President Hay in the chair and 45 persons present.

The regular program consisted of three communications, as follows:

"Longevity of Bacteria"; M. W. Lyon, Jr.

"The Amphisbænoid Lizards and their Geographic Distribution"; Dr. L. Stejneger.

"Sketch of the Natural History of the District of Columbia"; W. L. McAtee.

May 20, 1916—557th Meeting.‡

President Hay in the chair and 30 persons present.

Dr. Howard E. Ames exhibited photographs of a female coypu.

The regular program consisted of three papers, as follows:

"Some Fungi that Kill Insects"; A. T. Speare.

"Possible use of *Lachnosterna* larvæ as a Food Supply"; L. O. Howard.

"Agriculture in Pre-Columbian America"; W. E. Safford.

* Abstracts in Journ. Washington Acad. Sci., Vol. 6, pp. 362-364, June 4, 1916; and in Science, N. S., Vol. 43, pp. 941-942, June 30, 1916.

† Abstracts in Journ. Washington Acad. Sci., Vol. 6, pp. 406-407, June 10, 1916; and in Science, N. S., Vol. 43, p. 942, June 30, 1916.

‡ Abstracts in Science, N. S., Vol. 44, pp. 35-36, July 7, 1916; and in Journ. Washington Acad. Sci., Vol. 6, pp. 519-520, August 19, 1916.

October 21, 1916—558th Meeting.*

President Hay in the chair and 50 persons present.

Mr. A. L. Quaintance called attention to a new peach pest, giving lantern slide views of the insect and its work.

Dr. C. W. Stiles commented on zoological nomenclature, also on recent cases in which trichina had figured in lawsuits:

Dr. L. O. Howard cited an instance in which a cockroach was figuring in a lawsuit.

The regular program consisted of a single paper, as follows:

"Mollusk Collecting in the Philippines"; Paul Bartsch.

November 4, 1916—559th Meeting.†

President Hay in the chair and 60 persons present.

Dr. R. W. Shufeldt exhibited a specimen of Japanese giant salamander.

The regular program consisted of four papers, as follows:

"A Review of Recent Work on the House-fly"; R. H. Hutchison.

"Recent Spread of the Cotton Boll Weevil"; W. Dwight Pierce.

"Remarks on Entomological Inspection and Disinfection of Products offered for Entry into the United States"; E. R. Sasscer.

"An Outline of the Glow-worms of the American Family Phengodidæ"; H. S. Barber.

November 18, 1916—560th Meeting.‡

President Hay in the chair and 86 persons present.

Dr. O. P. Hay exhibited a cervical vertebra of an extinct Florida deer.

Dr. Paul Bartsch called attention to a hybrid duck seen in the markets.

The regular program consisted of two communications, as follows:

"Forests of Panama"; H. Pittier.

"Scientific Photography in the Study of Insects"; J. H. Paine.

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*Abstracts in Science, N. S., Vol. 44, pp. 896-897, December 22, 1916.

†Abstracts in Science, N. S., Vol. 44, pp. 897-898, December 22, 1916.

‡Abstracts in Science, N. S., Vol. 45, p. 72, January 19, 1917.

December 2, 1916—561st Meeting.*

President Hay in the chair and 50 persons present.

The regular program consisted of three communications, as follows:

"The Discovery of an Interesting New Tardigrade"; W. P. Hay.

"Exhibition of Venezuelan Plants and Fruits"; J. N. Rose.

"Poisonous Snakes"; M. W. Lyon, Jr.

December 16, 1916—562d Meeting.

THIRTY-SEVENTH ANNUAL MEETING.

President Hay in the chair and 23 persons present.

The annual reports of the officers and committees were received.

The following officers were elected for the year 1917:

President: W. P. Hay.

Vice-Presidents: J. N. Rose, A. D. Hopkins, Hugh M. Smith, Vernon Bailey.

Recording Secretary: M. W. Lyon, Jr.

Corresponding Secretary: W. L. McAtee.

Treasurer: Ned Dearborn.

Members of Council: N. Hollister, J. W. Gidley, William Palmer, Alex. Wetmore, E. A. Goldman.

President Hay was selected to represent the Society as a Vice-President of the Washington Academy of Sciences.

Ex-President Evermann gave an illustrated lecture on the Museum of the California Academy of Science.

The following Committee on Publications has been appointed for 1917: C. W. Richmond, Chairman; J. H. Riley, W. L. McAtee, N. Dearborn.

*Abstracts in Journ. Washington Acad. Sci., Vol. 7, pp. 45-46, January 19, 1917.

Vol. XXIX, pp. 1-6 January 25, 1916

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NOTES ON THE SYSTEMATIC POSITION OF CERTAIN GENERA AND HIGHER GROUPS OF STARFISHES.

BY WALTER K. FISHER.

THE GONIOPECTINIDÆ.—In "Asteroidea of the North Pacific and adjacent Waters"* the family Goniopectinidæ, proposed by Professor A. E. Verrill, was said to differ from the family Porcellanasteridæ in having double ampullæ connected with the tube-feet (p. 19), and in having an intestine and intestinal cœcum. The component genera of the Goniopectinidæ, *Goniopecten* and *Prionaster*, bear the closest resemblance to *Ctenodiscus*, although the rays of the latter are short while in the Goniopectinidæ they are long and slender. This resemblance results from the similar characteristic biserial arrangement of the skin-covered actinal plates with the intervening fasciolar channels, the similar structure of the marginals, between which are cribriform organs, and the similar form and armature of the adambulacral and mouth plates. Recently Mr. A. H. Clark found, in a specimen of *Prionaster elegans* Verrill, single ampullæ, thus breaking down one of the principal differences between *Ctenodiscus* and the Goniopectinidæ. I have again examined the ampullæ in a very large *Prionaster megaloplax* Fisher, and in *Goniopecten asiaticus* Fisher, and have also verified the structure of these organs, as described, in *Goniopecten demonstrans* Perrier. All of these have single ampullæ, what I formerly regarded as the lower lobe of the ampulla, or as a second ampulla, being a swelling probably due to the extreme contraction of the muscular vesicles. If the swelling has any significance at all, it is the merest rudiment of a ventral lobe,

* Bulletin 76, U. S. National Museum, 1911, part 1.

and the ampullæ are to be regarded as single. This fact seems to make it advisable to unite the three genera in a single family which would be separated from the Porcellanasteridæ proper by the presence of cribriform organs between all the marginals, by the actinal fascioles, and by the presence of superambulacral plates. Although an apical pore may be present in *Ctenodiscus*, I have also dissected specimens in which I could find no trace of an opening, nor of a tubular connection between the stomach and the "epiproctal cone." In the middle of the dorsal side of the stomach there is a roundish lobe of small size which may represent the degenerated rudiment of a cœcum. *Prionaster elegans*, on the other hand, has a fairly large, butterfly-shaped cœcum, connected with the apical pore by a definite tubule. *P. megaloplax* has a conspicuous "anal" aperture. This difference between *Prionaster* and *Ctenodiscus* must be weighed against the important common characters mentioned above. I would suggest that the genera be rearranged as follows:

Family Goniopectinidæ.

Characters.—Specialized fascioles or cribriform organs between all the marginal plates; actinal plates in double transverse series, there being between every pair a specialized fasciolar channel, roofed by webbed spinelets, leading from the marginal fascioles to the furrow; ampullæ single; superambulacral plates present; abactinal skeleton astropectinoid.

Subfamily Ctenodiscinæ.

Characters.—Marginal cribriform organs consisting of superimposed transverse webbed combs of spinlets; intestinal cœcum obsolete; no intestine.

Included Genera.—*Ctenodiscus* Müller and Troschel; *?Pectinidiscus* Ludwig.*

Subfamily Goniopectininæ.

Characters.—Marginal cribriform organs consisting of discrete spinelets covered by a single webbed series on the transverse margin of the plate; well developed intestinal cœcum, intestine, and apical pore.

Included Genera.—*Goniopecten* Perrier and *Prionaster* Verrill.

Craspidaster.—*Craspidaster hesperus* (Müller and Troschel), which resembles the Goniopectinidæ in having a single series of webbed peripheral spinelets on the marginal and actinal plates, differs in lacking the characteristic double serial arrange-

* *Pectinidiscus* has not as yet been fully described.

ment of the actinal plates (these being essentially astropectinoid in disposition), and in having patently double ampullæ. It is best considered as representing a separate subfamily of the Astropectinidæ, the Craspidasterinæ (new name).

MIMASTER AND RADIASTER.—In respect to its systematic position *Mimaster* Sladen has been a rather restless genus. Sladen recognized its curious combination of apparently incompatible characters and made it the type of a subfamily of the Pentagonasteridæ. It has been variously regarded as belonging to the Archasteridæ (Perrier, 1894), Plutonasteridæ (Verrill, 1899), and Goniasteridæ (Fisher, 1911), until recently it was dignified by being raised to family rank (Verrill, 1914). Professor Verrill's disposition seems to be the best way out of the difficulty.

Since the publication of the "Asteroidea of the North Pacific" I have had the opportunity of examining two true Mimasters, *M. tizardi* Sladen, and *M. notabilus* Fisher, as well as the *M. cognatus* of Sladen, which appears to be generically distinct.

The abactinal skeleton of *Mimaster* is strongly astropectinoid, the plates being typical penicillate paxillæ, but the marginals, while perhaps neutral, remind one strongly of the marginals of *Cycethra*, a resemblance heightened by the actinal and adambulacral armature, which is decidedly ganeriid. By having definite sucking disks on the tube feet *Mimaster* is removed from proximity to *Leptychaster*, an association suggested by the dorsal surface, including the marginals, while it can not be placed in the Ganeriidæ because it possesses superambulacral plates and lacks the heavily calcified internal interbrachial pillar, the reticulated, imbricated, abactinal skeleton, and the asterinoid abactinal armature of *Cycethra* and *Ganeria*.

In *Mimaster* the *membranous* interradial septum forms a complete partition from the side wall of the disk to a free margin close against the stomach; but in *Cycethra* and in *Ganeria* (as in *Solaster* and in *Asterina*) there is a rigid pillar running from above the mouth plates to the abactinal surface, the cœlom being undivided between this pillar and the margin (an incomplete calcified septum).

In this connection I would like to call attention to the resemblance between *Ganeria* and the Solasteridæ, recently suggested

in conversation, by Mr. A. H. Clark. The marginal plates of *Gancria falklandica* are essentially like those of Solaster, and in the adambulacral armature we find a very generalized form of the peculiar pectinate type of the Solasteridæ. The form and armature of the mouth plates, the actinal intermediate plates, and even the adambulacral plates can, however, be more nearly matched in the Asterinidæ. The abactinal skeleton, though of on open reticulate form, especially on the disk, is more nearly like that of the Asterinidæ than like that of the Solasteridæ.

While perhaps in some way related to the Ganeriidæ, I think *Mimaster* is well within the Phanerozonia. *Gephyreaster*, which I formerly associated with it in the Mimasterinæ, is probably more nearly related to *Pseudarchaster*. Unless its resemblance to *Mimaster* is only superficial, it may constitute an annectant group.

The purely nomenclatorial side of the matter is complicated by *Radiaster elegans* Perrier. Through the kindness of Dr. H. L. Clark I recently examined the type (unfortunately dried) in the Museum of Comparative Zoölogy (No. 909, Dominica, West Indies, 982 fathoms). From every outward indication this species is a typical *Mimaster*. *Radiaster** has one year priority. The family and its two genera may be summarized as follows:

Radiasteridæ, new name.

Mimasteridae Verrill, Monograph of the Shallow-Water Starfishes of the North Pacific Coast, 1914, p. 282.

Characters.—Phanerozonia with small, subequal, subpaxilliform marginals, resembling the Astropectinidæ abactinally and the Ganeriidæ actinally, but with sucking disks on the tube feet and complete membraneous interbrachial septa, and superambulacral plates; abactinal skeleton consisting of penicillate, usually independent, paxillae; actinal plates imbricated in transverse series, tabulate, with a coördinated tuft of spinelets; adambulacral armature a coördinated tuft of spinelets increasing in length toward the two or three almost undifferentiated furrow spinelets; first adambulacral somewhat compressed; mouth plates rather astropectinoid, with a straight marginal series of spines and without an unpaired median spine at the inner angle; madreporic body covered with paxillae springing from its surface.

Synopsis of the Component Genera.

1. Gonads confined to the disk and consisting of several tufts springing from a common point close to the interbrachial septum; hepatic

* *Radiaster* Perrier, Bulletin Museum Comparative Zoölogy, Vol. 9, June, 1881 p. 17. *Mimaster* Sladen, Proc. Royal Soc. Edinburgh, Vol. 11, 1882, p. 579.

cœca with long subdivisions, so that each ray appears to have from six to ten separate cœca of unequal length; tube feet with well-developed sucking disks; lateral abactinal plates not cruciform nor regularly imbricated

Radiaster [*Radiaster elegans* Perrier, *R. tizardi* (Sladen) and *R. notabilis* (Fisher)].

2. Gonads consisting of numerous tufts extending in a radial series near the superomarginal plates for over half the length of the ray; hepatic cœca two, not appearing multiple on account of long subdivisions as in the preceding; tube feet with very small sucking disks; lateral abactinal plates distinctly four-lobed, regularly imbricated

Mimastrella gen. nov. [Genotype *Mimastrella cognata* = *Mimaster cognatus* Sladen].*

Solaster and Crossaster.—These two genera have been united by most recent writers,† although in practice it is not very difficult to recognize them. Since new species of the *Crossaster* type are continually being described, it is becoming more and more desirable to keep them separate. A good differential character is the presence in *Crossaster* of a complete membraneous interbrachial septum between the internal interradial calcareous dorsoventral pillar and the margin. The pillar arises from the mouth plates and passes upward, its point of union with the abactinal skeleton being usually marked by a smooth spineless area. In *Crossaster papposus* between this calcified buttress and the margin there is a definite septum separating the gonads of adjacent rays, while in *Solaster endeca*, *S. borealis* and *S. abyssorum* the pillar is present, but not the membraneous septum; as a result the gonads of adjacent rays are not separated, and the cœlom is continuous. My recently described *Solaster scotophilus* has a complete membraneous septum and the outward habit of *Crossaster papposus*. It must therefore be classified as a *Crossaster*.

* *Mimaster* can not be used for this group because when described the genus was monotypic. The genotype, *M. tizardi*, being congeneric with *Radiaster elegans*, the name *Mimaster* becomes strictly a synonym of *Radiaster*.

† For some of the reasons for uniting them see "Asteroidea of the North Pacific," p. 329.

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PRODROME OF A REVISION OF THE CHRYSODOMOID WHELKS OF THE BOREAL AND ARCTIC REGIONS.

BY WILLIAM H. DALL.

The following revision of the boreal and arctic Chrysodomoid whelks results from a study of the collection from the north Pacific now contained in the National Museum and brought together from many sources.

The full report on the group will be more or less delayed, but will contain the data upon which this revision is founded, including new anatomical and other details.

FAMILY BUCCINIDÆ.

Genus CHRYSODOMUS Swainson, 1840.
Type *Murex antiquus* Gmelin. Britain.
Section **Sulcosipho** Dall, nov.
Type *Chrysodomus tabulatus* Baird. Puget Sound.
Subgenus **Barbitonia** Dall, nov.
Type *Fusus arthriticus* Bernardi. Japan.
Genus SEARLESIA Harmer, 1914.
Type *Trophon costifer* S. Wood. British Crag. (Recent analogue *Buccinum dirum* Reeve. Puget Sound.)
Genus ECPHORA Conrad, 1843.
Type *Fusus quadricostatus* Say. Miocene, Maryland.
?Genus STENOMPHALUS Sandberger, 1853.
Type *Fusus cancellatus* (Thomae) Sandberger. German Miocene.
Genus COLUS (Bolten, 1798) Dall, restr. 1906.
Type *Murex islandicus* Gmelin. Iceland.
Section **Latisipho** Dall, nov.
Type *Chrysodomus hypolispus* Dall. Bering Sea.

Subgenus ANOMALOSIPHO Dautzenberg and Fischer, 1912.
Type *Colus dautzenbergi* Dall, (=*Sipho verkruzeni* D. & F. 1912, not of Kobelt, 1876).

Genus SIPHONORBIS Mörch, 1869.
Type *Siphonorbis ebur* Mörch. Greenland.

Genus KRYPTOS Jeffreys, 1896.
Type *Kryptos elegans* Jeffreys. N. E. Atlantic, abyssal.

Genus PLICIFUSUS Dall, 1902.
(*Parasipho* Dautzenberg and Fischer, 1912.) Type *Fusus kroyeri* Möller. Greenland.

Subgenus **Retifusus** Dall, nov.
Type *Tritonium jessoense* Schrenck, 1867. Japan.

Section **Latifusus** Dall, nov.
Type *Chrysodomus griseus* Dall. California, abyssal.

Section **Microfusus** Dall, nov.
Type *Chrysodomus acutispiratus* Sowerby. Japan.

Section **Helicofusus** Dall, nov.
Type *Chrysodomus laticaudatus* Dall. Bering Sea.

Genus EXILIA Conrad, 1860.
Type *Exilia pergracilis* Conrad. Eocene. (Recent analogue *Chrysodomus kelseyi* Dall. San Diego, California.)

Genus VOLUTOPSIUS Mörch, 1857.
Type *Fusus largillierti* Petit. Newfoundland Banks.

Genus PYROLOFUSUS (Beck) Mörch, 1857.
Type *Fusus deformis* Reeve. Arctic seas.

Genus BERINGIUS Dall, 1879.
Type *Chrysodomus crebricostatus* Dall. Kadiak, Alaska.

Genus LIOMESUS Stimpson, 1865.
(*Buccinopsis* Jeffreys, 1867, not Conrad, 1857.) Type *Buccinum dalei* J. Sowerby. British Crag.

Genus ANCISTROLEPIS Dall, 1894.
Type *Chrysodomus eucosmius* Dall. Bering Sea.

Section **Japelion** Dall, nov.
Type *Buccinum hirasei* Pilsbry. Japan.

?Genus SULCOSINUS Dall, 1894.
Type *Buccinum? taphrium* Dall. Bering Sea.

I refer *Turrisipho* Dautzenberg and Fischer, to *Siphonorbis; Jumala* and *Ukko* Friele, to *Beringius; Neptunea* to *Chrysodomus; Tritonofusus* to the prior *Colus*, with *Sipho* Mörch not Brown, *Neptunella* and *Siphonella*. The entire group of *Fusinus* is separated from *Colus* by its nuclear characters.

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PROCEEDINGS

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NEW SPECIES OF OPUNTIA.

BY DAVID GRIFFITHS.

This seventh * installment of formal descriptions of new species of *Opuntia* has been somewhat delayed to secure more complete data from the mature cultivated plants. The types will be preserved in the U. S. Department of Agriculture and duplicates will be prepared for other herbaria.

Opuntia magnarenensis sp. nov.

A large hemispherical shrub 100–125 cm. high and 2 m. in diameter when fully developed, with main arms radiating and either ascending or resting on their edges, the secondary ones always erect from them; joints obovate, sometimes widest at middle, but usually widest slightly above middle, pointed both above and below, yellowish-green, slightly glaucous, about 18 by 30 cm.; leaves very large, flattened, prominently acuminate-cuspidate, 10–12 mm. long; areoles very large, oval to obovate, the largest ones on edges of last year's joints commonly 4 by 6 mm. and smallest about 3 by 5 mm., brown turning prominently gray and enlarging with age; spicules yellow, very prominent, scattered, unequal, 1 to 1½ cm. long, increasing tremendously with age in both length and numbers, the areoles becoming very prominent; spines white with light, bright reddish bases, flattened, stout, not annular, spreading in all directions, sometimes twisted, 2–5 mostly 3, the central upper one very long and porrect, 3–5 cm. long, others shorter spreading around it; flowers yellow, 7 cm. in diameter, filaments yellow, style white to greenish tinged, stigma dark green, 7-parted, buds dull greenish-red, pointed, with lax sepals; fruit purplish-red throughout, with abundant bloom, long, obovate, about 4 by 7 cm., its areoles tawney, about 20, bearing spicules 4 mm. long.

This species is common on the Big Sandy, 30–50 miles south of Kingman, Arizona. It is one of the conspicuous species on the bench lands above the river bottoms. In its main characteristics, it resembles more

* Proc. Biol. Soc. Wash. **27**: 23. 1914.

closely *Opuntia engelmannii* than any other species. The type is preserved under my inventory number 10,560, collected near Owens Post Office, Arizona, May 3, 1912.

Opuntia intricata sp. nov.

Plants large, half prostrate, with long tangled arms often nearly a m. in length, mostly lying in a mass, one on top of the other; joints obovate, commonly 11 by 20 cm. glaucous blue-green, variable in size but outline quite uniform, pruinosity lost with age; areoles obovate, 3 mm. long on sides, and 4 mm. on edges of joints, with conspicuous wool, brown and tawney white at margin when young, changing in age to dirty gray; spicules rather bright yellow in a compact triangular tuft in upper portion of areole, about 2 mm. long, increasing in age, and at 2 or 3 years filling entire areole which becomes enlarged and subcircular; spines scattering, only on edges of joints, at apex 1 to 3, mostly 1 to 2, basal portion light yellowish brown, fading to white at about half its length, 2 to 3 cm. long, flattened, twisted, not consistently but frequently annular; flowers light purplish, filaments pinkish above, greenish below, style white with a tinge of reddish above, stigma light green, 8-parted; fruit obovate, pyriform, light purplish-red with abundant bloom, rind and pulp tinting tardily, about 4 by 6½ cm.

This species is rather common in the lower parts of the mountain valleys, and upon the sandy alluvial bottoms at the mouths of washes above San Bernardino, California, and in similar positions southward. Old, mature plants have the habits described above. When grown under cultivation, however, the plants may be erect, or ascending until the arms reach a length of 50 to 75 cm., when they begin to bend over in a tangled mass upon the ground; or as is frequently the case in cultivation, break off at the articulations. This species is found in some of the European collections, and there is not much doubt but that their material was secured originally from A. H. Alvord of San Bernardino, California, who made extensive collections in the region. It has been referred by European collectors as a variety of *Op. basilaris* but it does not belong to that group. This description has been prepared from various notes made in the field, and from cultivated plants grown at Chico, California. The type bears my collection number 10,372 from near San Bernardino, California, May, 1912.

Opuntia aciculata sp. nov.

A low hemispherical shrub, 1 m. high, and 1½ to 2 m. in spread of branch, erect or main arms ascending or even resting on edge, and the secondary erect from them; joints ovate to obovate, mostly pointed above and below, 15 by 20 cm., but the older joints on our plants only 12 by 17 cm., dark green with some bloom; leaves circular in section, subulate, cuspidate, 7 mm. long, gradually recurved as they age; areoles subcircular, varying from 4 to 6 mm. in diameter with the conspicuous brown wool 1 mm. or more above the surface of the joint, about 2½ cm. apart on sides of joints; spicules bright brown, conspicuous and formidable, 5

to 7 mm. long, and tips lighter colored, nearly uniformly scattered throughout the areoles, the tips of the tufts measuring 10 to 12 mm. in spread; spines very few, only an occasional one on an occasional areole, brown, sloping down, 1 to 2 cm. long; flowers yellow with greenish centre 9 cm. in diameter, filaments greenish tinged, style white, stigma dark green, subglobose, 8 to 10-parted; fruit pyriform, deep purplish-red all the way through, having a little bloom up to early maturity.

The type is preserved under my inventory number 10,300, and was collected near Laredo, Texas, June 26, 1911. The description was drawn from cultivated plants grown at Chico, California, May 21, 1914. The distinguishing characters of the species are prominent, brown, abundant spicules, pointed joints, and remarkably few spines. It differs from *Opuntia tardospina* in being smaller in stature throughout, in being almost spineless even in age, and in having differently shaped joints.

Opuntia cretochaeta sp. nov.

Plants tall, arborescent, open-branched, 4 m. high or more in nature, with a distinct cylindrical trunk a meter or more long; joints obovate, 17 by 32 cm., widest at or above the middle, usually broadly rounded above and narrowed below, yellowish-green at maturity, but dark green when young, especially in shaded portions, smooth; areoles obovate, about 4 by 5 mm. and 3 to 3½ cm. apart, at first prominent, turning gray; leaves conical, 4 mm. long, cuspidate; spicules light-yellow, not conspicuous until toward close of growing season but then becoming formidable in a large compact tuft, 5 mm. long in the upper portion of areoles, increasing greatly in length and numbers in age; spines white, at first, single porrect, then 2 and spreading, but at 1 year of age 3 to 5 spreading, the longest 4 or 5 cm. in length, the others shorter, flattened, twisted, and variously bent, increasing greatly in length and numbers in age, often becoming 6 or 7 cm. in length, and 12 to 18 in number, often in transversely elongated areoles a cm. in width at 4 years of age; flowers deep orange-red when opened, dark greenish red with tinge of purple in bud, 5½ cm. in diameter when fully opened; filaments greenish below and white with very faint reddish tinge above, style bright glossy red, with tinge of purple at top, stigma very light greenish with slight purplish tinge on side of dorsal groove, 6-parted; ovary obovate to clavate, 28 by 50 mm., tubercular-raised at areoles, with small brown areoles 1½ mm. in diameter, 8 mm. apart; fruit light purplish-red, the entire surface areolated, bearing commonly 1 white spine in upper areole, obovate, about 3½ by 5 cm.

This species was collected originally near Dublan, Mexico, August 31, 1906, under my inventory number 8465. It has been grown at Chico, California, as well as at Brownsville and San Antonio, Texas.

Opuntia eocarpa sp. nov.

A reclining to ascending, spreading shrub, 75 cm. high and 150 cm. or more in spread, the main branches commonly resting on their edges and

ascending at extremities; joints broadly obovate, often as broad as long, about 20 cm. in diameter, yellowish-green with a little bloom, slightly raised at areoles even at second year; areoles dark, broadly obovate, 5 to 6 mm. in length; spicules yellow, 2 to 3 mm. long on sides of joints and compact along upper edge of areole, but on edges of joints they are divergent, prominent, 8 to 12 mm. long; spines formidable, divergent, stout, flattened, twisted, having light reddish-brown bases and gradually fading distally to white, 3 to 4, large, 3 to 4 cm. long, and 1 or 2 short white ones below, 1 to 1½ cm. long; flower deep yellow, red within, turning deeper yellow and red centre enlarging as day advances, 7½ cm. in diameter when fully opened, resembling that of *O. phaeacantha brunnea*, but larger throughout, filaments light-greenish below, style white, stigma large, very light green, 12-parted, with narrow segments; fruit light red with a tinge of purple and a little bloom toward maturity, but almost none when fully ripe, obovate to elliptical, about 4 x 5 cm. with a sunken, large, roughened scar, rind greenish and pulp colorless, areoles tawney, 2 mm. in diameter, spicules yellow, 2 mm. long, unequal, fugacious spines yellow but lighter and often white distally, 5 to 12 mm. long.

The species belongs to the *phaeacantha* group and differs from any of the described forms in that group in being larger throughout, and in having a different spination. The color of the spines resembles most closely that of *phaeacantha brunnea* of the second year's growth, but is even lighter colored than that. It is found rather commonly in the foothills of the Rellito and Santa Cruz Valleys of Arizona. The type specimen was collected near Pantano, Arizona, in September, 1911, under my collection number 10,452.

Opuntia recurvospina sp. nov.

An erect, open-branched species, 1 m. or more high and 1½ to 2 m. in spread of branch; joints obovate, contracted below into a stipitate base, but often widest at middle, commonly narrowed above into a sharply rounded apex, mostly about 18 by 32 cm., having a little bloom on last year's growth but current season's joints a clear, slightly yellowish-green and decidedly yellowish-green in age; areoles subcircular to broadly oval, brown with compactly formed wool, 1 to 1½ mm. high, 5 to 6 mm. long, enlarging slightly in age; spicules comparitively few, yellow, scattered through upper edges of areoles, unequal, 4 mm. or less in length in an occasional areole only, increasing but slightly with age; spines white with light brown to flesh-colored bases, flattened, twisted, 2 to 5 in number, mostly 2 or 3, spreading in all directions the second year and after that tightly recurved in all directions; flowers light yellow, 8 cm. in diameter, slightly greenish tinged within, filaments light above, greenish below, style white, stigma light-green, globose, 10-parted; fruit obovate, pyriform, about 4 by 7 cm., deeply pitted, purplish-red throughout, having a little bloom up to maturity but after that deep dark-red, its areoles tawney, with prominent wool, spicules yellow, 4 mm. long, unequal, located in central upper portion of areole, fugacious spines, remarkably prominent,

varying from close to length of spicules to 20 mm., and often 12 in number.

This species inhabits the foothills regions of the Rellito and Santa Cruz Valleys of southern Arizona. It is characterized by its large joints, peculiarly shaped for this group, recurved spines, and large, pyriform fruit. The type was collected near Pantano, Arizona, in September, 1911, under my inventory number 10,456.

Opuntia superbospina sp. nov.

Plants low, spreading, 30 to 40 cm. high and having a spread of 125 cm. or more, main arms resting on edge with distal segments ascending and secondary branches erect or ascending from the primary; joints obovate, about 10 by 19 cm., rather sharply rounded above and contracted below, with a moderately long stipitate base, very glaucous gray-green, slightly raised at areoles for about 2 years, turning yellowish-green in age; areoles large, obovate to oval, with prominent brown wool, about 6 mm. long; leaves short, subulate, cuspidate-pointed, pinkish, slightly recurved, 4 to 5 mm. long; spicules very prominent in a large tuft in upper portion of areole, yellow, 1 cm. long, continuing to increase for 2 years at least, in successive zones, from central areolar area; spines long, formidable, at first brownish at bases, especially at apex of joints, and white on sides, but all becoming white or nearly so in age, all but the lowermost areoles armed, 1 below to 3 or 4 above, stout, porrect-spreading, with the lowermost in the areole recurved and shorter than the others which are 6 cm. long on current year's growth, ranging to 8 cm. the second year and even longer than this in age; flowers yellow, red within, 7 to 8 cm. in diameter when fully opened, fading to pinkish and becoming more red in centre toward close of day, filaments pink, style white or slightly tinted, stigma white, 6-parted; fruit dull grayish-red with abundant bloom, rind greenish and pulp colorless, areoles about 18, gray to dull tawney, small, subcircular, 2 mm. in diameter, spicules yellow, 2 to 3 mm. long, fugacious spines, 2 to 5 or 6, and merging from length of spicules to 6 mm. in length, all yellow and much duller in color than the spicules of the stem.

The species is characterized by its very glaucous aspect, prominent yellow spicules and long, nearly white spines which are so numerous and formidable that it is impossible to get down into the centre of the plant. It was secured under my collection number 10,574, about 15 miles southeast of Kingman, Arizona, and has been observed in several localities in the same general region.

Optunia caesia sp. nov.

Plant a spreading shrub with main arms resting on their edges and the secondary ones erect from them, 60 cm. high and 2 m. in spread when fully matured; joints deep, glaucous blue-green, becoming yellowish-green in age, obovate, about 11 to 15 by 20 to 24 cm., gradually narrowed below to a stipitate base; areoles 4 mm. long, brown; spicules dark-brown in a compact tuft in the upper portion of areoles, 4 to 5 mm. long,

except at very apex of joints where in extreme cases they may be 15 mm. in length ; spines the first year 2 to 4, dark-brown except the lower downward sloping shorter ones, 15 to 20 mm. long, which are white, the others porrect and the longest often 6 to 8 cm. in length ; the second year fading to light-brown or yellow flesh-color, becoming white with age and increasing slightly in numbers, some of those on old wood very much flattened and twisted, annular at the base, especially the second season; flowers yellow with red centres, filaments yellow but greenish at base, style white, stigma large, subglobose, light-green ; fruit purplish-red with a deep bloom and much lighter colored within, the rind simply streaked with red and pulp slightly mottled, only at complete maturity is the color of the rind and pulp diffused and light-red, areoles small, elongated, ½ to 2 mm. long when wool is removed but before removing wool 3 mm. long and broadly oval, dull, dark gray, tawney with wool protruding 1 mm. and the brown, unequal spicules 2 mm. longer than the wool, fugacious spines irregular, 6 to 11 mm. long, lighter colored, often brownish to yellowish-white at maturity.

The species is easily recognized by the densely glaucous aspect of plant and fruit and shape of its joints. It has nearly as much bloom as the *O. robusta* group of the Mexican highlands. The type was collected between Crozier and Hackberry, Arizona, the first of May, 1912, under my inventory number 10555. It has been observed in several situations in that general region and one other collection has been made and cultivated.

Opuntia expansa sp. nov.

A low, spreading species with long, radiating arms, 50 cm. high and having a spread with us now of 160 cm. but in natural habitat the radiating arms often 130 cm. in length and the entire plant 2½ to 3 meters or more in diameter and reaching an extreme height of one meter, main arms radiating and resting on edge ; joints obovate, at first glaucous but losing its plumosity and becoming yellowish-green with age, about 11 to 13 by 20 to 22 cm., rounded above and contracted below into a more or less stipitate base; areoles broadly obovate to subcircular often 6 mm. in length on edges but commonly only 4 mm. on sides of joints, brown turning dirty black, becoming very prominent, subcircular and often 3 mm. high on old joints; spicules yellow to light-brown, in a compact tuft above, scarcely as long as the protruding wool with a few scattering bristles, more numerous and longer in age especially on edges toward apex of joints, sometimes 8 mm. long and always yellow in situ; spines light-brown at base, white distally, toward apex of two-year old joints there are commonly 4 to 5, the lower being white, 1 to 1½ cm. long, the next situated directly above usually 3 cm. long, white throughout or dirty yellow to brownish at base, the other 2 or 3 slightly shorter and more deeply colored, commonly brownish below and yellowish distally but color variable; flowers 8½ cm. in diameter, yellow with dull red centre, the red coloration streaking upward through the veins late in the day, buds with decidedly glaucous-greenish sheen and scales lax; fruit

deep purplish-red all the way through with a little bloom in early maturity, but almost maroon when fully matured, obovate, deeply pitted, about 3 by 5½ cm., areoles 2½ mm. in diameter, tawney, bearing yellowish spicules 2 mm. long and about 4 fugacious spines 5 to 6 mm. long in upper areoles.

This species is rather common among the piñons and junipers of the Anton Chico region of New Mexico and is commonly found associated with *Op. engelmannii cyclodes*. The type was collected under my inventory number 10,324 near Anton Chico, New Mexico, in August, 1911. It has also been received and secured under other numbers from Casaus and the mouth of the Gallinas.

Opuntia xerocarpa sp. nov.

A low spreading species 25 to 35 cm. high and a meter in spread, the main arms usually resting on their edges and the secondary growth erect from them; joints mostly obovate, thick and turgid, 7 to 9 by 11 to 14 cm., glossy yellowish-green, broadly to sharply rounded above; areoles broadly obovate to subcircular, 3 mm. long, at first brown with a marginal white zone soon turning completely tawney-brown and then dirty gray; spicules light-brown but inconspicuous on current year's growth, but on last season's wood 1 to 2 mm. long and continuing to develop in successive interior zones and frequently becoming 5 mm. in length in very much enlarged areoles; spines white, commonly 1 central 3 or 4 cm. long, flattened, twisted and sloping down, and 2 or 3 recurved downward sloping radials below, 1 cm. long or less, on edges of joints, however the centrals may be 2 or even 3 and the radials lengthened to 2 cm. and increased to 4 or 5; flowers yellow, 5 to 6 cm. in diameter, slightly greenish within, filaments yellow above and greenish at base, style white, stigma dark green, about 7-parted; fruit dry, 3½ to 4 cm. long and 1½ cm. in diameter, obovate to cylindrical, when fully matured green with a blush of red on one side, bearing about 24 small subcircular areoles, 6 to 8 mm. apart and bearing a small tuft of brown spicules and 1 to 3 or 4 short white spines, commonly 5 to 7 mm. long, and 2 or 3 to several fugacious spines of similar length.

This is a very characteristic, dry-fruited, flat-jointed *Opuntia* of the western slope of the San Francisco highlands. It is readily distinguished from other species of its dry-fruited allies by its spines, shape of joints and color of plant body. The type was collected about 15 miles southeast of Kingman, Arizona, in May, 1912, under my inventory number 10,579 and has been in cultivation since that time, other collections having been grown previously.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW HAZEL GROUSE FROM MANCHURIA.

BY J. H. RILEY.

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In these Proceedings,* under the description of *Tetrastes bonasia vicinitas*, I mentioned two specimens from Manchuria and provisionally referred them to *Tetrastes bonasia septentrionalis*. Mr. Copley Amory, Jr., has recently presented to the U. S. National Museum a fine series of seven specimens of true *Tetrastes bonasia septentrionalis* from near Verkhni Kolymsk, on the upper Kolyma River, N. E. Siberia. A comparison of these with one or two additional specimens not available when I wrote my other paper has shown the Manchurian birds to represent a very distinct form. It may be known as:

Tetrastes bonasia amurensis subsp. nov.

Type, U. S. National Museum, No. 236,907, adult male, near I-mien-po, N. Kirin, Manchuria, October 14, 1914. Collected by Arthur de C. Sowerby (orig. No. 243).

Differs from *Tetrastes bonasia bonasia* in having less white over the incipient ruff; in being grayer above (than in the gray phase) with a mere trace of deep hazel in the interscapular region; and in having the underparts more heavily marked and with a deeper shade of brown or black.

Description.—Nasal plumes blackish mixed with white and along the culmen with chestnut-brown; frons, a rictal stripe, lower eye-lid, and a spot behind the eye, white; the white of the frons separated in the middle by deep chestnut-brown and blackish and bordered posteriorly by blackish; top of head a rather deep drab, washed with russet, especially on the nape, and with indistinct irregular blackish bars; interscapular region hair brown with blackish and deep hazel bars; lower back and rump mouse gray with more or less distinct shaft streaks and fleckings of blackish and with a rather broad sub-apical band of snuff brown, mostly concealed but showing through enough to give a slight

* XXVIII, 1915, 161.

cast to this region; upper tail-coverts mouse gray with irregular bars and fleckings of blackish and with a slight wash of snuff brown; a line below eye and the ear-coverts mars brown, the former with some blackish spotting; sides of neck russet with irregular black bars and an apical grayish-white spot; the longer feathers over the incipient ruff blackish with some chestnut-brown on the inner web and with most of the outer web white; chin and throat black, bordered by white; feathers of the lower parts gray at the base, then auburn, then black, with a broad sub-terminal bar of white and with a more or less narrow edging of black, the latter lacking on the lower breast and belly; the chest just below the white edging to the throat strongly washed with a narrow band of hazel; flank feathers hazel with a sub-terminal black bar and a rather broad white tip; under tail-coverts vandyke brown vermiculated with black and with a narrow irregular subterminal black bar, broadly tipped with white; lesser wing-coverts hair brown barred with black and with a subterminal bar of pinkish-buff; alula and primary coverts hair brown irregularly margined on the outer web with pinkish-buff; middle and greater wing-coverts hair brown with black stippling and with more or less extensive guttate spots of light buff; primaries and secondaries chaetura drab, irregularly edged on the outer web with pinkish buff; tertials tawny towards the end, stippled with black and edged with ochraceous-buff, the outer web with a rather large spot and bar of black; scapulars russet with black stipplings and some rather large black spots and bars, the anterior feathers with buffy shaft streaks, the posterior with rather large white or buffy-white terminal spots; middle tail-feathers Prout's brown with irregular bars of wood brown and black, the whole stippled with black; outer tail-feathers neutral gray stippled with black and with a broad sub-terminal band of black; tarsi light grayish olive with a buffy wash and some obscure dusky markings. Wing, 162; tail, 110.5; culmen, 18.

Remarks.—I have given a rather detailed description of this form as it is so very different from anything before me. From *Tetrastes bonasia septentrionalis* it is so very distinct that it hardly needs comparison; that form is clear neutral gray above, lighter on the rump, with the black barring rather narrow on the interscapular region and with only the scapulars showing brown (hazel), while in the present form the back is hair brown with deep hazel bars and the black bars a little broader but not so numerous. The wings of *T. b. septentrionalis* are also very different from *T. b. amurensis*, the former contain more white and the edgings to the feathers are broader.

Of *Tetrastes bonasia amurensis* I have three males before me, two from the type locality and one from the Amur (near Nikolaievsk); they are similar except the hazel wash across the chest is much more pronounced in the type, in fact in the other two specimens it is almost entirely lacking.

	Wing.	Tail.	Culmen.
Three males from Manchuria average:	164.5	110.7	16.7
Six males of *T. b. septentrionalis*:	159	115.2	15.8

For measurements of European and Japanese specimens, see these Proceedings, XXVIII, 1915, p. 162.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW ANOLIS FROM CUBA.

BY T. BARBOUR AND C. T. RAMSDEN.

Not long ago Doctor Stejneger kindly loaned us for study a number of specimens of *Anolis* collected by Messrs. Palmer and Riley in Cuba during the year 1900. He is preparing a report upon this collection for publication and noted that it contained this new species. Nevertheless since we also had the species in manuscript he has generously allowed us to describe it. For this courtesy we owe him our sincere thanks. This pretty little lizard may be called

Anolis mestrei sp. nov.

Type, M. C. Z. No. 11,285 from the Valley of Luis Lazo, Western Pinar del Rio, Cuba, collected in March, 1915, by T. Barbour. Paratypes M. C. Z. No. 11,286, from the same locality, also U. S. Nat. Mus. Nos. 26,731, 32, 33 from San Diego de los Baños and No. 27,344 from "El Guamá," a finca near the city of Pinar del Rio, all four specimens from the Palmer and Riley collection.

Description of the type.—Head with two slightly diverging ridges on the frontal region; forehead concave; all the head scales rather feebly keeled; seen from in front rostral about the same height as the mentals; six elongate scales between the nostrils; a single series of scales separating the supraocular semicircles; occipital slightly smaller than ear opening, separated from the supraocular semicircles by about four rows of scales, which are very much larger than the dorsal granules and slightly larger than the scales which bound the occipital posteriorly; supraorbital disc composed of about six large and a few additional smaller but somewhat enlarged scales; these are all very feebly keeled and arranged in gradation, the largest scales nearest the scales of the semicircles, which they match in size; there are about 3 series of enlarged scutes in the discs; disc separated from semicircles by one row of granules; three or four scales between the superciliaries and the supraorbital semicircles bounding the area of the supraorbital granules anteriorly; canthus rostralis sharp, consisting of five or six elongate shields which are

continuous with the superciliaries; loreal rows five or six; subocular semicircles in contact with supralabials; supralabials six, the suture between the fifth and sixth under the centre of the eye; temporals excessively minute, granular, no enlarged series forming a supratemporal line; dorsal and lateral scales minute, granular, none on the middorsal line enlarged; ventral scales medium in size, flat, imbricate, without trace of keel; scales of throat and chest also smooth; forelimbs above with small, imbricate, very feebly keeled scales, smaller than the ventrals; femur and tibia with similar but slightly larger and smooth or very feebly keeled scales; fingers and toes above not distinctly carinate; digital expansion narrow, about 15 lamellae under phalanges II and III of fourth toe; tail broken in type; (in U. S. N. M. No. 26,731—tail long, compressed, without a "fin," divided into irregular segments of about 5, keeled scales each, the limiting row of each segment slightly enlarged); in type, dewlap rather large, with smooth scales, anterior edge slightly thickened; postanal scales not enlarged.

Color of the type in life, mottled gray brown, of more or less a "salt and pepper" appearance. Dewlap white, with a large rich red brown spot at its base, surrounded by the white; the scales of the brown area white like the rest, the skin only colored. Belly whitish but throat with longitudinal dark lines. (All the paratypes show this character.)

Variation.—There is marked variation in the degree of carination of the head shields. U. S. N. M. No. 26,931 has them almost smooth, yet we can not believe that this specimen represents a separate species.

Habits.—The species seems to be one which is found almost wholly along the edges of woods on the trunks of trees and in shrubbery. The first author observed it often in the Valley of Luis Lazo and on his return was surprised to find but two specimens among the Anoles secured. While there with Prof. de la Torre and his assistant Señor V. J. Rodriguez, Barbour's companion, Mr. W. S. Brooks, was taken with a very severe fever and in the hurried packing up of our booty and rather precipitate departure we fear that some specimens may have been left behind. Suffice it then to say that we recognized the species at once in life as one completely unknown to us and one which we have not seen elsewhere during our many journeys throughout Cuba. Mr. and Mrs. Barbour collected during part of 1912 at San Diego de los Baños but failed to find the creature there as Palmer and Riley did—probably because they were at San Diego during a singularly cool and dry season when all Anoles were rare.

We have named this species for an old friend, Doctor Aristides Mestre, Adjunct Professor of Biology at the University of Havana.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

APLODONTIA HUMBOLDTIANA, A NEW MOUNTAIN BEAVER FROM THE HUMBOLDT BAY DISTRICT, CALIFORNIA.

BY WALTER P. TAYLOR.

[Contribution from the Museum of Vertebrate Zoölogy of the University of California.]

The range of the genus *Aplodontia* within California embraces three areas: The Cascade-Sierra Nevada mountain system from the northern boundary of the State south at least to Mammoth, Mono County; the Trinity-Siskiyou mountain mass in the extreme northern part of the State; and the coast district from the northern boundary of the State south to San Francisco Bay. Two coast forms have already been described: *Aplodontia phæa* Merriam, from Point Reyes, Marin County, and *Aplodontia nigra* Taylor, from Point Arena, Mendocino County. It has been known for some time that another form of *Aplodontia* occurs in the Humboldt Bay district, but lack of adequate material for description and comparison has postponed the decision of its systematic status till now. The writer desires to express his thanks to the authorities of the Field Museum of Natural History, and particularly to Mr. Wilfred H. Osgood, Assistant Curator of Mammalogy and Ornithology, for the loan of specimens for study.

Aplodontia humboldtiana new species.

Type.—Male adult, No. 21,162, Mus. Vert. Zool.; Carlotta, Humboldt County, California; January 4, 1914; collected by H. E. Wilder; Orig. No. 1494; stuffed skin, with skull and jaws, all in good condition.

Diagnosis.—Similar in coloration to *Aplodontia chryseola*, but darker; paler hue of brown series of colors interspersed with black hairs; ventral brown wash much less distinct. Skulls may usually be separated from

those of *chryseola* by outline of nasals. In *humboldtiana* the embayment in the lateral outline tends to be more pronounced and situated farther forward than in *chryseola*. Interpterygoid fossa usually broader; paroccipitals lighter; measurement transversely across angular process of mandible less.

Comparisons.—Examples of *Aplodontia humboldtiana* are larger and less richly colored than topotypes of *A. pacifica* from Newport, Oregon. From the new form one receives the impression of black interspersed with buffy, while from *pacifica* one gets the impression of rich brown, with black hairs plentifully insprinkled, and especially emphasized on the middle line of the back. *A. humboldtiana* is not so black as *A. nigra*, which is the darkest member of the genus known to date. The new form is less rich in brown coloration than any of the species occurring in contiguous districts, with the possible exception of *nigra*, *chryseola* being next in degree of richness, and *pacifica* the brightest of all. *A. humboldtiana* is also marked off from all its neighbors by the faint brown wash ventrally. In *nigra* the ventral brown wash is more distinct, in *chryseola* still more distinct, and in *pacifica* the most distinct of all.

Cranially *Aplodontia humboldtiana* can usually be separated from *A. pacifica* by the broader outline of its nasals, which are in most examples conspicuously dilated anteriorly rather than straight as in the Oregon species. Zygomatic width tends to be greater in *humboldtiana* than in *pacifica* or *A. nigra*, more as in *A. chryseola*. In general the cranial measurements of the new form tend to be greater than in *pacifica* or *nigra*. Nine of the fifteen specimens of *humboldtiana* measured have the width of the interpterygoid fossa equal to or exceeding the maximum of this measurement in *chryseola* and *pacifica*. *A. humboldtiana* has paroccipital processes intermediate in condition between the less prominent, more plate-like type observed in most examples of *pacifica* and the more prominent, heavier, more knob-like type noted in *chryseola*. Measurement transversely across angular process of mandible practically the same in *humboldtiana* as in *pacifica*, less than in *chryseola*. But greatest length of mandible links *humboldtiana* with *chryseola* rather than with *pacifica*. This measurement affords a separative character as between *humboldtiana* and *nigra*, also, being greater in the former than in the latter.

Material.—Twenty-one specimens, all from California: 8 (Nos. 21,155–21,162, Mus. Vert. Zool., taken by H. E. Wilder) from Carlotta, Humboldt County; 7 (No. 11,413, Mus. Vert. Zool., taken by Frank Stephens; Nos. 18,990–18,994, 19,174, Mus. Vert. Zool., taken by H. E. Wilder) from Cuddeback, Humboldt County; 5 (Nos. 9061–9064, 9066, Field Mus. Nat. Hist., taken by E. Heller) from Eureka, Humboldt County; 1 (No. 21,983, Mus. Vert. Zool., taken by H. S. Prescott) from Requa, Del Norte County.

Measurements.—Type (adult male): Total length, 365 mm.; tail vertebræ, 35; hind foot, 58; basilar length of skull, 59.8; width of nasals, 10.5; length of audital tube, 19.4; length of incisive foramina, 7.5; zygomatic width, 53.9; greatest width of interpterygoid fossa, 5.5; mastoid

width of cranium, 53.7; alveolar length of superior cheek teeth, 18.7; distance between infraorbital foramina, 16.1; mandible, transversely across angular process, 22.1; greatest length of mandible, 48.4.

Remarks.—Germane to this discussion are the following facts: For some time it has been recognized that the *Aplodontia* of the Humboldt Bay district is distinct from its coast-dwelling neighbors. Concerning the degree of its relationship to *Aplodontia chryseola* of the neighboring montane district interiorly there have been no adequate data at hand. A fairly sharp faunal line separates the Trinity Mountain district from that of the northern humid coast. At least seven genera of rodents are represented in the two regions by distinct species or subspecies. Consequently it is not surprising to find that adequate material shows that the *Aplodontia* of the coast region is distinct from that in the neighboring montane district.

It is, however, somewhat surprising to find that the closest affinities of *Aplodontia humboldtiana* are with *A. chryseola* rather than with its neighbors on the coast, for the affinities in most groups of mammals would appear to be north and south in the coast districts rather than east and west from the coast districts to neighboring montane districts. At least this seems to be true in the genus *Aplodontia*, which has the rather compact group of coast-dwelling forms represented by *Aplodontia phæa*, *A. nigra*, and *A. pacifica*, apparently more closely related to each other than to any other members of the genus. Grinnell has shown (An Analysis of the Vertebrate Fauna of the Trinity Region of Northern California, Univ. Calif. Publ. Zool., vol. 12, 1916, pp. 401, 407) that there are few Boreal species, either of birds or mammals, in the Trinity region which are identical with, or show closest affinities to, representatives in the northern humid coast belt. It is of interest that no rodent appears among the species listed by him as illustrative of close affinities in this direction.

Consequent upon these considerations it appears that *Aplodontia humboldtiana* furnishes an exception to the usual systematic alignment in the region in question, having its closest affinities rather with its montane neighbor to the eastward, than with its lowland neighbors either north or south along the coast.

Vol. XXIX, pp. 25-26 February 24, 1916

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW CISCO FROM LAKE ERIE.

BY TARLETON H. BEAN.

On September 21, 1915, Mr. Phillip H. Hartman, Superintendent of the State Hatchery at Erie, Pa., showed the writer a cisco which he had obtained from a Lake Erie fisherman, and which he has recently sent to me for description. The fish is so remarkable in the development of its fins as to raise a question concerning its relation to the normal forms of Lake Herring of the Great Lakes. The pectorals extend beyond the origin of the ventrals. The ventrals reach beyond the end of the anal base. The longest anal ray exceeds the depth of the body. The longest dorsal ray is more than one-third of the length of the fish without caudal.

Leucichthys macropterus new species.

The type of the species, an immature male, is 244 millimeters long without the caudal. D. 11; A. 11; scales 8-74-8; scales between occiput and dorsal fin 34; branchiostegals 8; gillrakers 8+22, the longest equal to eye; head 4.28 in length; depth 4; length of caudal peduncle 10.5; depth of caudal peduncle 12; eye 4⅔ in head; long diameter of orbit equals distance from tip of snout to eye, 4 in head, and about equal to interorbital space; length of maxilla from tip of snout 3 in head; mandible very slightly projecting, 2⅓ in head; distance from snout to occiput twice length of maxilla.

Distance from ventral origin to pectoral origin five-sixths of pectoral length; length of pectoral one and two-thirds times head. Length of ventral nearly twice length of head. Accessory ventral about equal to maxilla. The longest dorsal ray one and one-half times head.

The length of the base of adipose dorsal is only slightly greater than the height of the fin, and is not equal to the eye. The longest anal ray somewhat exceeds depth of body. The lower caudal rays longest, equalling length of pectoral.

Colors in formalin, upper parts pale brownish, paler below; fins all pale; eye dark bluish with traces of bronze on the iris.

The measurements are given in millimeters in the following table:

MEASUREMENTS OF LEUCICHTHYS MACROPTERUS.

	mm.
Length without caudal	244
Comparative measurements:	
Head, 4.28 in length	57
Depth, 4 in length	65
Caudal peduncle	
Length	23
Depth	20
Eye, 4⅔ in head	11
Orbit, long diameter	15
Snout from eye	15
Interorbital space	16
Maxillary length from tip of snout, 3 in head	19
Mandible, very slightly projecting	25
Snout to occiput	38
Ventrals to pectorals (ventral origin to pectoral origin)	81
Pectoral length in ventral-pectoral distance	.85
Pectoral length	95
Ventral origin from tip of snout	137
Ventral length	107
Accessory ventral length	18
Dorsal height (longest ray)	85
Dorsal origin from tip of snout	123
Adipose length—length of base	9
Adipose height	8
Anal height (longest ray)	70
Lower caudal rays (longest)	95

The discovery of this singular form of cisco is due to the watchfulness of Superintendent Hartman over the collections of fishes obtained by fishermen and collectors in the vicinity of the Erie Station. The specimen was caught in a gill net by the tug *Erie*, December 19 or 20, 1914, on a north course out of Erie near the boundary line between New York and Canada.

Type in U. S. National Museum, Washington, D. C., catalogue number 76,845.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW EAST INDIAN STARFISHES.

BY WALTER K. FISHER.

The new species of starfishes* herein described were collected by the U. S. Fisheries steamer *Albatross* during her cruise of 1907–1910. The type of *Asterina cristata* is from the Museum of Comparative Zoölogy, of Cambridge, Mass. The other types are in the U. S. National Museum. These species will be fully described and figured in the final report.

Asterina cristata new species.

Diagnosis.—Related to *A. cepheus*, but with a variable number of abactinal plates (upward of 50 to a ray) elevated and tubercular in form and surmounted by 1 to 5 unequal, robust, pointed spines, the largest 4 or 5 times as long as the spinelets of the other plates, and many times greater in diameter; other abactinal plates with 5 to 10 short, sharp spinelets in spaced groups, mostly on the adcentral border; in center of disk a poorly defined pentagon of elevated plates; at base of ray, 6 regular longitudinal series of papulæ on either side of a radial area of irregularly arranged pores. Inferomarginal plates with a conspicuous tapered spine surrounded by smaller spinelets. Actinal intermediate plates with a group of 2 to 4, mostly 3, basally webbed spinelets; furrow spinelets usually 6, webbed for about half their length, the 3 or 4 median conspicuously larger than the laterals; subambulacral spinelets usually 4, the 2 median much longer than the laterals (in another specimen there are 5 or 6, of which 2 are enlarged). Rays 5, rather narrow, with a rounded extremity. R=37 mm., r=14.5 mm., R=2.5 r; breadth of ray at base, 15 mm.

Type.—No. 689, Museum of Comparative Zoölogy.

Type-locality.—Ponapé, Caroline Islands.

*New genera and species from the *Albatross* Philippine collection have already been published in the Proceedings of the United States National Museum as follows: vol. 40, May 17, 1911, pp. 415–427; vol. 43, Feb. 5, 1913, pp. 599–648; vol. 46, Sept. 30, 1913, pp. 201–224.

The characteristic feature of this species is the presence of elevated abactinal plates with robust conical spines, forming conspicuous protuberances, very variable in number.

Pteraster corynetes new species.

Diagnosis.—Abactinal surface resembling superficially that of *P. pulvillus;* probably more nearly related to *P. semireticulatus.* Paxillæ with low pedicel surmounted by 7 or 8 longer, radiating, peripheral spinelets surrounding a central shorter one; tips of peripheral spinelets united by fibrous tissue; spiracula in lines between spinelets; no deposits in supradorsal membrane; furrow fans with 7 spines (distally, 6); actinolateral spines stout, the tips defining ambitus; 5 oral spines, the 10 united by a continuous membrane; suboral spine may be entirely lacking; when present, slender, tapering. Rays 5; R=24 mm., r=13 mm., R=1.8 r; breadth of ray at base, 14 or 15 mm.; thickness of disk, 9 mm.

Type.—Cat. No. 37,014 U. S. N. M.

Type-locality.—Station 5623, Molucca Passage, 7.5 miles northeast Makyan Island (0° 16′ 30″ N., 127° 30′ E.), 272 fathoms, fine sand, mud; 1 specimen.

In my key to the species of *Pteraster* (Asteroidea of the North Pacific, p. 368), *P. corynetes* belongs to the second section, although the rays are slightly longer than in the other species. Among those species having all the oral spines united by a continuous membrane, only 5 are comparable with *corynetes,* namely *pulvillus, temnochiton, rugatus, semireticulatus,* and *ingolfi,* to none of which it is closely related.

Pteraster obesus myonotus new subspecies.

Diagnosis.—Closely related to *P. obesus* H. L. Clark, of Japan, and resembling superficially *P. pulvillus* Sars. Differing from *obesus* in being nearly pentagonal in form, in having a fairly tough supradorsal membrane in which there are well developed bands of muscle forming a reticulum of hexagons and triangles; and in having fewer paxillar spines (7); adambulacral spines 5 (6 on the first few plates), the innermost very short; 7 or 8 free oral spines, the innermost flattened and truncate; suboral spine sharp, a little longer than longest oral spine, and with the distal half hyaline, tapering, three-edged. R=28 mm.; r=24 mm.; R =1.2 r.

Type.—Cat. No. 37,015 U. S. N. M.

Type-locality.—Station 5518, Mindanao Sea, off Point Tagalo, 200 fathoms, gray mud, globigerina; bottom temperature 54° Fahr.

Diplopteraster multipes patagiatus new subspecies.

Diagnosis.—Closely resembling *D. multipes,* but differing in having narrower paxillar areas (exclusive of actinostomial membrane) and in having the same number of spines in both sorts of furrow combs (or if an

unequal number, then one more in the non-prominent combs, instead of one less, as in *multipes*); adambulacral spines longer. R=95 mm.; r=60 mm. (measured to edge of actinostomial membrane); R=1.5 r; r=50 mm., measured to edge of paxillar area; breadth of paxillar area at interradias, 50 to 57 mm. (=60% or less of R, while in *multipes* it equals 80%, or more, of R.

Type.—Cat. No. 37,016 U. S. N. M.

Type-locality.—Station 5656, Gulf of Boni, Celebes (3° 17′ 40″ S., 120° 36′ 45″ E.), 484 fathoms, gray mud; bottom temperature, 41.2° Fahr.

Hymenaster rhodopeplus new species.

Diagnosis.—Closely resembling *H. nobilis* Sladen, but differing in having 7 instead of 6 rows of paxillae to each ray, in having a stouter and longer adambulacral spine (much longer than aperture papilla), and in having 2 acicular suboral spines to each plate (instead of 1, resembling an aperture papilla). Marginal contour pentagonal; R=82 mm.; r=55 mm.; breadth of paxillar area at base, 35 mm.; distance from center of disk to margin of paxillar area on interradial line, 30 to 32 mm.

Type.—Cat. No. 37,017 U. S. N. M.

Type-locality.—Station 5606, Gulf of Tomini, Celebes (0° 16′ 28″ N., 121° 33′ 30″ E.), 834 fathoms, green mud.

Hymenaster bartschi new species.

Diagnosis.—Very similar to *H. pullatus*, but differing in having the paxillar areas of the 5 rays separated interradially nearly to the oscular valves, and in having numerous spiracula in the supradorsal membrane, there being a series of band-like spiracular areas along either side of the paxillar areas extending toward the interradial line. General contour originally probably nearly pentagonal, produced at the corners into attenuate tips. R=about 70 mm. Supradorsal membrane very thin and transparent between the numerous, conspicuous, criss-crossing muscle bands. Pseudopaxillae in 7 rows, the median and adradial rudimentary, with 1 to 3 tiny spinelets; the 2 lateral series with 3 or 4 spinelets to each paxilla. Furrow spinelets 3, flattened at the base and tapering to a point, the adoral slightly the longest (1.5 to 1.75 mm.). Actinolateral membrane broad, rather thin, deep brown in color; twelfth to seventeenth actinolateral spines the longest.

Type.—Cat. No. 37,018 U. S. N. M.

Type-locality.—Station 5428, Sulu Sea, off eastern Palawan (9° 13′ N., 118° 51′ 15″ E.), 1105 fathoms, green mud; bottom temperature, 49.7′ Fahr.

Named for Dr. Paul Bartsch of the U. S. National Museum.

Zoroaster ophiactis new species.

Diagnosis.—Closely related to *Zoroaster alfredi* Alcock, from which it differs in having longer rays, stouter, conical, carinal spines, relatively smaller papular pedicellariæ, ungrooved spinelets, less numerous adambulacral pedicellariæ, and in lacking, deep in the furrow, the 2 large bunches

of pedicellariæ characteristic of *alfredi*. R=282 mm., r=15.5 mm., R =18 r; breadth of ray at base, 17 mm. Disk very small, fairly level on top in large specimens, tumid in small; rays slender and strongly carinate, the carinal plates forming a definite spiniferous ridge. Between adradial plates (which have no central spine) and adambulacrals, 7 longitudinal series of plates at base of ray, each plate with a central conspicuous, slender, tapering, sharp spine, which on the 3 lowermost rows becomes flattened and appressed. Adambulacral armature: 1 spine deep in furrow with a terminal three-cornered sacculus with upward of 10 unequal, medium sized and small pedicellariæ, and above this a row of 3 or 4 spines bent outward, the third usually the longest; that above furrow spine with a large pedicellaria.

Type.—Cat. No. 37,008 U. S. N. M.

Type-locality.—Station 5606, Gulf of Tomini, Celebes, 834 fathoms, green mud, 1 specimen.

Zoroaster microporus new species.

Diagnosis.—Related to *Zoroaster barathri* Alcock, from which it differs in having squarish, instead of hexagonal carinal plates, smaller miliary spinelets, longer central spines on 5 lateral rows of plates (instead of on the 2 or 3 lowermost series only), more numerous pedicellariæ, in having 2 inner spines of the prominent adambulacrals with pedicillariæ (3 in *barathri?*), and in having 2 transverse series of spines on the actinal face of both sorts of adambulacrals. R=205 mm., r=12 mm., R=17 r; breadth of ray at base, 13 mm. Disk small, scarcely more than the united bases of the rays; rays long, slender, with a conspicuous, rounded unarmed carinal ridge, and a well-defined sulcus along either side; 5 series of lateral plates with a central spine; tube-feet biserial.

Type.—Cat. No. 37,009 U. S. N. M.

Type-locality.—Station 5637, 21 miles southwest Amblan Island (off Bouro Island), Moluccas (3° 53′ 20″ S., 126° 48′ E), 700 fathoms, gray mud.

Zoroaster carinatus philippinensis new subspecies.

Diagnosis.—Differing from *Zoroaster carinatus* in having more numerous adambulacral spines, with many more pedicellariae; less tumid apical plates, less prominent central spinelets to carinal plates; more numerous pedicellariæ generally. Disk small, rays long, slender, pointed, with a midradial ridge or carina; central spinelets of carinal plates slightly enlarged; 4 rows of slender appressed spinelets along side of ray (3 in small specimens); superomarginal and proximal inferomarginal plates without central spine (the latter sporadically with spine in *carinatus*); prominent adambulacral plates with transverse series of 6 or 7 spines (5 in small specimens), the inner 2 with several large and small pedicellariæ. R=194 mm., r=13.5 mm., R=14 r; breadth of ray at base, 14 or 15 mm.

Type.—Cat. No. 37,010 U. S. N. M.

Type-locality.—Station 5587, Sibuko Bay, Borneo, 415 fathoms, green mud, sand, coral; bottom temperature 42.3° Fahr.

Bythiolophus new genus.

Diagnosis.—In general structure resembling *Zoroaster*, except in the presence of superambulacral plates and in the arrangement of the abactinal skeleton. In this the adradial series is more prominent than the carinal, consisting of alternately larger and smaller, transversely elongated plates, the larger of which overlie the lateral third of the carinals; both sorts strongly overlap the upper end of the superomarginals. Two series of marginals and 4 series of intermediate plates. Adambulacral plates as in *Zoroaster*.

Type.—*B. acanthinus*, new species.

Bythiolophus acanthinus new species.

Diagnosis.—Rays 5. R=105 mm., r=13 mm. R=8 r; breadth of ray at base, 14 mm. Rays 4 sided, very gradually tapering; abactinal surface of ray sunken along median line except near tip, where the surface is nearly plane; sides forming a steep bevel; interbrachial arcs angular; radial plates sunken, but tumid, with a short, sharp, appressed spine; adradial plates prominent, forming margin of abactinal surface, larger and smaller alternating, the larger and some of the smaller with a central spine similar to the carinal spines; 6 lateral series of plates, each with a prominent central spine, the third and fourth from top the longest; prominent adambulacral plates with transverse series of 4 spines, and about 3 spinelets (on actinal surface), the inner with 1 to several pedicellariæ.

Type.—Cat. No. 37,011, U. S. N. M.

Type-locality.—Station 5648, Buton Strait, Celebes, 559 fathoms, green mud, bottom temperature, 39.2° Fahr.

Odinia penichra new species.

Diagnosis.—Rays 16, rather slender, the costal region extending about half the length of ray and containing 10 to 12 complete, rather weak, conspicuously spiniferous costæ, widely and nearly equidistantly spaced; disk with steeply beveled margin and conspicuous, terminally denticulate spinelets in ones and twos on its slightly convex plates; adambulacral armature with 1 slender aboral furrow spinelet and 1 actinal spine, proximally bifid; oral plates with 4 or 5 actinostomial spinelets, and 1 aboral furrow spinelet; no suboral spine. R=100 mm., r=7.5 mm. (to edge of disk), R=13.3 r; breadth of ray at base, 3.5 mm.; breadth of actinostome, 9 mm.

Type.—Cat. No. 37,019 U. S. N. M.

Type-locality.—Station 5217, between Burias and Luzon, 105 fathoms, coarse gray sand.

Brisinga trachydisca new species.

Diagnosis.—Rays 13 or 12; a multicostate form with the spinelets of disk in groups of 2 to 6, spaced like pseudopaxillæ; costæ 40–45, very prominent, irregular and sinuous, without intercostal bands of pedi-

cellariæ, and with relatively coarse spinelets, the costal region occupying more than a third of the total length of ray but less than one-half; adambulacral plates not crowded; armature with 1 aboral furrow spinelet, 1 adoral actinal spine, 1½ to 1¾ the length of the plate, and 1 prominent actinal spine 3 times the length of plate. Rays slender, very long; breadth of disk equals 4 to 4½ times width of ray at base.

Type.—Cat. No. 37,020, U. S. N. M.

Type-locality.—Station 5491, between Leyte and Mindanao, 736 fathoms, green mud, coral, bottom temperature 52.3° Fahr.

This species differs from *B. andamanica* in having more closely crowded costæ, with strongly, not feebly developed plates, in having a longer costal region, in lacking well-developed bands of pedicellariæ between the costæ and in having fewer (12 or 13, not 15), less deciduous rays. *B. gunnii* differs in having more numerous rays, much thinner disk, which has a downy appearance, only 20 to 30 ridges, especially prominent laterally but obsolete abactinally, intercostal bands of pedicellariæ, a much shorter major subambulacral spine, and mouth plates composed of 2 incompletely fused adambulacrals, leaving a "ligamentous symphysis between."

Brisinga mimica new species.

Diagnosis.—Rays 16. Costæ numerous (25 to 30), closely placed, prominent, irregular, with relatively coarse spinelets, without intervening bands of pedicellariæ; costæ confined to basal fifth of ray, beyond which for an equal distance are about 15 very inconspicuous ridges composed of small plates, but carrying a fairly heavy felting of pedicellariæ; disk large, with isolated delicate spinelets not in groups; adambulacral plates proximally wider than long and crowded in appearance; armature typically 1 aboral furrow spinelet, 1 aboral actinal spinule and 1 longer adoral actinal spine (equaling 2 plates in length), and 1 major spine about 3 plates in length. Rays slender, very long; R=385 mm., r=19 mm.

Type.—Cat. No. 37,021, U. S. N. M.

Type-locality.—Station 5648, Buton Strait, Celebes (5° 35′ S., 122° 20′ E.), 559 fathoms, green mud; bottom temperature 39.2° Fahr.

B. insularum has 13 rays and disk spinelets in groups, intercostal ridges of pedicellariæ, only 13 to 17 costæ, and longer lateral spines. *B. bengalensis* has 14 rays, a small disk, with the abactinal spinelets in tufts, 20 costæ, occupying basal ninth of the ray, intercostal bands of pedicellariæ equally salient with the ribs.

Brisinga moluccana new species.

Diagnosis.—Rays 16. Costæ 25, complete, prominent, well-spaced, with 1 to 3 intercostal bands of pedicellariæ; costal spinelets relatively coarse; disk medium, with isolated papilliform, small, spinelets, and minute pedicellariæ; adambulacral plates about as wide as long proximally; armature typically: 1 true furrow spinelet at either end of plate and equal to about ⅔ the length of plate; aborad and actinad to the

adoral spinelet is a shorter one generally pointed away from the furrow; the large actinal spine, equal to 2 or 3 plates in length, is situated on the aboral half of plate. Costal area swollen, occupying somewhat more than basal third of ray; integument thin, devoid of prickles. Breadth of disk equal 5 times width of ray at base (6 mm.). R=410 mm., r=15 mm.

Type.—Cat. No. 37,022, U. S. N. M.

Type-locality.—Station 5626, between Gillolo and Kayoa Islands, Molucca Islands, 265 fathoms, gray mud, fine sand.

Brisinga acanthogenys new species.

Diagnosis.—Rays 11. Costæ 20, complete, prominent, well spaced, with 1 complete and 1 or 2 incomplete bands of intercostal pedicellariæ; costal spinelets fairly prominent, few in number; disk *small*, with beveled margin; plates granuliform, spaced, with usually 2 or 3 very small spinelets but no pedicellariæ; lateral spines long, equaling length of 7 or 8 adambulacral plates; no integumentary prickles on rays; adambulacral plates about as wide as long proximally; armature, proximally: 1 true furrow spinelet at each end, 1 minor adoral subambulacral spinule a little longer than the plate, and a major subambulacral spine 3½ to 4 plates in length, situated on a prominence of the aboral half of the plate; mouth plates each with 2 suboral spines. Breadth of disk equal to 3½ times width of ray at base (6 mm.). R=350 mm., r=11 mm.

Type.—Cat. No. 37,023, U. S. N. M.

Type-locality.—Station 5440, mouth of Lingayan Gulf, Luzon, 172 fathoms, fine gray sand, globigerina; bottom temperature, 53.2° Fahr.

Craterobrisinga new subgenus.

Diagnosis.—Proximal adambulacral plates short, wider than long; the major subambulacral spines of proximal plates clavate, with enlarged capitate, often truncate tip. Type, *Brisinga panopla* Fisher.

This subgenus includes *B. panopla* Fisher, *B. alberti* Fisher, *B. cricophora* Sladen, *B. parallela* Koehler, besides the species described below.

Brisinga (Craterobrisinga) eucoryne new species.

Diagnosis.—Rays 11. Related to *B. alberti* Fisher. Five or 6 inconspicuous rudimentary costæ at base of ray, followed by 17 to 20 well-spaced prominent ridges occupying proximal third of ray; numerous small integumentary spinelets, and about 3 inconspicuous bands of pedicellariæ between the costæ, which are composed of elongate elliptical plates, usually not compressed, bearing 1 or 2 spinelets in center; disk small, with crowded, rather long, solitary spinelets giving a hirsute appearance; adambulacral plates proximally wider than long, with crowded armature; first dozen plates with the slenderer of the 2 subambulacrals often truncate and slightly flaring; typical armature; a true furrow spinelet at either end of the plate and 2 large actinal grooved

spines sometimes in a transverse series at middle of plate or in an oblique series; outer spine of first 10 plates with a flaring truncate tip, ending in numerous points; each mouth plate with 2 large pointed suboral spines. Breadth of disk equaling 3⅓ times width of ray at base (6 mm.). R= 205 + mm., r=10.5 mm. (small section from tip of ray missing).

Type.—Cat. No. 37,024, U. S. N. M.

Type-locality.—Station 5348, Palawan Passage, 375 fathoms, coral sand, bottom temperature, 56.4° Fahr.

Stegnobrisinga new subgenus.

Diagnosis.—Integument between the costal arches of ray strengthened by many close-set, mostly contiguous or sometimes overlapping papery plates of irregular form and conspicuous size, completely filling the interspaces; proximal subambulacral spines acicular, as in typical *Brisinga*. Type, *Brisinga placoderma*.

The numerous costæ will at once separate this subgenus from *Freyella*, which has a characteristic appearance, quite unlike that of *Stegnobrisinga*.

Brisinga (Stegnobrisinga) placoderma new species.

Diagnosis.—Rays 13 or 14. Costæ 35 to 40, close together and not very prominent; intercostal areas paved with close-set, irregular, often overlapping papery plates devoid of spinelets; costal arches fairly regular and parallel, opposite every adambulacral, or occasionally more frequent, but only every third to fifth with a lateral spine; disk with beveled border and with close-set isolated spinelets and conspicuous slender-jawed pedicellariæ; adambulacral armature variable, usually 2 furrow spinelets at each end of the furrow margin, or 1 aboral and 2 adoral about as long as the plate, and a subambulacral spine 2½ to 3 plates in length. Breadth of disk equal to 3½ to 4 times width of ray at base (8 mm.). Rays long.

Type.—Cat. No. 37,025, U. S. N. M.

Type-locality.—Station 5648, Buton Strait, Celebes, 559 fathoms, green mud, bottom temperature, 39.2° Fahr.

Freyella spatulifera new species.

Diagnosis.—Rays 14, not very long. Disk with a beveled margin, covered with a close, uniform nap of mostly solitary, delicate spinelets; disk plates not distinguishable. Genital region of ray short, slightly swollen, the spinelets in clusters of 2 to about 6 per plate. On all but basal fourth of ray there are low, transverse, parallel ridges, caused by the plates being slightly elevated, upon which the spinelets are more numerous than in the narrow intervening areas. These ridges resemble somewhat the costæ of *Brisinga*, but are much less prominent. A slender, needle-like spine on the side of every adambulacral, beginning with the eighth, increases in length until equal to about 6 or 7 adambulacral plates. Adambulacral armature at base of ray consists of 1 furrow spine-

let at each end of the plate and a third, longer one, above the aboral spinelet; on the actinal surface is a prominent subambulacral spine which on the first 15 plates is conspicuously spatulate, the broad lip being sometimes flat, sometimes scoop-shaped, sometimes grooved. The truncated end has, often, 2 or 3 knobs, and the part of the spine which is flattened decreases from about half to about a fifth, or even less, on the distal spines affected. Mouth plates each with 3 short spinelets on the actinostomial margin, and 2 on the distal furrow corner; suboral spine about as long as the first subambulacral, with a slightly flattened, sublanceolate tip, sometimes ending in 2 distinct, sharp points. R=135 mm. + r=9 mm.; breadth of ray at base, 4.5 mm.; length of genital region, 30–35 mm.

Type.—Cat. No. 36,747, U. S. N. M.

Type-locality.—Station 5668, 2° 28′ 30″ S., 118° 43′ E. (off Mamuju Island), 901 fathoms., gray mud.

This species which is characterized by the broadly spatulate, proximal subambulacral spines and the rudimentary, transverse, abactinal spiniferous ridges differs from *F. echinata* Sladen in lacking the conspicuous abactinal spines of the genital region, and from *F. insignis* Ludwig (from off Panama) in having differently formed proximal subambulacral spines. In *insignis* the spines usually end in 2 to 4 diverging prongs and are only exceptionally flattened to any extent, while the lateral spine is opposite every alternate adambulacral plate and there is only 1 small aboral furrow spinelet. *Freyella pacifica* Ludwig, which has the tip of the proximal subambulacral spines slightly enlarged, has the lateral spine and furrow spinelet as in *insignis*.

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A NEW BAT FROM PORTO RICO.

BY HARTLEY H. T. JACKSON.

The Biological Survey Collection contains 235 specimens of bats obtained by Mr. Alex Wetmore while engaged in field work in Porto Rico during the spring and summer of 1912. An examination of this material reveals two specimens of an undescribed form of *Eptesicus*, which I take pleasure in naming for the collector. The bat may be recognized by the following diagnosis:

Eptesicus wetmorei sp. nov.

Type.—Young adult ♂, alcoholic with skull removed, No. 179,142, U. S. National Museum, Biological Survey Collection, from Maricao (altitude 1375 feet), Porto Rico; collected May 29, 1912, by Alex Wetmore. Original number 900.

General characters.—Nearest to *Eptesicus cubensis* (Gray) from which it differs externally in its slightly larger size, relatively larger ears and longer tragi, and duller color. Skull slightly larger than that of *cubensis;* relatively wider interorbitally and through braincase. Molariform dentition heavy; much heavier than in *cubensis.*

Color.—Upperparts duller than in *Eptesicus cubensis;* about fuscous of Ridgway.* Underparts much paler than upperparts; near olive-brown, anteriorly, shading posteriorly into drab. Ears and membranes fuscous-black.

Measurements.—Type (measured in flesh by collector): total length, 97; tail vertebrae, 41; hind foot, 12. Type (measured by writer from specimen in alcohol): length of forearm, 46; length of tibia, 19.5; length of thumb, 8.5; length of ear from crown, 13; length of tragus, 7.5.

* Ridgway, R. Color standards and color nomenclature, 1912.

Skull of type: condylobasal length, 17.1; greatest length, 18.2; breadth of braincase, 8.5; interorbital constriction, 4.4; length of maxillary tooth row (including canine), 7; length of mandibular tooth row (exclusive of incisors), 7.8.

Remarks.—The Porto Rican brown bat needs critical comparison only with *Eptesicus cubensis* from which it can be separated by the diagnosis above given. A male topotype (skin and skull, No. 179,230, U. S. National Museum, Biological Survey Collection) is immature, but as far as is determinable bears all the characters of the type.

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A LIST OF THE FISHES OF THE SENECA CREEK, MONTGOMERY COUNTY, MARYLAND, REGION.*

BY LEWIS RADCLIFFE AND W. W. WELSH.

The present paper is based upon collections of fishes from the Chesapeake and Ohio canal near Rushville, Maryland, and from Little Seneca and Tenmile creeks near Boyds, Maryland, December 12 to 14, 1911. The authors accompanied one of the parties of the United States Bureau of Fisheries engaged in reclaiming the food fishes from the canal. This party seined a section of the canal about six miles in length from a point near Sycamore Island in the Potomac River up to Tenfoot Island. Large quantities of fish were hauled ashore with the seine and thousands of food fish which would have perished if left in the canal were carried over the bank and released in the Potomac River. As many of these were breeders, the fish supply of this section of the river was considerably augmented. Under these conditions, exceptional opportunities were afforded for gathering data as to the species occurring in this region and their relative abundance. Many of the fishes congregated in the deeper holes, especially in the basin or widewater in the canal above Rushville. About half a mile below Rushville, there is a lock locally known as Violett's Lock. A feeder from the river enters the canal below the lock, affording a means of ingress for the fishes of this section of the river. As the section above the lock is fed from a point much higher up and as the lock acts as a partial barrier, differences in the fauna of the two sections existed. Now that the fish from both sections are being released into this part of the river, these differences may

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disappear. In June and September, 1914, the junior author thoroughly seined a section of Little Seneca and Tenmile creeks, near Boyds, Maryland. These are branches of Seneca Creek, which empties into the Potomac River at Rushville.

Because of the proximity of the Seneca basin to the streams about Washington, D. C., the present paper may be of interest to those interested in the distribution of the species of this region. The list contains 34 species from the vicinity of Rushville, all but one being from the canal, and 19 species from Little Seneca and Tenmile creeks. Of the 41 species listed, 12 were common to the two regions, as follows:

Schilbeodes insignis	Notropis photogenis amœnus
Catostomus commersonii	Hybopsis kentuckiensis
Hypentelium nigricans	Anguilla rostrata
Semotilus atromaculatus	Lepomis auritus
Pimephales notatus	Micropterus dolomieu
Notropis analostanus	Boleosoma olmstedi

The following species were found only in Little Seneca and Tenmile creeks:

Semotilus corporalis	Rhinichthys atronasus
Notropis cornutus	Exoglossum maxillingua
Rhinichthys cataractæ	Etheostoma flabellare

Uranidea gracilis

Without exception, these species are characteristic of the smaller streams, usually inhabiting the swifter creeks and brooks.

McAtee and Weed (Proc. Biol. Soc. Washington, Vol. XXVIII, 1915, p. 6) list 27 species from the Chesapeake ahd Ohio canal between locks 11 and 12. Of these, all but four were taken in the section seined near Rushville and eleven additional species, as follows:

Ictalurus furcatus	Notropis procne
Moxostoma macrolepidotum	Notropis analostanus
Carassius auratus	Hybopsis kentuckiensis
Hybognathus nuchalis	Fundulus diaphanus
Pimephales notatus	Percopsis omiscomaycus

Micropterus salmoides

Of these, *Moxostoma macrolepidotum* was very abundant and *Hybognathus nuchalis* and *Pimethales notatus* were common.

Annotated List of Species.

Siluridæ.

1. **Ictalurus punctatus** (Rafinesque).

This species has been introduced into the Potomac River below Great Falls and is apparently rare above the falls. Among the fish seined from the canal, only a single example, 134 mm. long, was seen.

2. **Ictalurus furcatus** (Le Sueur).

A single example, 555 mm. long, was obtained in the canal above Violett's lock. The unusual conditions to which this specimen was exposed serves to illustrate the remarkable vitality of catfishes. It was captured about 10.00 A. M., December 13, carried in a cart without covering during the remainder of the day and in the evening placed in a live box filled with carp. On the morning of the 14th it was lying on top of the carp, out of the water, showing no signs of activity; on the morning of the 15th it was active. Being too large for our collecting cans, it was wrapped in a newspaper, packed in a grip and thus carried to Washington. In the afternoon, when unpacked, it appeared about as lively as when first captured.

3. **Ameiurus nebulosus** (Le Sueur).

Abundant in the canal.

4. **Schilbeodes insignis** (Richardson).

This species is common in Tenmile Creek, near Boyds, apparently being most abundant in the autumn. Examples up to 112 mm. in length were collected. In the canal four small examples were taken at a point below the lock, locally known as Buzzards Hole.

Catostomidæ.

5. **Catostomus commersonii** (Lacépède).

Sparingly common in the canal. The young are common in Little Seneca and Tenmile creeks. Those taken in the creeks in June, 1914, may be arranged according to length into two groups, the first of specimens 27 to 35 mm. long and the second of specimens 80 to 165 mm. in length. The latter are believed to belong to the stock of the previous year.

6. **Hypentelium nigricans** (Le Sueur).

Adults were abundant in the canal and the species also occurs in abundance, especially the young, in Little Seneca and Tenmile creeks. On June 6, 1914, many examples ranging in length from 25 to 140 mm. were taken in the latter region.

7. **Erimyzon oblongus** (Mitchill).

Abundant in the canal. A male 330 mm. long had three tubercles on each side of snout. Color in life: back, brownish, crossed by nine blackish saddles of about width of three rows of scales; sides, brown with silvery and golden shades; belly, silvery white; body scales margined

with light golden color; fins, reddish, narrowly margined with dusky black; dorsal, caudal and anal with dusky mottlings. McAtee and Weed (Proc. Biol. Soc. Wash., Vol. XXVIII, 1915, p. 10) state that the species is rare in river and canal.

8. **Moxostoma macrolepidotum** (Le Sueur).

Very abundant in canal in this region. Three examples ranged in length from 238 to 355 mm.

CYPRINIDÆ.

9. **Cyprinus carpio** (Linnæus).

Common in the canal. Two of the largest were 650 and 800 mm. in length. This species is very tenacious of life if handled in such a manner that the gills are not injured, but bleeds to death very quickly, even from a slight abrasion. Carp seined from the canal were not returned to the river but were saved by the seiners for food, the most of them to be salted for winter use. Fish thus taken were carried in sacks in a wagon during the day and in the evening were packed in a live car placed in the bed of a small stream, some of them being above the water level. The number that died under this treatment was surprisingly small.

10. **Carassius auratus** (Linnæus).

Not uncommon in the canal. Of eight examples examined, the largest, 300 mm. in length, was black and dull orange. One was a uniform bright red, the others dusky silvery.

11. **Hybognathus nuchalis** Agassiz.

Common in the canal, the largest being 105 mm. in length.

12. **Semotilus corporalis** (Mitchill).

Common in Little Seneca and Tenmile Creeks.

13. **Semotilus atromaculatus** (Mitchill).

No examples were taken in the canal. Three, 93 to 163 mm. long, were seined in a small rivulet near the canal. In Little Seneca and Tenmile creeks, the species is abundant. Examples taken in June ranged in length from 50 to 115 mm., and small examples taken in September were 40 to 45 mm. long.

14. **Notemigonus crysoleucas** (Mitchill).

Abundant in canal, especially at a point locally known as Buzzards Hole; none taken in upper stretches of Seneca Creek.

15. **Pimephales notatus** (Rafinesque).

Common in the canal; abundant in Little Seneca and Tenmile creeks.

16. **Notropis procne** (Cope).

Apparently rare in the canal.

17. **Notropis hudsonius amarus** (Girard).

Abundant in the canal.

18. **Notropis analostanus** (Girard).

Apparently rare in the canal and in Little Seneca and Tenmile creeks.

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

Very abundant in the canal, the largest being 92 mm. long. Two examples were taken in Tenmile Creek.

20. **Notropis cornutus** (Mitchill).

Abundant in Little Seneca and Tenmile creeks. Specimens taken in June ranged in length from 48 to 110 mm.

21. **Rhinichthys cataractæ** (Cuvier & Valenciennes).

Common in Little Seneca and Tenmile creeks. Examples taken in June may be grouped into two classes according to length, the first 24 to 27 mm. long, the second 66 to 82 mm. long.

22. **Rhinichthys atronasus** (Mitchill).

Abundant in Little Seneca and Tenmile creeks.

23. **Hybopsis kentuckiensis** (Rafinesque).

Several examples taken in the canal and in Tenmile Creek.

24. **Exoglossum maxillingua** (Le Sueur).

A single example taken in Tenmile Creek.

ANGUILLIDÆ.

25. **Anguilla rostrata** (Le Sueur).

Two examples from canal and one from Tenmile Creek.

DOROSOMATIDÆ.

26. **Dorosoma cepedianum** (Le Sueur).

Very abundant in the canal widewater above Rushville. Large schools were seen, more than a thousand adults being taken at a single haul of a 100 foot seine. The largest was 340 mm. long.

PŒCILIIDÆ.

27. **Fundulus diaphanus** (Le Sueur).

An adult taken in the canal below Violett's lock and a young example in a small pond above the lock.

PERCOPSIDÆ.

28. **Percopsis omiscomaycus** (Walbaum).

Very abundant in the canal at a point locally known as Buzzards Hole, the larger examples ranging in length from 85 to 126 mm. Although the canal was seined for a distance of about 6 miles above this point, no examples were taken at other points. The only other record for this species in the vicinity of Washington is that of Smith and Bean (Bull. U. S. Fish Com. for 1898, 1899, p. 185) from Rock Creek and Cabin John Run.

CENTRARCHIDÆ.

29. **Pomoxis annularis** Rafinesque.

Adults abundant in the canal widewater above Rushville. Over 1600 were rescued and liberated in the Potomac River. The largest one measured was 330 mm. long, but others which it is believed exceeded this length were seen. In over 100 examples examined the number of dorsal spines was 5 or 6, with two exceptions in which it was 7. McAtee and Weed (Proc. Biol. Soc. Wash., Vol. XXVIII, 1915, p. 12) state that this species and *P. sparoides* "are about equally common and occur both in the river and canal." Among the large number seined at this point, not a single example of the latter species was observed.

30. **Ambloplites rupestris** (Rafinesque).

Not uncommon in the canal. Examples from the point locally known as Buzzards Hole were of a very light silvery color, some of them showing scarcely any traces of black mottlings and with the size of the black opercular blotch greatly reduced. When placed in alcohol, these assumed the characteristic markings.

31. **Chænobryttus gulosus** (Cuvier & Valenciennes).

Abundant in the canal, more than 1,300 being rescued. Among those taken was an individual which appears to be a hybrid with *Lepomis gibbosus*. This has been described by the senior author (Copeia, No. 7, New York, June 20, 1914).

32. **Lepomis cyanellus** (Rafinesque).

Small examples abundant in the canal. This introduced species is rapidly gaining a foothold throughout the region about Washington, apparently preferring ponds, muddy, slow-moving streams, canals and the like.

33. **Lepomis auritus** (Linnæus).

Common in the canal and abundant in Little Seneca and Tenmile creeks.

34. **Lepomis gibbosus** (Linnæus).

Common in the canal. Over 3,000 of the three species of *Lepomis* were rescued in this region.

35. **Micropterus dolomieu** (Lacépède).

Common in the canal below Violett's lock, but greatly outnumbered above the lock by *M. salmoides*. According to local fishermen *dolomieu* greatly outnumbers *salmonoides* in the Potomac along this stretch of the canal, while farther up the river, below Harpers Ferry, the reverse is true. The feeder from the Potomac enters the canal below the lock and the small-mouthed bass may have entered in this manner, while above the lock the fish entered through a feeder from a point much higher up, where the large-mouthed bass predominates. Now that both species are being liberated in the Potomac in this region, this condition may be changed. Two examples were taken in Tenmile creek.

36. **Micropterus salmoides** (Lacépède).

Common in the canal above Violett's lock. As fast as the food fishes were seined from the canal, they were carried over the bank in buckets and liberated in the Potomac. One large bass, when released from the bucket in company with other varieties, instead of darting out into the river, seized and swallowed head foremost a small crappie which had been carried over with it. The fish did this within a few feet of the person releasing it. Over 1,100 bass (two species) were rescued from this section of the canal, many being adults.

PERCIDÆ.

37. **Perca flavescens** (Mitchill).

Not uncommon in the canal, mostly small.

38. **Boleosoma olmstedi** (Storer)

Not uncommon in the canal and in Little Seneca and Tenmile creeks.

39. **Etheostoma flabellare** (Rafinesque).

Abundant in the Little Seneca and Tenmile creeks.

SERRANIDÆ.

40. **Morone americana** (Gmelin).

Common and of large size in the canal widewater above Rushville. Over 600 were rescued.

COTTIDÆ.

41. **Uranidea gracilis** (Heckel).

Abundant in the upper waters of Little Seneca and Tenmile creeks. Specimens taken in June ranged in length from 22 to 85 mm.

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GENERAL NOTES.

NOTE ON THE INDIGENOUS RODENT OF SANTO DOMINGO.

Hitherto the only known specimen of the indigenous rodent of Santo Domingo has been the type, sent to Paris by Ricord, and described as a new genus and species, *Plagiodontia ædium*, by F. Cuvier in 1836.* The discovery of three left lower mandibles (one with dentition complete), a tibia, and part of a pelvis among some miscellaneous bones taken by W. M. Gabb from a kitchen midden in a cave on the shore of San Lorenzo Bay, Santo Domingo, 1869–71, is therefore of much interest.† Two of the mandibles represent adult individuals, while the third is not mature. Some of the measurements of the two adults (Nos. 200,411 and 200,412 U. S. National Museum) are: length from projection behind articular surface to posterior border of alveolus of incisor, 48, 50; depth through articular process, 24.0, 24.6; diastema, 11, 13; toothrow (alveoli), 19.0, 20.2; first lower molar (alveolus), 4.4 x 4.4, 5.0 x 5.0. In both of the adults the teeth were still growing from a basal pulp, so that the enamel pattern undergoes no change at successive levels from crown to base. The pattern is correctly represented by Cuvier (pl. 17, fig. 5); it is identical in character with that of *Adelphomys* from the Santa Cruz beds of Patagonia as figured by Ameghino ‡ and Scott.§ The upper cheek teeth as figured by Cuvier (pl. 17, fig. 4) are equally like those of a Santa Cruz specimen regarded by Scott (pl. 65, fig. 13) as representing the maxillary dentition of *Scleromys* Ameghino, a genus based on lower teeth differing widely from those of *Adelphomys* and *Plagiodontia*. The exact meaning of the discrepancies can not now be explained. These conclusions, however, seem justified: that *Plagiodontia* is not closely related to *Capromys*, and that the occurrence of these two genera and of *Amblyrhiza* in the West Indies during relatively recent times indicates the probability of a once-abundant Antillean representation of the Hystricine group.

—*Gerrit S. Miller, Jr.*

* Ann. Sci. Nat., Paris, ser. 2, vol. 6, p. 347.

† The cave and kitchen midden are described in Gabb's account of the topography and geology of Santo Domingo. Trans. Amer. Philos. Soc., n. s., vol. 15, pp. 146–147. 1873.

‡ Mam. Fos. Argent., pl. 6, fig. 3 c.

§ Rep. Princeton Univ. Exped. Patagonia, vol. 5 (paleont. 2), pl. 65, fig. 21.

REMAINS OF TWO SPECIES OF CAPROMYS FROM ANCIENT BURIAL SITES IN JAMAICA.

While the indigenous Antillean rodents of the genus *Capromys* are represented by several species in Cuba, only one, *C. brownii* Fischer, has hitherto been found in Jamaica. Two distinct members of the genus are each represented by a toothless mandible and two femurs taken from ancient burial sites near Salt River, Jamaica, by R. C. McCormack and now in the U. S. National Museum. One of these is identical with the known living Jamaican species. The other, differing from *Capromys brownii* in conspicuously smaller size (greatest length of femur without epiphysis about 56 mm. instead of about 68 mm., lower toothrow 16.4 instead of 19.4) and in the obviously reduced condition of the third lower molar, I am unable to distinguish from *C. thoracatus* (True) of Little Swan Island. Whether or not this apparent identity is due merely to the incompleteness of the individuals represented by the Jamaican specimens, and what such identity might mean should it ever be proved to exist, are questions that can not now be answered; but in any event the discovery of these smaller bones in Jamaica is an interesting fact.

—*Gerrit S. Miller, Jr.*

THE FIRST NEW ZEALAND CRINOID.

Prof. William B. Benham, of the University of Otago, Dunedin, New Zealand, has been so kind as to submit to me for determination the first crinoid ever discovered in New Zealand waters.

It was collected by Mr. Percy Seymour from a row-boat in about 15–20 feet of water at Preservation Inlet on the west coast of the South (or Middle) Island. Three specimens in all were secured.

Of the fauna of Preservation Inlet Professor Benham writes: "From the same locality some Hydrocorallines and Antipatharians were obtained, and a Pennatulid, all of which are 'Australian' in their affinities. The fauna of the west coast of New Zealand is little known, but it differs considerably from that of the east, south, or north coasts of the island. The west coast is difficult to get at and is only sparsely inhabited, and few of us naturalists have been able to collect there except very superficially and sporadically, as boats only visit Preservation Inlet very irregularly, and once there one never knows how long one might be compelled to stay, as there is no road across the forest clad mountains."

It is interesting to note that this crinoid belongs to a species characteristic of, and confined to, southern and southeastern Australia and Tasmania, *Comanthus* (*Cenolia*) *trichoptera* (J. Müller).*

The twenty-eight arms of the specimen sent by Professor Benham are 115 mm. long; the centrodorsal is large, thick-discoidal, the dorsal pole broad and flat, with the centre depressed; the cirri are XL-L, 24–27 (usually 26–27), 22 mm. to 25 mm. long.

The relatively long cirri, which are composed of more numerous segments than the cirri of the typical form, would appear to indicate that this specimen represents a recognizable variety, probably peculiar to New Zealand, for which I propose the name *Comanthus trichoptera* **benhami**. The type specimen is the property of the University of Otago.

—*Austin H. Clark.*

* See "Recent Crinoids of Australia," Sydney, 1911, p. 755.

IDENTIFICATION OF A SUPPOSEDLY ANOMALOUS ECHINODERM.*

In 1902 Dr. Hubert Lyman Clark described, under the title of "An Extraordinary Animal,"† a very curious creature, evidently an echinoderm, which he was unable to place satisfactorily. He says that "it probably is an echinoderm, but whether an echinoid or a holothurian I am unable to decide * * * The whole external appearance of the lower part of the animal is * * * quite similar to the body of the holothurians, *Sphærothuria* or *Echinocucumis*. But the spines when examined under the microscope appear more like echinoid spines * * * There can be little doubt that the specimen is a monstrosity, but of what? My own opinion is that it is a holothurian, related to *Sphærothuria*, but the spines and the 'digestive tube' (?) are very much like those of an echinoid.—The most puzzling question to me is, how did an animal with apparently no mouth or anus and no means of locomotion reach such a considerable size?"

The specimen is preserved in the U. S. National Museum (Cat. No. 19,899) and, as it seemed to me desirable to identify it positively if possible, I recently undertook an independent study of it.

As Doctor Clark's description is not quite accurate in certain details, I offer the following supplementary notes.

General Form.—The specimen is composed of two quite distinct portions, a larger, ovoid in outline with the greater diameter 13 mm. and the lesser 11.5 mm., in end view circular, 11.5 mm. in diameter; and a smaller, broken away on one side, consisting of a very irregular half cylinder with the ends more or less in-curved, measuring 12 mm. in length and 5.5 mm. in width, which is attached to one side of the larger part in the direction of the longer axiis, nearer the smaller than the larger end. The border of the larger part opposite the attachment of the smaller is slightly flattened.

Covering of the Larger Part.—The larger portion is entirely enclosed in irregular polygonal plates of various sizes, each of which bears from one to six (usually from one to three) jointed spines, and a few in addition a pedicellaria, which superficially resembles a short, small rounded-conical spine. The spines, most of which are broken, appear to be cylindrical, with a more or less abrupt conical tip. Within the area delimited by the smaller part and the missing portion the investment consists of a smooth pavement of very irregular polygonal plates which are somewhat smaller than those of the free wall.

Covering of the Smaller Part.—The smaller portion is composed, insofar as it is preserved, of six columns of narrow elongate plates which carry long spines, longer than the spines on the surface of the larger part, in a single median row, but no pedicellariæ. The six columns are webbed by perisome, which may carry a few additional plates. Extending laterally from the first and sixth of these columns are two horizontal rows of

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† Zool. Anzeiger, vol. **25**, 1902, pp. 509-511, fig. p. 510.

similar plates, the more distal of which lie about half way from the base to the outer edge of the entire smaller portion as viewed laterally. On both sides the surface is torn away in the angle between the outermost of the vertical columns, and the uppermost of the horizontal rows. To the left the horizontal rows terminate in a torn edge; to the right they become lost in a maze of plates similar to those of the surface of the larger portion.

Inner Structure of the Larger Part.—The larger portion is a completely enclosed sac, showing no evidence of communication either with the exterior or with the interior of the smaller portion. Within it I can find nothing but a thick irregular lining of connective tissue, on the surface of which is an elongate depression, evidently mistaken by Dr. Clark for the lumen of a digestive tube.

Inner Structure of the Smaller Part.—The interior of the smaller portion is mostly occupied by gonads, lying along its longer axis. But I also found a relatively large sac-like structure and part of another near the broken end of the columns.

Identification of the Specimen.—The features which offer the greatest possibilities for the determination of the specimen are (1) the arrangement of the plates on both the larger and the smaller portions, (2) the character and distribution of the spines, and (3) the character and distribution of the pedicellariæ.

The pedicellariæ are of the type found in the Brisingidæ.

The arrangement of the plates on the larger portion and the distribution of the spines and of the pedicellariæ on these plates, as well as the character of the spines, are identical with the same features in certain species of *Brisinga*.

The arrangement of the columns of plates in the smaller portion, and the character of these plates and of the spines which they bear, are exactly duplicated in the arm bases of certain species of *Brisinga*.

Furthermore the gonads, which are very *Brisinga*-like, lie in the same relation to these plates that they do to the dorsal arm plates of the species of *Brisinga;* and the sac-like structures are very like the rather large *Brisinga* ampullæ.

As all the tangible characters of the specimen are identical with comparable characters in the genus *Brisinga*, and are not duplicated in any other genus of echinoderms, least of all in the echinoids and holothurians, it seems evident that we are dealing with a large cyst-like outgrowth from the base of a *Brisinga* arm.

A large species of *Brisinga*, in its details agreeing perfectly with comparable features of the specimen, was taken at the same dredge-haul; furthermore, many of the specimens of this *Brisinga* bore cyst-like outgrowths on the arm bases containing a curious type of degenerate mollusc.

There can be not the slightest doubt that this supposedly anomalous echinoderm type is merely a detached cyst, with part of the dorsal surface of the arms and the underlying gonads, from the species of *Brisinga* dredged at "Albatross" Station 3342, from which the parasite has been removed. —*Austin H. Clark.*

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SIX NEW STARFISHES FROM THE GULF OF CALIFORNIA AND ADJACENT WATERS.*

BY AUSTIN H. CLARK.

The zoögeographic region which extends from Peru northward to and including the Gulf of California and the southern portion of the Pacific coast of the peninsula of Lower California is very remarkable not only on account of the relatively large number of peculiar genera which occur therein, but also because of the curious relationships which the endemic species show to others in southeastern Australia, the Hawaiian Islands, the Mediterranean, and the Caribbean Sea, in addition to their relationships with types occurring in Oceania and in the Malayan region.

A considerable amount of work has been done here, both by shore collectors and, in deep water, by the "Albatross"; yet it is clear that there is still a great amount to be accomplished, for many types which should occur here are as yet unknown, while others have not been seen since they were first recorded, some of them more than half a century ago.

Of the six species herein described *Sideriaster canaliculatus* is related, more or less closely, to *S. grandis*, known from a single specimen from the Gulf of Mexico; *Saraster insignis* is related to other types in the eastern north Pacific; *Anthenea mexicana* is related, though not very closely, to other species of the genus in Australia, India and China; *Narcissia gracilis* is related to two Atlantic forms, one of which occurs in the Gulf of Mexico; *Echinaster parvispinus* is related to other species of the genus in the Malayan region; while *Cyllaster seminuda* finds its nearest counterpart in the Hawaiian Islands.

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These new species will be figured and further discussed in a paper dealing with the fauna of the region based upon the recently determined material in the U. S. National Museum, where figures of such rare forms as *Acanthaster ellisii* (Gray) and *Leiaster teres* Verrill, which the Museum also possesses from the Gulf of California, will also be included.

FAMILY ASTROPECTINIDÆ GRAY.

Sideriaster canaliculata new species.

Five arms; R=64 mm.; r=19 mm.; R:r=3.4:1; width of ray at base (measured from the interradial line) 22 mm.; superomarginals 45.

General form stellate; disk medium sized; rays tapering evenly to a blunt extremity.

Gonads confined to the interradial portion of the disk, not extending out along the rays.

There are well developed superambulacral plates.

The paxillæ are closely placed, though not crowded, and are remarkably uniform in size, those adjacent to the superomarginals being only slightly smaller than those in the radial line of the arms, and the latter similarly only slightly larger than those in the center of the disk.

A large paxilla from the radial region at the base of the arms has a rather low thick stalk supporting a crown consisting of from six to ten (most commonly seven, rarely more than eight) stout blunt radiating spines, with frequently one or two (rarely more) additional much smaller and shorter spines between them, and from one to four (most commonly one or two) short stout round-tipped spines, resembling the radiating spines but shorter, at the summit. The radiating spines are about as long as the column of the paxilla is high.

The large prominent exposed madreporite is situated exactly midway between the center of the disk and the interbrachial margin. It is circular, 3.5 mm. in diameter, and bears numerous more or less complete septa extending from the periphery a greater or lesser distance toward the center. It presents a most striking similarity to a coral polyp.

Papulæ, regularly six about each plate, occur uninterruptedly across the arms.

The superomarginals are short and broad; in the interbrachial arc they are wedge-shaped, about half as long at the actinal as at the abactinal end, 5 mm. wide and 1 mm. long at the well rounded abactinal border; they are evenly curved, the arc of the curvature making an angle of about 60° with the plane of the disk; gradually they become more oblong and increase in length to the fifth and following, which have parallel sides and are noticeably larger than those in the interbrachial arc; on the arms they become more recumbent, lying mostly on the abactinal surface, though still with a uniform curve from the actinal to the abactinal border.

The superomarginals bear on their outer surface usually three (some-

times two or four) alternating rows of short stubby well spaced truncated spines which increase slightly in diameter from the base to the broad nearly flat tip, and are about as high as, or slightly higher than, their basal diameter; in the interbrachial arc there are about twelve of these spines to a row, and on the outer part of the arms eight or nine; those in the median row are slightly larger than those in the lateral rows. The channels between the superomarginals are filled with very numerous short very slender spinelets which are almost or quite concealed from view by the outermost rows of spines on their outer surface.

The line of union between the superomarginals and the inferomarginals is slightly sunken.

The inferomarginals correspond to the superomarginals, which in general they resemble; but in addition to the armature as described for the latter they possess on the outer border of the actinal surface, or more or less below the middle of the plate, a broad extremely flattened truncated spatulate spine from 1 mm. to 1.5 mm. in length, about half as broad as long or even shorter, increasing more or less in length from the base to the tip, with more or less convex sides. In the interbrachial arc there may be two or even three of these spines to a single inferomarginal; beyond the proximal third of the arm they become smaller, at the middle of the arm being but little larger than the short spines covering the outer surface of the plate, soon after disappearing altogether.

The actinal intermediate areas are moderate in size; the plates are arranged in regular series running from the inferomarginals to the corresponding adambulacrals; an unpaired line of plates runs from the mouth plates about half way to the marginals. A single series of actinal intermediate plates extends to the twentieth inferomarginal, a second to the twelfth, and a third to the seventh. These actinal intermediate plates are narrow, with deep channels between the rows which are filled with small slender spinules similar to, but fewer and coarser than, the spines filling the channels between the marginals. Each plate bears on its actinal surface usually from four to eight short truncated spines, similar to those on the marginals but more spaced, and of various sizes instead of uniform, or nearly uniform, size. All of the plates bordering the adambulacral and mouth plates, and a few of the others, bear pedicellariæ, usually with three or four jaws.

The adambulacral plates bear on their sharply angular furrow margin three broad and strongly flattened spines. The innermost of these, situated at the apex of the angle, is slightly recurved, and is flattened transversely to the furrow; the spines on either side of this are straight, slightly less broad, and the axis of their flattening is parallel with the edge of the plate so that they make an angle of 30° with the axis of flattening of the median spine, or of 60° with each other. Behind these is a row of two or three similar flattened spines, the axis of the flattening being parallel with the furrow; but one or both of the outer of these may turn more or less so as to form supplementary furrow spines, and the central one may become enlarged, especially toward the end of the ray. Beyond these is a row of two similar, but smaller spines. The grooves

between the plates are filled with slender spines resembling those in the grooves between the marginals.

The mouth plates are narrow; the furrow margin is short, with apparently five flattened spines which decrease in length outwardly and resemble those of the furrow series on the adambulacrals, but are more slender; the margin adjoining the adambulacrals bears five or six much shorter spines of diminishing length; just within these there are five or six longer and stouter spines, also of diminishing length. The sutural edge bears three or four long spines corresponding to and resembling those on the distal furrow margin, abruptly changing to a series of much smaller spines before the maximum width of the plate is reached. The edge bordering the adambulacrals bears very numerous short fine spines like those bordering the adambulacrals.

Color in alcohol, brownish yellow.

Type.—Cat. No. 36,951, U. S. N. M., from "Albatross" Station 2998, Gulf of California, in 40 fathoms.

Family BENTHOPECTINIDÆ Verrill.

Saraster new genus.

Genotype.—*Saraster insignis*, new species.

The characters of this genus are given in the description of the type species following.

Saraster insignis new species.

Five arms; R=100 mm.; r=10 mm. (actinally) to 12 mm. (abactinally); R : r=8.3 to 10 : 1; width of ray at base (between odd interradial marginals) 15 mm.; superomarginals 46.

General form stellate; rays broad at the base, tapering rather rapidly in the first quarter, much less rapidly from that point onward; odd interradial marginals are present in both series in all interradii.

The gonads reach the fifth or sixth superomarginal.

The pedicels have well developed, though small, sucking disks.

The interbrachial septum is very small, membranous.

The dorsal muscle bands are not attached to a proximal ambulacral ossicle.

There are no pedicellariæ.

The abactinal plates are strongly stellate, large and small intermingled, the large with a low tabulum. Each abactinal plate bears usually one, on the disk sometimes two, rarely three, long rough spines which have numerous longitudinal serrate ridges; in the center of the disk the spines may reach 5 mm. in length; along the mid-line of the arms they remain of the same length until the end of the basal quarter, though they become more slender; beyond this point, and along the sides of the arms, they are shorter and more slender, but the transition from the longer to the shorter spines is always very gradual. If there is more than one spine to a plate, they are usually of very different sizes. The plates of the disk

and arm bases commonly have from three to six very small spines of different sizes about the bases of the larger.

The papulæ are large, abundant, and conspicuous, occurring all over the abactinal surface to within 20 mm. of the tips of the arms; they are slightly smaller in the mid-radial line of the arms and in the center of the disk than elsewhere.

The madreporite is oval, measuring 4 mm. by 3 mm., the longer diameter radial; the surface is elevated, high, evenly convex, covered with numerous fine irregular ridges; its center is one-third of the distance between the odd interradial superomarginal and the center of the disk.

The odd interradial superomarginal is six sided; the abactinal and the two adjacent sides are of about the same length; the former is slightly concave, and the two latter are produced into a slight spine at the lower angles; the proximal border, adjoining the odd interradial inferomarginal, is about as long as the opposite side, straight, or slightly convex; the two lower lateral sides are about twice as long as the others, slightly concave. The abactinal surface of the plate within the outer face is produced into a rounded tubercle, not especially conspicuous, which bears on its outer side (not on its summit) a rough spine only slightly larger than the large spines of the disk, directed outward and more or less downward.

The superomarginals are low and long, mostly about twice as long as broad; the first is irregularly polygonal or quadrate, about as long as broad; the following are irregularly rhombic with the distal and proximal angles truncated; the suture between the adjacent superomarginals slants strongly inward, the abactinal end being more distal than the actinal. Each superomarginal bears in its upper two-thirds, springing from a common elevation, two slender spines, one directly above the other; the uppermost is the longer, resembling the long spines of the center of the disk but somewhat more slender; the lower is shorter and more slender; in the outer half of the arms the latter disappears. The common elevated base bearing these spines carries a few spinules.

The odd inferomarginal is elongated dorso-ventrally; the actinal third lies on the actinal surface, while the abactinal two-thirds stands almost vertically, forming with the corresponding superomarginal the side wall of the interbrachial arc. Viewed laterally the odd interradial inferomarginal appears six-sided; the actinal side, forming the border between the actinal and abactinal surfaces, is about twice as long as the other sides, which are all of equal length; that part of the plate which lies on the actinal surface is approximately semicircular, with two slight tubercles midway between the mid-radial point and the point of union with the adjacent inferomarginals. The plate bears a vertical median column of three slender spines of which the uppermost, situated in the center of the lateral surface, is 3 mm. long; the next, situated on the lateral surface just at the actinolateral border, is of about the same size; the third, situated just beyond the center of the actinal surface, is much smaller.

At first the inferomarginals are slightly displaced distally, but after the proximal fourth of the arm they correspond to the superomarginals; in the proximal fourth of the arm they resemble the superomarginals in

size and shape, but distally they are somewhat smaller. The upper border of the inferomarginals imbricates slightly over the lower border of the corresponding superomarginals. Each inferomarginal bears two spines, which are similar to those borne by the superomarginals.

The actinal intermediate plates are two (rarely three) in number, rounded, suspended in perisome just beyond the two tubercles on the inner border of the odd interradial marginals, or just distal to the outer angles of the mouth plates.

The adambulacral plates are slightly longer than broad; their distal and proximal borders are parallel, oblique, slanting adorally toward the furrow; the furrow border forms a prominent angle with a rounded apex and concave sides. The first adambulacral plate is separated from the odd interradial inferomarginal by the actinal intermediate plate; the second adjoins the first inferomarginal; the third lies across the suture between the first and second inferomarginals; from this point onward the adambulacrals, slightly more numerous than the inferomarginals, sometimes correspond, sometimes alternate, with them. The armature consists of two, rarely three, small slender spines situated side by side at the apex of the angle on the extreme inner edge well within the furrow; behind these, on the inner edge of the plate as viewed actinally, a much larger spine, resembling those on the inferomarginals, though very slightly smaller and less stout.

The mouth plates bear three long spines along the furrow which decrease rapidly in size outwardly; on the actinal surface of the plates, within the outermost of these, there is a single spine resembling the longest of the furrow series.

Color in alcohol dull gray, below white.

Type.—Cat. No. 36,895, U. S. N. M., from "Albatross" Station 2992, off Clarion Island, Lower California, in 460 fathoms.

Family GONIASTERIDÆ Forbes.

Subfamily Antheneinæ Fisher.

Anthenea mexicana new species.

Five arms; R=54 mm.; r=24 mm.; R:r=2.25:1; superomarginals 13 or 14.

Form stellate, with the interbrachial arcs and the tips of the rays well rounded. At the ends the arms are abruptly upturned so that the tips stand vertically.

The outline of the dorsal plates, which are flat and not tumid, is more or less concealed. These plates bear distinct, usually cylindrical, tubercles, which are arranged in regular rows parallel to the mid-radial line of the arms. The most prominent of these tubercles are in two rows, one on either side of the mid-radial line, about 3 mm. apart at the widest point, which run from a point half way between the center of the disk and the arm base almost to the arm tip; the slightly sunken naked area between these rows (occupying the mid-radial line of the arm) decreases very slightly in width toward the arm tip. Beyond these rows on either

side is another parallel row of somewhat smaller tubercles which runs from a point on the side of the interradial furrow half way between the center of the disk and the margin of the superomarginals to the level of the fourth or fifth superomarginal, where it disappears; these lateral rows are about as far from the median rows as the latter are apart. Beyond these long lateral rows on either side is a short lateral row arising on the border of the interradial furrow about two-thirds of the distance from the center of the disk to the superomarginals, and running to the level of the distal border of the second superomarginal.

Shallow, rather broad, furrows extend from the apical region of the disk to near the superomarginals; these are more or less petaloid in shape, and are 4 mm. in maximum diameter, half way between the center of the disk and the superomarginals; these furrows are bordered with a more or less irregular and indistinct row of tubercles, and carry within the groove three pairs of large low tubercles.

Many of the abactinal plates carry pedicellariæ which, however, seem to be absent from the arms.

The madreporic body is small, about 2.5 mm. in diameter, with rather coarse striæ.

The superomarginals decrease regularly in width to the arm bases, then remaining of practically the same width to near the ends of the arms; they are slightly tumid, and their surface is covered with well spaced, rather high, tubercular granules; except for a few of the terminal, each bears a pedicellaria.

The inferomarginals correspond to the superomarginals, which they resemble in all ways except in being slightly wider, and in not decreasing perceptibly in width until near the tip of the arms; all of them bear pedicellariæ.

The actinal intermediate plates are numerous, and are arranged in rows between the marginals and the adambulacrals; they bear very numerous well spaced globular tubercles; toward the periphery of the actinal surface these tubercles become smaller, and merge into the tubercles covering the inferomarginals. Nearly all of the actinal intermediate plates bear the characteristic pedicellariæ; these are largest on the plates bordering the adambulacrals, where they occur in a diagonal position, their long axis coinciding with that of the series of plates of which the plates bearing them are a part; further from the ambulacral grooves the pedicellariæ become smaller and more irregular in orientation, though most of them have their long axis parallel to that of the series including the plate which bears them.

The adambulacral plates are apparently about as long as broad; the furrow border is slightly curved; they carry five or six (usually five) furrow spines, graduated in height from the small and short outer to the long and stout strongly flattened central, which increase in diameter and end in a rounded tip. These plates, especially near the mouth, may carry a small pedicellaria on the proximal (adoral) border. Within the series of furrow spines there is a series of three stout spines, the central much the largest, parallel to the furrow; beyond this, and spaced from

it, there is a series of three much smaller and shorter spines, not greatly larger than the granular spines of the actinal intermediate plates, from which they are separated by a narrrow bare area.

The mouth plates have seven stout spines on the furrow border, which decrease very slightly in length; within the distal portion of the furrow border are two much stouter spines, and just within the apex another similar to these; along the inner margin of the plates is a row of five or six spines similar to these, but shorter.

Type.—Cat. No. 38,318, U. S. N. M., from the west coast of Mexico.

Family LINCKIIDÆ Perrier.

Narcissia gracilis new species.

Five arms; R=54 mm.; r=8.5 mm.; R: r=6.3:1; height to apex of abactinal region 7 mm.; width of arms at base 10 mm.

General form stellate, with long slender regularly tapering rays, upturned at the tip; the body is low, the maximum height being less than the diameter of the arms at their base; the arm section at the base is low, rounded triangular.

The center of the abactinal surface is occupied by a mass of plates of different sizes in which the primary plates can usually be distinguished. From this central mass of plates there runs down the mid-line of each of the arms a prominent series of elongate polygonal plates bordered on either side by a row of much smaller plates beyond which is another row of larger plates, which are nearly as large as the plates in the mid-radial series. At the middle of the arm the series of small plates on either side of the carinal series disappears, and the carinal series merges with the large plates of the series beyond, the three series combining to form a broad dorsal band of irregularly arranged subequal polygonal plates.

In the proximal half of the arm many, or most, of the plates in the carinal row and in the rows of larger plates on either side of it bear pedicellariæ, but these are absent in the outer half of the arm.

Between the rows of large plates on either side of the carinal series in the proximal half of the arm and the dorsal band of large plates in the distal half of the arm, and the superomarginals, there are five rows of plates decreasing very slowly in size from above (abactinally) downward; of these rows the lowest reaches only to the third-fifth superomarginal, the second reaches to the fifth-eighth, and the third reaches the eighth-twelfth; the fourth and fifth, distally becoming more or less irregular, persist nearly to the tip of the arm. The last thirteen-fifteen superomarginals are in contact with the mid-dorsal band of large plates.

The madreporite is small, circular, 1.5 mm. in diameter, situated midway between the center of the dorsal surface and the interbrachial angle.

The anus is rather prominent, excentric, protected by short stout spines.

Single papulæ occur in the angles between all the abactinal plates, excepting between the plates in the broad dorsal band in the distal half of the arm, where they are rare. There are no actinal papulæ.

Pedicellariæ are only exceptionally present on the smaller abactinal plates.

Superomarginals and inferomarginals large and prominent, of equal size, rounded oblong, slightly longer than broad, in the distal quarter of the arm becoming squarish and at the tip slightly broader than long. The two series correspond except at the upturned arm tip. As far as the distal third or fourth of the arm each superomarginal, and several of the inferomarginals, bears a delicate pedicellaria with two long and very slender jaws ending in a palmate tip which lies in a slit-like groove on the surface of the plate.

Intermarginal papulæ occur in the proximal half or two-thirds of the arms.

Between the inferomarginals and the adambulacrals there are several rows of actinal intermediate plates; the first of these, adjoining the adambulacrals, is composed of plates which at first are not much inferior to the latter in size, though in the outer half of the arm their size slowly diminishes; this row extends to the fifth or sixth inferomarginal from the end of the ray; most of the plates in the middle half of the row bear pedicellariæ like those of the marginals; above this is a second row of slightly smaller plates which extends to the seventh inferomarginal; a third row of still smaller plates reaches to the fourth inferomarginal, while above this last are two additional rows, one of which reaches the third, the other the second, inferomarginal; except in the first row none of these plates bear pedicellariæ.

The adambulacral plates are oblong, at first about twice as broad as long, decreasing slightly in length distally, and increasing again terminally; the plates in this series are separated from each other by prominent grooves. The furrow spines are four, becoming three in the distal half of the arm; they are triangular in cross section, the sharpest apex of the triangle being directed toward the center of the furrow border of the plate which bears them; the most proximal is the stoutest, and the two median are the most slender.

Beyond the furrow series there are three rows each composed of three short truncated spines which are triangular or polygonal in section; the innermost row, bordering the furrow spines, is somewhat curved, and is placed somewhat obliquely so that the distal end is nearer the furrow than the proximal; the spines of the outermost row are scarcely distinguishable from the granular investment of the body surface.

The mouth plates are triangular; each bears from seven to nine stout prismatic spines on the ambulacral border; on the common actinal surface of each pair there are from eight to ten stout prismatic spines which decrease in size outwardly.

The whole body is covered with closely packed fine hemispherical or polygonal granules which entirely conceal the outlines of the underlying plates; the only breaks in this granular covering are the papular pores and the narrow elongate grooves in which lie the pedicellariæ.

The color in alcohol is light yellowish, or dark brown.

Type.—Cat. No. 38,317, U. S. N. M., from "Albatross" Station 2829, off Lower California, in 31 fathoms.

FAMILY ECHINASTERIDÆ VERRILL.

Echinaster parvispinus new species.

Five arms; R=53 mm.; r=10 mm.; R:r=5.3:1.

The arms are robust, evenly tapering.

The abactinal plates are thick and heavy, but relatively small, arranged in three regular rows along the dorsal (abactinal) surface of the arms, with three additional irregular rows between the outermost of the dorsal rows and the superomarginals. The three dorsal rows of plates, which are about 2 mm. apart, form three rather prominent narrow and irregular ridges, and bear numerous short conical or cylindrical, sometimes capitate, jointed spines, usually two or three to a plate, which rarely reach 1 mm. in height, in an irregular zigzag series; in the carinal row there are about forty-five of these spines from the base to the tip of the arm.

The plates of the lateral rows are somewhat less regular in disposition, and are less elevated. The spines which they bear are more slender than the spines of the three median series, though not much smaller; this, combined with the lesser elevation of the plates, serves to make the lateral plates and spines noticeably less conspicuous than the median. The plates in these lateral rows are more numerous than those in the median, there being four in the former to three in the latter. In the lateral rows there is only one spine to a plate.

The center of the abactinal area bears scattered spines which are similar to those of the three median rows on the arms.

The madreporite is oval, about 2 mm. in the greater diameter, bearing short peripheral spines.

Papulæ are very abundant, in alcoholic specimens often appearing to form broad continuous lines which extend the whole length of the arms between the rows of spines. Single intermarginal papulæ may occur, especially toward the ends of the arms.

The superomarginals, which form a continuous band all along the arm, are irregular in shape, longer than broad; their spines, one to a plate, form a regular line all along the arm, and are similar in character to the spines on the plates above.

The inferomarginals proximally bear two (rarely three) spines similar to those of the superomarginals in a transverse series, these becoming reduced to one in the outer half of the arms.

In the actinal interradial areas only the spines of the inferomarginal series occur; these are commonly much reduced in size, and sometimes obsolete.

On the adambulacral plates the furrow series consists of three spines; the first of these is very small, recurved, situated on the inner face of the plate near the bottom of the groove; the next is nearly or quite twice as long, slender, situated half way up on the inner face, and the third is much stouter than the two preceding, situated on the inner border of the plate. Behind this third spine is another much smaller spine on the actinal surface of the plate.

Color in alcohol usually dark purplish or reddish brown, sometimes light pink.

Type.—Cat. No. 36,893, U. S. N. M., from "Albatross" Station 3021, Gulf of California, 14 fathoms.

Cyllaster new genus.

Genotype.—Cyllaster seminuda, new species.

The disk is very small.

The rays are slender (R=6r to 8.3r), usually subcylindrical, very flexible, usually arising somewhat abruptly from the disk; that is, there is usually a more or less straight, though short, interbrachial border.

The abactinal skeleton is more or less open, or aborted.

The papulæ are isolated, very large and conspicuous.

The marginal plates are more or less imperfectly developed and irregular, or absent altogether.

The adambulacral plates have from two to six sabre-shaped spines on the furrow face; the actinal surface is densely packed with from twenty to forty spines or spinules, all long, or one or two rows bordering the furrow long, the remainder short.

This genus is very closely related to *Henricia;* it includes, in addition to the type, *Cyllaster polyacantha* (Fisher), *C. clarki* (Fisher), and *C. pauperrima* (Fisher), all of which were originally described as *Henricia.*

Cyllaster seminuda new species.

Five arms; R=about 50 mm.; r=6 mm.; R:r=8.3:1.

The arms are very long, slender, approximately cylindrical, and very flexible; there are no marginals in either series.

The abactinal skeleton is very greatly reduced. A continuous line of very narrow elongate plates runs along the mid-dorsal line from the base of the arms to the tip; it does not extend onto the disk. Between this median line and the region normally occupied by marginals is a widely open, exceedingly irregular, meshwork of narrower and smaller plates; within the spaces between the narrow lines forming this meshwork are numerous granules. Exteriorly the plates and the granules bear numerous fine spines, those on the granules being usually one or two in number, though sometimes more, according to their size, those on the plates being irregularly distributed, on the mid-dorsal line showing a tendency to grouping. The skeleton becomes somewhat more dense at the arm tips. The disk and arm bases carry a few small detached plates and numerous spiniferous granules.

The interradial areas of the disk actinally have an irregular median column of very narrow plates which resembles the line of plates running down the midline of the arms, and numerous relatively large widely spaced granules, which become suddenly smaller and more numerous toward the abactinal surface.

Between the adambulacrals and the outer (actinal) border of the dorsal meshwork, covering the region normally occupied by the marginals, is a band occupied solely by very numerous minute spiniferous granules.

The madreporite is large, oval, with a few coarse irregular striæ situ-

ated on the border of the disk as viewed abactinally; it bears a few small spinelets about its border.

The papulæ are very large, abundant, and conspicuous, covering the dorsal surface of the disk and arms, and the lateral surfaces of the latter; on the sides of the arms they are arranged in regular diagonal lines; in the midradial region of the arms and on the disk their arrangement is irregular.

There are no traces of any plates between the adambulacrals and the actinal border of the dorsal meshwork.

The adambulacral plates at first are about twice as broad as long, becoming about as long as broad after the proximal third of the arm; each of these plates is separated from its neighbors by a distinct interval or suture.

The adambulacral plates bear within the furrow three long and very slender spines situated one above the other; on the furrow margin there are usually three longer and stouter spines, forming a furrow comb; these may be arranged with the central one in advance, or they may (more rarely) stand in a diagonal line with the outermost nearest the center of the furrow; the innermost spine on the furrow margin (whether the first or the second) is directly over the slender furrow spine. The typical arrangement seems to be, middle one in advance, proximal one slightly behind it, distal one considerably behind it. The middle one, which is larger than the others, is more or less sabre-shaped. The actinal surface of the plate is studded with small spinelets which are irregular in position.

The mouth plates are large and, owing to the absence of actinal intermediate, or other except adambulacral, plates, very conspicuous. The mouth spines are five in number, resembling the spines on the border of the adambulacrals. On the outermost angle, deep in the furrow, are two more spines, much smaller and more slender, of which the proximal is opposite the fifth of the furrow series, and the distal, which is slightly smaller, is situated slightly beyond. The inner half of the mouth plates is covered with small spinules, but the distal half is naked.

Color in alcohol brownish white.

Type.—Cat. No. 38,316, U. S. N. M., from "Albatross" Station 2993, off the Revillagigedo Islands, Lower California, in 364 fathoms.

Vol. XXIX, pp. 63–70 April 4, 1916

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE GENERIC STATUS OF CHRYSANTHRAX OSTEN SACKEN.

[BOMBYLIIDÆ, DIPTERA.]

BY J. R. MALLOCH.

The subgenus *Chrysanthrax* was erected by Osten Sacken for the reception of *Anthrax fulvohirta* Wiedemann and three allied species.* Subsequently the genotype was fixed by Coquillett as *fulvohirta*, a species widely distributed throughout North America.† The characters used by Osten Sacken in defining the subgenus, while rather minute and apparently trivial, appear to be correlated with characters of the pupa that warrant the acceptance of them as of generic value. According to the definition of Osten Sacken the distinguishing characters of the imagines are the fulvous pile on the thorax, and often a golden-fulvous tomentum on the abdomen; the dark brown antero-proximal half of the wings—without any paler aureoles on the cross veins within the brown; the punctiform contact of the fourth posterior and discal cells; the smooth tibiae; the tapering and indistinctly jointed front tarsi, beset on both sides with delicate erect hairs; the small front claws; the cone-shaped third antennal joint, merging into a style; the short conical face, etc.

Through the kindness of Mr. Otto Swezey, of Honolulu, I have been able to examine the empty pupal skin of a specimen of *fulvohirta* reared as a secondary parasite from *Elis sexcincta*, a primary parasite of white-grubs. This pupa presents charac-

* Biol. Cent. Amer., Vol. 1, 1886, p. 121.

† Type Species of North American Diptera, Proc. U. S. Nat. Mus., Vol. 37, 1912, p. 523.

ters that appear to me quite sufficient to warrant the generic separation of *Chrysanthrax* from *Hyalanthrax*, and very probably there are just as good characters available in the pupae of the other so-called subgenera which are as yet unknown in the pupal stages. It is necessary to indicate that in my paper, recently published, on this group I retained the generic name *Anthrax* for the two species of *Hyalanthrax* therein described—*hypomelas* and *lateralis*.* These two species and another that I have since obtained are primary parasites, and in this respect differ from *fulvohirta*, but I do not purpose suggesting that the species be separated generically on this account. There is in the structure of the head capsule of the two species a very great difference, and it is upon this character that the groups are entitled to generic and not subgeneric separation. The number and strength of the thorns which are present upon the head capsule of pupae of different genera of Nematocera, or the armature of the thoracic and abdominal segments are indices in great measure of the pupal habitats of the species that bear them. The cephalic spines are not only shields or sheaths for the antennae or other cephalic appendages, but are retained and used as instruments to assist in the work of emerging from the ground or other habitat—a process undertaken by the imago of this group before it leaves the pupal skin. In the paper just cited I have stated that I consider the absence of cephalic armature in the Tahanidæ and its presence in the Asilidæ to be due to the fact that the former are normally present only in soil that is damp or sandy and easily penetrated, while the latter (*Asilus et al.*) are almost invariably found in soil that is dry and much more compact. There is, therefore, a greater need for strong armature on the head in Asilidæ than there is in Tabanidæ, though both have abdominal locomotor spines. It is probably unnecessary for me to emphasize this fact further, but it may be of interest to restate the fact that the pupae of the Cyrtidæ have neither cephalic armature nor abdominal spines, neither being requisite for the emergence of the imago as the larvae are parasitic in spiders; and it is certainly interesting to discover that there is in conjunction with the different larval hosts of the species of *Chrysanthrax* and *Hyalanthrax* a coincident difference in pupal

* Bull. Ill. State Lab. Nat. Hist., Vol. XI, Art. 4, 1915, pp. 332-334.

structure. All three species of the latter genus that I have seen are internal primary parasites in lepidopterous or coleopterous larvae which do not spin tough cocoons, and all of them have the cephalic armature very similar, consisting of a pair of stout upper processes—which are contiguous at base and have the apices somewhat flattened but not thorn-like—a small lateral tubercle, and a similar small one on the central line near the lower margin. On the other hand, *Chrysanthrax fulvohirta* is parasitic upon a hymenopteron that spins a very tough cocoon, and in order that the imago of the fly may emerge therefrom it has the cephalic armature adapted to the purpose of cutting its way out. The upper pair of processes are widely separated at base and are thorn-like, their apices being sharp and slightly downwardly directed; the lateral thorn is about as large as either of the upper pair and of similar structure; the pair on the central line near the lower margin are similar to those of *Hyalanthrax*. It will be seen from the foregoing that the differences in the pupae are quite as great as are those between other genera in this family and even more distinct than the differences between some of the genera in Asilidæ.

I give herewith a synopsis of the difference between the pupae of the genera of Bombyliidæ known to me, and descriptions of those which I have not previously dealt with. The great majority of the pupae of this family may be distinguished at a glance from those of Asilidæ, which they most nearly resemble, by the armature of the body. The Asilidæ known to me have invariably the transverse abdominal armature in the form of stout spines which are usually alternately large and small in each series. In all the pupae of Bombyliidæ which I have seen this armature consists of very short, flattened thorns which are occasionally reflexed at bases and apices, and usually appear to be attached to, rather than a part of, the segment upon which they are located. Another character that at present seems to be of great value in separating the families is found in the structure of the lateral cephalic thorn (antennal sheath). In Asilidæ this consists of three to five thorns on a common base; in Bombyliidæ, either of a single thorn, which may be very small, or of two distinctly separated thorns.

KEY TO GENERA AND SPECIES.

1. Upper pair of cephalic processes thorn-like, widely separated at bases; lateral cephalic process or processes long, thorn-like . . . 2
— Upper pair of cephalic processes stout, not thorn-like, contiguous for the greater portion of their length; lateral cephalic process small, tubercle-like 7
2. Antero-lateral margin of head with a single long thorn 3
— Antero-lateral margin of head with 2 long thorns, the bases of which are contiguous 4
3. The transverse series of short thorns on abdominal segments 2–4 with their bases and apices turned up at right angles; labrum unarmed . . . . . * *Spogostylum anale.*
— The short thorns in transverse series on segments 2–4 turned up at apices only; labrum with a bifid thorn near apex . . . . . *Chrysanthrax fulvohirta.*
4. The short, stout thorns on abdominal segments turned up at bases and apices . . . . . *Exoprosopa fasciata?*
— The short, stout thorns on abdominal segments turned up at apices only 5
5. Transverse armature of first abdominal dorsal segment consisting of a series of short, stout thorns on middle portion, and a number of long, slender, closely placed hairs on each side . . . . . *Exoprosopa fascipennis.*
— Transverse armature of first abdominal dorsal segment consisting of a few widely placed hairs, the middle portion either entirely bare or with very slight indications of small tubercles which do not appear as distinct thorns 6
6. Lower one of the pair of lateral cephalic thorns simple apically, but with a small wart-like protuberance at base on lower surface, the small wart bearing 2 distinct hairs; wings without discal protuberances . . . . . *Sparnopolius fulvus.*
— Lower one of the pair of lateral cephalic thorns with a short subapical protuberance, the apex of thorn turned upward, base simple; wings each with a pair of protuberances, one about one-fourth from base and the other near middle . *Anastoechus nitidulus.*
7. Eighth ventral abdominal segment without hairs on disc . . . . . *Hyalanthrax hypomelas.*
— Eighth ventral abdominal segment with hairs on disc 8
8. Eighth ventral abdominal segment with 2 hairs on each side of disc; distance from the pair of thorns on lower central portion of head to apex of basal portion of sheath of mouth parts about 4 times as great as distance from the latter to apex of proboscis . . . . *Hyalanthrax lateralis.*
— Eighth ventral abdominal segment with 10–12 long hairs on disc; distance from the pair of thorns on lower central portion of head to apex of basal portion of sheath of mouth parts about twice as great as distance from the latter to apex of proboscis . . . . . *Hyalanthrax alternata.*

* This genus name has been emended to *Spongostylum* by some European authors. (See Verrall, "British Flies," Vol. 5, 1909, p. 517.)

DESCRIPTIONS OF PUPAE.

Chrysanthrax fulvohirta Wiedemann.

Anthrax fulvohirta Wiedemann, Dipt. Exot., 1821, p. 149.
Chrysanthrax fulvohirta (Wiedemann) Osten Sacken, Biol. Cent. Amer., Vol. 1, 1886, p. 122.

Length, 13 mm. Whitish testaceous, slightly shining, cephalic and abdominal thorns dark brown. Head with six strong thorns, the upper 4 stout, the lower central pair more slender and shorter; the hairs above bases of thorns stronger than normal; lateral view of head as in Figure 14, anterior view as in Figure 13; basal section of sheath of mouth parts (labrum) with a bifid thorn near apex. Thoracic spiracle distinct, its margin formed of small bead-like swellings, the open side (i. e. the break in circle) directed backward; discal hairs on thorax long and strong, 4 in number and in the normal positions; wing with a small subcostal protuberance about one-third from base; wings extending to middle of second ventral abdominal segment; mid legs extending beyond wings as far as apex of fourth tarsal joint; hind legs extending beyond wings as far as apex of second tarsal joint; the tip of tarsi reaching to apex of fourth ventral segment; surface of thorax smooth. Abdomen with spiracles well defined, similar in form to those of thorax, the open side directed forward; first dorsal segment with 6 long bent hairs on each side of disc, the central portion without short thorns; transverse armature of second dorsal segment consisting of rather closely placed, short, stout thorns which are reflexed at apices, do not extend to lateral margins and, except in central portion, are interspersed with long fine hairs which are carried to lateral margin; thorns progressively weaker and more widely placed on the following segments, and the hairs more numerous and rather longer until on the seventh segment they alternate with the thorns; eighth segment with 3 short thorns and 4 long hairs; lateral margin (post-spiracular) of first segment with 7–8 long stout hairs, those on segments 2–7 more numerous and weaker; eighth segment with 4–5 hairs; ventral segments 2–7 each with a median transverse series of long hairs, each series with distinct but short interruption at middle; eighth segment without discal hairs; apical segment as in Figure 12, the lateral apical margins tridentate, the teeth or thorns progressively stronger from lower to upper.

The specimens from which the description is drawn was sent me by Mr. Otto Swezey. It was obtained at Urbana, Ill., April 25, 1914, by Mr. G. N. Wolcott, at which time it was still inside of the cocoon of *Elis sexcincta*, a primary parasite of *Phyllophaga* (*Lachnosterna*) spp. Mr. Swezey has recorded the occurrence of *fulvohirta* as a secondary parasite on *Elis*. The species is common throughout the greater portion of the United States and is represented in the collection here by specimens from the following Illinois localities: Havana, Dubois, St. Francisville, Meredosia, Topeka, Muncie, Jonesboro, Quincy, Pekin and Metropolis. The dates range from the beginning of August till September 19. There is

also in the collection a specimen from Westville, N. J., taken August 23. The southern range of the species extends into Mexico and Florida.

Anastoechus nitidulus Fabricius.

Bombylius nitidulus Fabricius, Syst. Antl., 1805, p. 132.
Systoechus nitidulus (Fabricius) Schiner, Fauna Austr., Vol. 1, 1862, p. 63.
Aanastoechus barbatus Osten Sacken, West. Dipt., Bull. U. S. Geol. and Geogr. Surv., Vol. 3, No. 2, 1877, p. 252.

Length, 8.5 mm. Whitish testaceous, slightly shining, cephalic and abdominal thorns dark brown. Cephalic armature consisting of 8 strong thorns, the upper pair widely separated, their apices acute; lateral pair on a slight eminence, the lower one boot-shaped at apex; central pair on lower margin as long as the other pairs, their bases swollen and fused; lateral view of head as in Figure 3, anterior view as in Figure 2; proboscis extending to apex of wings, slightly tapering from base to apex. Surface of thorax irregularly reticulated; spiracle of moderate size, margin raised; discal hairs weak (only one—that above anterior portion of wing-base—visible in specimen); a small, sharp, ridge-like tubercle at base of wing and two slight swellings on the disc, one about one-third from base and the other about one-third from apex, the former near costa, the latter on median line; wings extending to middle of third ventral segment of abdomen; hind tarsi extending to middle of fifth. First dorsal abdominal segment with one or two short hairs laterally and a few very weak, indistinct, widely placed thorn-like elevations on central part of the transverse series; segments 2–8 each with a very regular transverse series of short, stout thorns which stand almost upright and are interspersed with weak and exceptionally short hairs; spiracles small but distinct: post-spiracular area of first segment with 5–6 very stout and moderately long hairs; the post-spiracular hairs on other segments weak and rather short; ventral segments except the eighth each with 3 hairs on each side of median line in a transverse median series; apical segment on each side with a strong upwardly turned thorn above and a small backwardly directed one below, as in Figure 1.

The specimen from which the foregoing description was drawn was sent me by Mr. Hyslop, of the U. S. Bureau of Entomology. The pupa was obtained under a stone at Wilbur, Washington, in the Big Bend country of that State. The larval habits are unknown.

The species was originally described from Europe and was re-described by Osten Sacken from America. The synonymy is according to Coquillett, who decided from an examination of American and European examples that the species are identical. Judging from published records the species occurs in the west more commonly than in the east. The following States are mentioned by Aldrich* as those in which it is known to occur: Wyoming, Colorado, California, Massachusetts, and New Mexico.

* Cat. North Amer. Dipt., 1904, p. 237.

Hyalanthrax alternata Say.

Anthrax alternata Say, Jour. Acad. Nat. Sci. Phil., Vol. 3, 1823, p. 45.
Anthrax consanguinea Macquart, Dipt. Exot., Vol. 2, Pt. 1, 1841, p. 69.
Anthrax scrobiculata Loew, Berl. Ent. Zeitschr., 1869, p. 24.
Anthrax stenozona Loew, Berl. Ent. Zeitschr., 1869, p. 25.
Hyalanthrax stenozona? Osten Sacken, Biol. Cent. Amer., Vol. 1, 1886, p. 138.

Length, 15 mm. Whitish testaceous, slightly shining, cephalic and abdominal thorns dark brown. Upper pair of cephalic processes very stout, contiguous for the greater portion of their length, their apices flattened and truncate (Fig. 7); lateral processes much larger than in *lateralis* and more slender than in *hypomelas* (Figs. 9, 10, 11); distance from base of ventral thorns on lower margin of face to apex of first section of sheath of mouth parts less than twice the length of the apical part of the latter (Fig. 4), the corresponding distance in *lateralis* and *hypomelas* differing from that in *alternata* as shown in figures 5 and 6. In the armature of the abdomen *alternata* differs from *hypomelas* and *lateralis* in the complete transverse median series of hairs on the eighth ventral segment, these hairs being absent in *hypomelas*, and *lateralis* having but two on each side. Lateral view of apical abdominal segment as in figure 8.

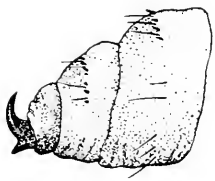
I have before me two pupae of *alternata*, one received from J. J. Davis and the other from J. A. Hyslop, both of the U. S. Bureau of Entomology. The example sent by Davis is that of a specimen reared from a lepidopterous pupa; the one from Hyslop is that referred to by him in a recent paper * on the life history of *Meracantha contracta*, in the larvae of which the species is parasitic.

The three species of this group that I have examined are very closely allied and are readily distinguished from other Bombyliidæ known to me by the stout upper cephalic processes, which are closely contiguous at base, and by the very small size of the lateral cephalic processes and their close approximation to the central line of the head, their bases being but little farther from that line than are those of the upper pair.

* Psyche, Vol. 22, 1915, p. 41.

EXPLANATION OF PLATE I.

Fig. 1. *Anastocchus nitidulus*, lateral view of apex of pupa.
Fig. 2. *Anastocchus nitidulus*, front view of head of pupa.
Fig. 3. *Anastocchus nitidulus*, lateral view of head of pupa.
Fig. 4. *Hyalanthrax alternata*, front view of mouth parts of pupa.
Fig. 5. *Hyalanthrax hypomelas*, front view of mouth parts of pupa.
Fig. 6. *Hyalanthrax lateralis*, front view of mouth parts of pupa.
Fig. 7. *Hyalanthrax alternata*, dorsal view of upper cephalic processes of pupa.
Fig. 8. *Hyalanthrax alternata*, lateral view of apex of pupa.
Fig. 9. *Hyalanthrax hypomelas*, lateral cephalic process from below.
Fig. 10. *Hyalanthrax lateralis*, lateral cephalic process from below.
Fig. 11. *Hyalanthrax alternata*, lateral cephalic process from below.
Fig. 12. *Chrysanthrax fulvohirta*, lateral view of apex of pupa.
Fig. 13. *Chrysanthrax fulvohirta*, front view of head of pupa.
Fig. 14. *Chrysanthrax fulvohirta*, lateral view of head of pupa.



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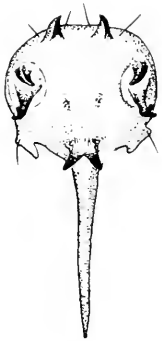

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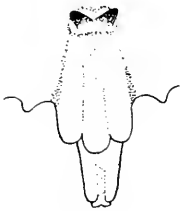

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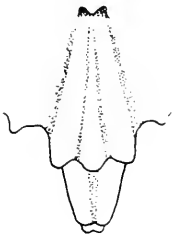

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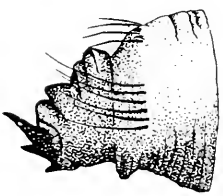

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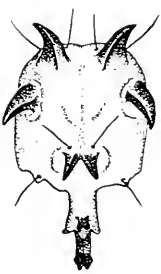

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW SUBSPECIES OF THE AMERICAN LEAST TERN.

BY EDGAR A. MEARNS.

The least tern, *Sterna antillarum* (Lesson) was described from Guadeloupe Island, West Indies, in the year 1847. The Pacific Coast form has apparently never been recognized and is here described as follows:

Sterna antillarum browni new subspecies.

BROWN'S TERN.

Type-specimen.—Adult male, Cat. No. 134,773, U. S. Nat. Mus.; collected on its breeding-ground, near Monument No. 258, Mexican Boundary Line, on the edge of the Pacific Ocean, in San Diego County, California, July 12, 1894, by Edgar A. Mearns. (Original number, 11,259.)

Subspecific characters.—Slightly smaller than *Sterna antillarum antillarum* (Lesson), from which it also differs as follows: Black of crown prolonged backward in an occipital crest which occupies the middle of the upper neck; three outer primaries usually black except on the inner border of their inner webs; upper parts darker gray; under parts more grayish (less pure white); bill usually more narrowly tipped with black, often without any.

Measurements.—Type (taken by the author from the fresh specimen).—Length, 228 mm.; alar expanse, 522; wing, 181; tail, 78; culmen (chord), 29.5; tarsus, 16; middle toe, together with its claw, 16. Average measurements of three adult male topotypes (skins).—Wing, 166; tail, 75.7; culmen, 28.2; tarsus, 14.3; middle toe, 12.2. Averages of two adult female topotypes (skins).—Wing, 166.2; tail, 75; culmen, 24.5; tarsus, 14; middle toe, 11.5.

Measurements of Sterna antillarum antillarum (Lesson).—Averages of nine adult males from the Atlantic shores of the United States (skins).—Wing, 168.1; tail, 82; culmen, 28.8; tarsus, 14.6; middle toe, 12.9. Averages of ten adult females from the Atlantic coast of the United

States (skins).—Wing, 162.3; tail, 71.2; culmen, 27.3; tarsus, 14.8; middle toe, 12.2.

Remarks.—This form is named in honor of Mr. Edward Johnson Brown, who has contributed so largely to the collection of birds in the United States National Museum, from both the Atlantic and Pacific coasts of North America.

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PROCEEDINGS

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TWO NEW SALAMANDERS OF THE GENUS DESMOGNATHUS.

BY E. R. DUNN.

Haverford College.

The following descriptions of one new species and one new subspecies of *Desmognathus* are published in the course of a revision of the genus now in progress.

Desmognathus monticola sp. nov.

Type from Elk Lodge Lake, near Brevard, North Carolina, altitude about 3000 feet; No. 38,313, adult male, U. S. National Museum; collected July 13, 1908, by Ronald and Emeline Tipping.

Diagnosis.—Vomerine teeth always present. Parasphenoid teeth usually confluent anteriorly. Legs stout, 3 intercostal spaces between appressed toes of adult. A distinct color pattern. Belly uniform, usually light. Transformed specimens, total length, 30–135 mm.; length of head and body, 17–64 mm.

Description.—The vomerines form two short slightly arched series which approximate each other in the median line. The parasphenoids are usually confluent in front. They are long narrow series and are well distant from each other save in front. Their distance from the vomerines is about equal to the length of one of the vomerine series. The relative shape of the tail is about as in *fusca;* the relative length is greater; it is not flattened as in *quadramaculata*. The legs are stout. In young specimens the appressed toes are separated by 2 costal interspaces, in adults by 3. The length of the head is from 4–4½ in the length of head and body. The head width is from 5–6 in the length of head and body. This is the second largest form of the genus with medium head and body, long tail and medium legs. The skin of the head is sometimes rugose as in *quadramaculata*. The costal grooves are 13–14. There is always a tubercle in the anterior angle of the eye.

The color of this form is much like that of *fusca*, but shows certain

differences. The light dorsal spots are smaller and more heavily outlined with dark. They do not break up until the animal is practically mature and the dorsal color is almost black, whereas in *fusca* it is seldom even in the smallest specimens that they have not coalesced into a light dorsal band. When these spots do coalesce in *monticola* portions of the dark outline are left as conspicuous dark spots on the generally pale dorsal band. The ventral coloration is practically uniform and lacks all trace of the mottling so conspicuous in *fusca*. The sides are not mottled as in *fusca*, but the dark lateral band merges gradually into the pale ventral surface. In the young the ventral surface is unpigmented. A uniform pigmentation gradually encroaches on the belly from the sides inwards and from behind forwards, so that the last unpigmented part of the ventral surface is between the fore legs. Eventually the whole belly is uniformly and lightly pigmented. In some specimens this pigmentation is fairly dark, never however becoming as dark as in *quadramaculata*. In comparing *monticola* with the latter it should be remembered that *monticola* usually retains traces of the dorsal pattern and never has the light lateral band so characteristic of young and medium *quadramaculata*.

The only sexual difference discernible in this form is the very slightly more flexuous outline of the jaws in the male.

Remarks.—This animal is between *fusca* and *quadramaculata*, with which two species it has been hitherto confused. Although very closely related to *fusca*, it does not seem to intergrade with it in the mountains of Virginia and West Virginia where they occur together. So far as known *fusca* does not occur in the mountains of North Carolina.

Distribution.—From Clarke County, Virginia, and Greenbrier County, West Virginia, south in the Alleghanies to Brevard, North Carolina, and probably into Georgia. Zonal range, Transition and Canadian. Vertical range, 500–4500 feet.

Specimens examined.—Sixty-three, from localities as follows: *North Carolina:* Brevard (type locality), 21; Burnsville, 1; Spruce Pine-Micaville, 1; Cane River, 3; Blantyre, 2; Sunburst, 3; Joanna Bald, near Andrews, 1; Tatula Mt., near Highlands, 1. *Virginia:* Berry's Ferry, Clarke County, 1; Hanging Rock, Clarke County, 8; Clarke County, 1; Delaplane, 2; Stony Man, 1; Augusta County, 2. *West Virginia:* Greenbrier County, 2; Baileysville, 2; Star Creek, 2; Horsepen Creek, 1; Big Stony Creek, near Barger's Spring, 1.

Desmognathus ochrophæa carolinensis subsp. nov.

Type from spring near top of Mt. Mitchell, North Carolina, altitude "over 6500 feet"; No. 31,135, male adult, U. S. National Museum; collected October 5, 1902, by Brimley and Sherman.

Diagnosis.—Similar to *ochrophæa*, but larger, with dark belly, and with a tubercle canthus oculi. Transformed specimens, 44–113 total length; length of head and body, 24–54 mm.

Description.—The vomerines are always present in the female. Males lose them at a total length of 65–75 mm. The vomerines form a short, scarcely arched series, containing 5–6 teeth. The series are separated from the nares by two-thirds the length of one of them, from each other by one-fourth length, and from the parasphenoids by one length. The parasphenoid series are separate for their whole length. The mandibular dentition is as in *ochrophæa*. The teeth in the male lower jaw are large, and are confined to the part anterior to the eye. The outline of the jaw is very strongly flexuous in the male. The female has a more flexuous outline of the jaw than the female of *ochrophæa*. The tail usually shows no trace of a dorsal keel, but is cylindrical throughout, and marked by strong segmented grooves, as is the tail of *Plethodon erythronatus*. The tail is quite long proportionally, being frequently longer than the head and body. The tail of the female is longer than that of the male. Males reach a larger size than do females. The number of costal interspaces between the appressed limbs is four. The head length is from 4–4½ in the length of head and body. The head width is from 5½–6 in the length of head and body. The skin of the head is finely rugose as in many specimens of *quadramaculata* and *monticola* from the North Carolina mountains. The tubercle canthus oculi is uniformly present.

The color of this form is variable. Old specimens are uniformly black. As a rule the dorsal pattern is intermediate between that of *ochrophæa* and that of *fusca*. That is, there is a very dark lateral band but the back shows traces of an original series of dorsal light spots. The blackness of the sides of the tail is as characteristic of this form as of *ochrophæa*. Unlike *ochrophæa*, the belly of *carolinensis* becomes black with age.

Remarks.—Although very close to *ochrophæa* and probably intergrading with it in the mountains of northern West Virginia, this form tends toward the other species of the genus. The presence of the tubercle canthus oculi and the darkness of the belly are both characters in which it diverges from *ochrophæa* and towards the other species of the genus. The color of the dorsal surface is usually more like that of the other forms, although some specimens from the type locality show a dorsal pattern exactly like *ochrophæa* from Pennsylvania. Cope (1889) mentions this form as a variety of *ochrophæa* on page 194 of the "Batrachia of North America."

Distribution.—From Beverly, West Virginia, south in mountains to Gwinnett County, Georgia. Canadian zone. Vertical range, 2500–6500 feet.

Specimens examined.—Sixty-one, from localities as follows: *Georgia:* Gwinnett County, 1. *North Carolina:* Mt. Mitchell (type locality), 19; Cane River, 6; Yancey County, 1; Roan Mt., 8; Blantyre, 2; Highlands, 2; Wayah Bald, 2; Tatula Mt., 1; Andrews, 1; Henderson County, 1; Haywood County, 11. *Tennessee:* Roan Mt., 7. *West Virginia:* Big Spring River, 3; Rich Mt., near Beverly, 1.

MEASUREMENTS.

(Head from tip of snout to gular fold; tail from posterior angle of vent.)

D. monticola (type series).

No. U. S. N. M.	Total length.	Head.	Body.	Tail.	Sex.	Vomerine teeth.	Number of costal interspaces between appressed toes.
38,313*	116	13	45	58	♂ad.	3–3	3
38,314	91	12	45	34	♀ad.	5–5	3
38,315	100	12	31	49	♂	4–4	3
38,316	75	13	44	18	♂ad.	3–3	3
38,320	58	7.5	27.5	23	juv.		2
38,321	63	7.5	25.5	30	juv.		2
38,323	46	7	19	20	juv.		2
38,324	36	5.5	14.5	16	juv.		
38,325	34	5	14	15	juv.		
38,326	31	5	12	14	juv.		

D. o. carolinensis (type series).

No. U. S. N. M.	Total length.	Head.	Body.	Tail.	Sex.	Vomerine teeth.
31,133	51	7	22	22	juv.	
31,134	44	6	18	20	juv.	
31,135*	102	11.5	40.5	50	♂ad.	lacking
31,136	82	10	33	39	♀ad.	4–4
31,137	65	8	24	32	♂imm.	4–4
31,138	59	7.5	21.5	29	♀imm.	6–6

* Type.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON QUAMASIA WITH A DESCRIPTION OF A NEW SPECIES.

BY C. V. PIPER.

The liliaceous genus *Quamasia* Raf. (*Camassia* Lindl.) consists of a small number of species mostly from the region west of the Rocky Mountains. Economically two or more of the species have been important to the Indians for food, the bulbs being well known under the name "Camas." Several of the species are cultivated as ornamentals, particularly in Europe.

The characters by which the species are defined are often obscure in herbarium material. A recent study of that which has accumulated in the United States National Herbarium, necessitated by some unusually interesting specimens collected by Mr. W. C. Cusick near Roseberg, Oregon, indicates that it may be necessary to recognize several additional species. There is need, however, of careful field study and good suites of specimens before this can be done with assurance.

In the mean time notes on certain differences observable in herbarium material may be useful to field botanists who may have opportunity to determine the taxonomic value of these characters.

Quamasia angusta n. comb.

Scilla angusta Engelm. & Gray, Bost. Jour. Nat. Hist. 2:237. 1845.
Camassia fraseri angusta Torr. & Gray, Pac. R. Rep. 24:176. 1855.

This plant seems to differ constantly from *Q. esculenta* (Ker) Coville in the nervation of the perianth segments, each being 3-nerved while they are 5-nerved in *Q. esculenta*. The constancy of this character and the difference in range point to the plant being specifically distinct. *Quamasia angusta* is confined to Texas.

Quamasia leichtlinii (Baker) Coville, Proc. Biol. Soc. Wash. 11:63. 1897.

Chlorogalum leichtlinii Baker, Gard. Chron. n. ser. 1:689. 1874.
Camassia esculenta leichtlinii Baker, Bot. Mag. t. 6287. 1877.
Camassia leichtlinii Wats. Proc. Am. Acad. 20:376. 1885.

In the original description of this plant Baker writes: "This is a plant which has been widely spread in gardens both in England and on the Continent under the name 'White Camassia,'" and further states, "Our plants were received from the Edinburgh Botanic Garden, and I learn from Mr. M'Nab that it was collected by Mr. John Jeffrey in British Columbia in 1851." "I do not find it from Jeffrey or any other collector in the Kew herbarium." "From Camassia it may be readily distinguished by its firm, persistent leaves, large bracts, and the entirely different habit of the inflorescence. It falls under Chlorogalum very well, but is not in any danger of being confused with the two kinds already known, one of which is the well-known Californian Soap Plant." Three years later Baker referred the plant to *Quamasia* under the name *Camassia esculenta* var. *leichtlinii*, and published therewith a handsome colored illustration. He again repeats the information that "It was discovered by Mr. John Jeffrey in British Columbia in 1853." "The present sketch was taken from a plant which flowered on the rockery in Kew Gardens in May, 1873."

In April, 1914, Mr. W. C. Cusick found growing in the Umpqua Valley around Roseburg, Oregon, a white-flowered *Quamasia* in abundance. Fresh specimens as well as herbarium material from Mr. Cusick show that this plant agrees exactly with the description and colored plate published in the Botanical Magazine in 1877. Mr. Cusick writes further: "An old pioneer told me it was a food plant of the Indians. The gophers gathered the bulbs in caches, and the Indian women would go around with their camas diggers and thrust the elkhorn point into any favorable looking ground, and then get down to the hole and smell; if the camas bulbs were there she got them out. This was all spoiled by the settlers' pigs which soon caught on to the smelling business and so put the Indian women quite out."

Inasmuch as no white-flowered *Quamasia* has ever been recorded from British Columbia, it is a matter of interest to know whence Jeffrey originally secured the plant which, according to Baker, was quite commonly cultivated in Europe in 1874. Jeffrey collected plants at various places on the Pacific Coast from British Columbia to southern California. Practically the whole knowledge of his activities is that contained in the report entitled "Botanical Expedition to Oregon." In this report are given lists of the various seeds and bulbs sent by Jeffrey at different times, and in many cases revised identifications of the plants are given. From these lists it does not appear that any species of *Quamasia* was collected by Jeffrey in British Columbia or in northern Washington. In a list of the specimens and seeds sent by Jeffrey in box No. 10 appears the following note: "No. 1007, Camassia sp. Umpqua Valley, flowers white, six

bulbs." This is apparently the only *Quamasia* he collected, and as it came from identically the locality where Mr. Cusick now finds this white-flowered plant so abundantly, there can be but little doubt that the type locality of *Quamasia leichtlinii* is not British Columbia as published, but the Umpqua Valley of Oregon.

In the vicinity of Roseburg, Mr. Cusick also collected plants with dark blue flowers and others with pale blue flowers. These appear to differ from typical *Q. leichtlinii* in no other respect than the color of the corolla. White-flowered mutants in blue-flowered plants are very common and have been reported in other species of *Quamasia*. It is noteworthy, however, that in the many specimens of *Quamasia leichtlinii* in the National Herbarium, only one, namely, that collected by Howell at Oakland, also in the Umpqua Valley, has white or whitish flowers.

Mr. Cusick's abundant and complete material of *Quamasia leichtlinii* permits of a critical comparison with the blue-flowered plants that have been described under the names *Quamasia azurea* Heller and *Camassia suksdorfii* Greenman.

Both of these plants agree with *Q. leichtlinii* in having the perianth segments spreading regularly and after anthesis becoming connivent and twisting together, whereas in other species of *Quamasia* the segments remain separate.

Quamasia suksdorfii (Greenman) Piper. (*Camassia suksdorfii* Greenman, Bot. Gaz. 34 : 307. 1902; *Quamasia suksdorfii* Piper, Cont. Nat. Herb. 11 : 191. 1906) is based on specimens collected by Suksdorf in Klickitat County, Washington. Doctor Greenman in proposing the species comments as follows: "From Camassia leichtlinii Watson * * * C. suksdorfii differs in the color of the flowers, the less sharply triangular, thinner, and less conspicuously nerved capsule. The seeds, moreover, in C. suksdorfii are larger and have a more bluish luster than in C. leichtlinii."

Incidentally it may be added Dr. Watson's conception of *Camassia leichtlinii* (Proc. Am. Acad. 20 : 376) was based largely on Suksdorf's material and notes of the plant named *C. suksdorfii* by Dr. Greenman.

Quamasia azurea Heller, Bull. Torr. Bot. Club, 26 : 547. 1899, is based on specimens collected near Montesano, Washington. It is compared with *Q. quamash* from which it is said to differ in its more delicate bright blue flowers, and by growing on grassy slopes. The type has not been examined but other material from near the type locality answer its description accurately.

Q. leichtlinii as represented in Mr. Cusick's specimens has a cream-colored perianth segment 20–30 mm. long, all either 5-nerved or 7-nerved.

Q. suksdorfii has blue perianth segments all 7-nerved, the two outer nerves short. The capsules of the two show no characteristic difference. The value of the seed characters is difficult to judge as so few of the specimens possess mature fruit that can confidently be associated with specimens in bloom. In all the Pacific Coast species they are very much alike. Those in Mr. Cusick's specimens of *Q. leichtlinii* are decidedly

obpyriform, while in the type of *Q. suksdorfii* they are but slightly thicker toward the apex.

Q. leichtlinii, *Q. suksdorfii* and *Q. azurea* are very closely allied and not clearly definable by any of the characters that have been pointed out. Indeed in the plants that have been referred to *Q. leichtlinii*, namely, all of those whose perianth is nearly regular and connivent-twisting after anthesis, there are other forms apparently better deserving of recognition. This species or species group ranges from Vancouver Island to California, mainly west of the Cascade Mountains and the Sierra Nevada, but also occurs on the eastern slope of the Cascade Mountains but not in the interior where *Q. quamash* is very abundant. In the area west of the mountains named *Q. quamash* is a rare plant.

The great majority of the specimens in the National Herbarium have all the perianth segments 5-nerved and 20–25 mm. long agreeing with the type of *Q. azurea*.

Based on nervation alone groups of forms may be differentiated:

1. Perianth segments all 3-nerved;
2. Perianth segments 3 and 5-nerved;
3. Perianth segments all 5-nerved;
4. Perianth segments 5 and 7-nerved;
5. Perianth segments all 7-nerved.

In general the number of nerves to perianth segments seems to be correlated with the vigor of the plant. At least those with the largest perianths, sometimes 3–3.5 cm. long, have more numerous nerves, while some of those with 3-nerved segments have very small flowers. It does not appear in this species at least that the nervation of the perianth is of taxonomic significance, but the matter deserves field study.

A very noteworty specimen collected at Colby, Butte County, California, Mrs. R. M. Austin, No. 738, July, 1897, has 5 and 7-nerved perianth segments 20–25 mm. long, with pedicels as long as the flowers in anthesis, but in fruit 3–4 cm. long, more than twice that of the bracts. In its long pedicels it suggests *Q. howellii*, but the large connivent-twisted perianth at once separates it from that species.

On the whole it is difficult to avoid the conclusion that *Q. azurea* and *Q. suksdorfii* should be considered synonymous of *Q. leichtlinii*.

Quamasia leichtlinii commonly occurs in grassy prairies or well-drained meadows, contrasting in this respect with the wet meadow preference of *Q. quamash*.

Quamasia quamash (Pursh) Coville, Proc. Biol. Soc. Wash. 11 : 64. 1897.

Phalangium quamash Pursh, Fl. Am. Sept. 1 : 226. 1814.
Quamasia esculenta Raf. Am. Month. Mag. 2 : 265. 1818.
Camassia esculenta Lindl. Bot. Reg. 18 : t. 1486. 1832.
Scilla Kamas Nutt. Proc. Acad. Sci. Phila. 7 : 55. 1834.
Camassia quamash Greene, Man. Bay Reg. Bot. 313. 1894.

Quamasia quamash is an abundant species in the eastern portions of

Washington and Oregon, western Montana, but also occurs sparingly west of the Cascade Mountains from Vancouver Island to northern California, and in Utah. It prefers low flat land of heavy clay texture and often occurs in bottoms that are overflowed in spring.

The material in the National Herbarium seems very consistent except in the matter of the venation of the perianth segments. Most of the material from Idaho has all the perianth segments 3-nerved, as has the original specimen collected by Lewis at "Quamash Prairie" or Weippe, Idaho. The same is true of most of the specimens from Montana, Washington and Utah.

On the other hand, many of the specimens from Washington and Montana and two from northern California have the perianth segments either all 5-nerved or with an occasional one 3-nerved. In some of the specimens the segments seem to be alternately 3-nerved and 5-nerved in every flower.

No other characters have been detected connected with that of the nervation of the perianth segments, but these should be sought for both in flowering and fruiting specimens by those who have opportunity to study the matter in the field.

Quamasia walpolei n. sp.

Bulbs ovoid, 2.5–3 cm. long, 1–2 cm. thick; leaves linear, flat, 20–25 cm. long, 5–10 mm. broad, many nerved, green above, paler or somewhat glaucous beneath; scapes strictly erect, 30–50 mm. high, smooth, pale green; bracts subulate, somewhat scarious, shorter than the buds but longer than the pedicels, the lowermost one or two below the inflorescence; raceme dense, even in fruit, 15–30 flowered, narrow, spike-like, 10–15 cm. long; pedicels all of nearly equal length, erect or becoming so, 5–8 mm. long; perianth segments linear-lanceolate, pale blue, 10–13 mm. long, the outer 3-nerved, the inner 5-nerved, persistent, each twisting separately after anthesis, apparently irregularly disposed, one spreading downward, the others upward; capsules 6–8 mm. long and nearly as broad, obtusely angled, strongly few nerved; seeds slightly obpyriform, black, shiny, 3 mm. long.

Closely allied to *Q. quamash* (Pursh) Coville, but readily distinguished by its dense raceme, more numerous smaller flowers, short subequal pedicels and smaller capsules. It is a pleasure to dedicate the interesting species to the late Mr. F. A. Walpole.

All of the specimens examined are from southwestern Oregon:

Hood River, Klamath Indian Reservation, F. A. Walpole, No. 2218, June 22, 1902, in flower (type); Fort Klamath, F. A. Walpole, No. 2251, July 25, 1902, in fruit; Klamath Valley, Dr. H. M. Cronkhite, Nos. 16 and 48, in 1864; Kean Creek, Jackson County, Elmer 1. Applegate, No. 2302, May 25, 1898; Roseburg, W. C. Cusick, No. 4026.

According to Mr. F. V. Coville camas bulbs are gathered in abundance on the Klamath Indian Reservation. So far as the National Herbarium specimens disclose only *Quamasia walpolei* grows in that area, so this species must apparently be edible.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW PINE MOUSE FROM FLORIDA.

BY ARTHUR H. HOWELL.

Audubon and Bachman recorded the pine mouse from Florida in 1851,* but modern collectors have until very recently failed to find the species in the State. Bangs, in his paper on Florida mammals, was unable to give any information as to the occurrence of the animal there.†

In November, 1913, Stanley E. Piper, of the Biological Survey, secured a single specimen at Ocala, Florida, the skull, however, not being preserved, and in December, 1915, Ray T. Jackson, also of the Biological Survey, succeeded in trapping four more at the same place. These prove to represent a very distinct form, which is here described.

Pitymys parvulus sp. nov.

FLORIDA PINE MOUSE.

Type.—Adult female, skin and skull, No. 210,485, U. S. National Museum (Biological Survey Collection), from Ocala, Florida; collected December 15, 1915, by R. T. Jackson.

General characters.—Similar to *Pitymys pinetorum pinetorum*, but paler and decidedly smaller.

Color.—Adult: Upper parts tawny (of Ridgway, 1912), shading on sides and tail to vinaceous-cinnamon; under parts dusky, faintly shaded with vinaceous-cinnamon; feet flesh color. Young: Upper parts between fawn color and wood brown; under parts drab without cinnamon suffusion.

Skull.—Similar to that of *pinetorum* but much smaller; nasals relatively shorter; mastoid portion of bullæ more inflated.

Measurements.—Type (adult ♀): total length, 94; tail vertebræ, 15; hind foot, 14. *Skull:* basal length, 19.3; length of nasals, 5.7; zygomatic

* Quad. N. Am., II, 1851, p. 219.

† Land Mamm. Penin. Florida, etc., Proc. Boston Soc. Nat. Hist., Vol. 28, 1898, p. 182.

breadth, 13.2; mastoid breadth, 11.4; least interorbital breadth, 4.2; alveolar length of upper molar row, 5.1.

Remarks.—Considering the nearness geographically of this species to *Pitymys pinetorum* of South Carolina and Georgia, the differences between them are remarkable. Further collecting in northern Florida may show that they intergrade, but for the present it seems best to regard *parvulus* as a distinct species.

The habits of this species are described by Mr. Jackson, as follows:

"This little mouse usually selects areas that are covered with a dense growth of trees and shrubs, mainly sand pine and scrub oak. No runways were found in the openings where there were no trees. They dig burrows ranging from about three-fourths of an inch to an inch in diameter and running from one to five or six inches below the surface. These runways weave in and out around the roots of the trees and shrubs (on which no doubt the mice feed to a great extent) and do not run in a straight line for any distance, probably not over a foot or two. The little animals also use the mole runways, probably after they have been abandoned by the mole. (One adult specimen was caught in a mole runway.) Several attempts to follow runways to the nest of the mouse finally resulted in finding a nest under an old board. It was made of palmetto bark and lined with a silky, fibrous material, much like the inside of a milk-weed pod. Around the nest was found the hulls of about two hundred pine seeds."

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

NEW GENERIC NAME FOR A TREE-TOAD FROM NEW GUINEA.

In 1882 Dr. G. A. Boulenger described a new genus and species of tree-toad from Ecuador as *Nyctimantis rugiceps* (Cat. Batr. Sal. Brit. Mus., pp. 421, 422). The main generic difference relied on to distinguish it from *Hyla* was the erect pupil. In 1897 (Ann. Mag. Nat. Hist. (6) Vol. 19, p. 12) he described another species, from New Guinea, as *Nyctimantis papua*. There is not the faintest probability that these two tree-toads are directly phylogenetically related, thus constituting a natural genus, and as they differ in *N. rugiceps* having the derm of the top of the head involved in the cranial ossification, while in *N. papua* it is free, I propose as a generic term for the latter the name **Nyctimystes.** The New Guinean tree-toad should then stand as *Nyctimystes papua.*

—*Leonhard Stejneger.*

NOTES ON AMPHISBÆNIAN NOMENCLATURE.

As it is necessary for me to use the names in a forthcoming lecture, I wish to place on record the following changes:

The generic name *Anops* Bell, Proc. Zool. Soc. London, 1833, p. 99, for the South American amphisbænid lizard *A. kingii,* is preoccupied by *Anops* Oken, 1815, for a crustacean. I therefore propose to substitute for it **Anopsibæna.** The generic name *Baikia* is not available, as I consider the *B. africana* as representing a distinct genus.

Likewise, the specific name of the Cuban amphisbænid usually known as *Amphisbæna punctata* Bell, 1828, is preoccupied by *Amphisbæna punctata* Wied, 1825, from Brazil. I find, moreover, that the genus *Cadea* is a valid one, so that the Cuban species may in the future be known as *Cadea* **blanoides.**

—*Leonhard Stejneger.*

A SECOND RECORD OF NYCTINOMUS DEPRESSUS FOR IOWA.

On October 21, 1914, a curious bat was captured alive in the high school building at Marshalltown, Iowa. An attempt to keep it alive was unsuccessful. The skin, however, was saved and later sent to Mr. Charles B. Cory of the Field Museum, who identified it as *Nyctinomus depressus* Ward. The only previous record for the State is the one secured by Dr. B. H. Bailey at Cedar Rapids, Iowa (Cory, Mammals of Illinois and Wisconsin, p. 477). Securing a second bat of this species is of additional interest in view of the fact that there are no other records, known to the writer, of its occurrence east of Colorado.

—*Ira N. Gabrielson.*

A CHANGE OF NAME FOR AN ARIZONA MISTLETOE.

The genus *Razoumofskya* is widely distributed in the western United States and is represented by numerous species. Most of these seem to be confined each to some particular coniferous tree. Since the plants usually grow high up on large trees, they are often overlooked, consequently it is not surprising that new species are found occasionally. The most recently described species, parasitic upon *Pinus strobiformis* Engelm., is known only from southern Arizona. It was described as *Arceuthobium blumeri* A. Nels.,* but since the generic name *Arceuthobium* Bieb. (1819) is antedated by *Razoumofskya* Hoffm. (1808), the plant should be known as *Razoumofskya blumeri* (A. Nels.) Standley.

—*Paul C. Standley.*

* Bot. Gaz. 56 : 65. 1913.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW EUBLEPHARID LIZARD FROM COSTA RICA.

BY G. K. NOBLE.

In a collection of reptiles and amphibians from Costa Rica recently presented to the Museum of Comparative Zoölogy by Mr. H. S. Blair of the United Fruit Company there is an undescribed species of the genus *Lathrogecko*. It may well be called:

Lathrogecko xanthostigma sp. nov.

Diagnosis.—Head slightly more than one and one-half times as long as broad; snout as long as the distance from the ear to the orbit; dorsal scales very small, rounded, slightly tubercular; nasals followed by a group of three small post-nasals; mental moderate in size, followed by several small scales; five upper labials, four lower labials; ventral scales very much larger than the dorsals.

Type.—M. C. Z., 11,658; Zent, near Puerto Limon, Costa Rica; H. S. Blair collector and donor.

Habitat.—Only known from the type locality.

Description of the type specimen.—(Adult.) Snout moderately pointed, the distance from the orbit to the tip of the snout exactly the same as the distance from the ear opening to the orbit; ear opening moderate, elliptical and horizontal. Rostral large, cleft above, a distinct ridge around the upper edge; rostral bounding the nostril anteriorly. Four or five upper labials; four lower labials; both series grading off gradually in size posteriorly. Mental only moderately large, cut by two small grooves posteriorly and followed by a cluster of scales much larger than the granules of the throat; gulars similar to the dorsal granules but smaller. Body depressed; dorsal surface covered with small, rounded, slightly tubercular scales, those on the snout being larger than those on the occipital region but smaller than those on the upper surface of the body; ventral scales large, rounded, smooth and imbricate; lower surfaces of legs and arms with similar scales spreading anteriorly over part of their upper surfaces.

Color above dark brown; a yellowish white band extending completely around the top of the head, starting from the rostral, then running along the canthus rostralis, continuing across the temporal region and bending over the occipital region to complete a similar crescent on the other side; two or possibly three indistinct rows of pale yellowish spots extending along each side of the body. Throat whitish, obliquely striped along the sides with dark brown, ripple-like marks which extend over the labials; chin spotted in the mid region with pale brown; belly dark brown. Posterior side of thighs dark brown with large whitish spots.

Dimensions (in millimeters).—Snout to ear opening, 7.6; width of head, 4.95; snout to vent, 30.8; fore limb, 8.2; hind limb, 11.4.

Remarks.—It is interesting to find in this collection from Costa Rica a new species of lizard belonging to a genus so recently described as *Lathrogecko* (cf. Ruthven, Occ. Papers, Mus. Zoöl., University of Michigan, 21, February 10, 1916). The almost simultaneous discovery of two species of a new genus in such separated regions as Colombia and Costa Rica is an excellent example of the fortuitous nature of most herpetological collecting.

The species described above may be easily distinguished from *Lathrogecko sanctae-martae* Ruthven by the characters given in the diagnosis or again by the different color.

The preparation of this note would not have been possible had it not been for the kindness of Dr. Thomas Barbour.

Vol. XXIX, pp. 89-92 June 6, 1916

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DRAGON-FLIES FROM THE ENGLISH OLIGOCENE.

BY T. D. A. COCKERELL AND HAZEL ANDREWS.

The material described below was collected by the Rev. P. B. Brodie in the Oligocene beds at Gurnet Bay, in the Isle of Wight, and represents the Oligocene Odonate fauna of Britain, as far as we know it to-day. It is noteworthy that two of the species have Indo-Malay affinities; one represents a genus which existed in Europe and America in Tertiary times, but is now confined to America; the fourth belongs to a genus still present in Britain. The specimens are all in the British Museum.

Oligoaeschna (?) anglica new species. Fig. 1.

Costo-apical region of wing preserved. Stigma elongated (length 4 mm.), bounded by 2½ cells below; five cells on costal margin beyond stigma; below the base of stigma are two rows of cells between M_1 and M_2, but M_2 is then deflected strongly downward, and the rows of cells increase to three, and toward the apex of the wing, where they become small and irregular, to four or more; M_2 separated from R_3 by two rows of cells, the number not increasing below base of stigma, where the interval is conspicuously greater; R_3 separated from supplementary vein below by a single row of cells. The part of the wing preserved is hyaline.

Gurnet Bay (Brodie). British Museum, 8649.

This could be referred to *Oligoaeschna* of the Indo-Malay region or *Gomphaeschna* of the nearctic. The strong downward bend of M_2 is like that of *Oligoaeschna*, as is also the shape of the stigma; so the indications, as far as they go, are in favor of *Oligoaeschna* rather than *Gomphaeschna*. The remarkable bend of M_2 occurs also in the Jurassic genera *Cymatophlebia* and *Morbaeschna*.

Oplonaeschna vectensis new species. Figs. 2, 3, 4.

The type shows the stigma with adjacent parts, and has the following characters: Stigma, 5 mm. long, bounded by 3½ cells below; M_2 bent downward below base of brace-vein of stigma, and at this point the cells

between M_1 and M_2 become double; below middle of stigma the supplementary vein below M_1 begins, and below end of stigma the cells between it and M_1 become double, while those between it and M_2 are in three rows from level of middle of stigma; below the stigma M_2 is separated from R_s by three rows of cells. R_s is separated from the supplementary vein below it by at least four rows of cells, as is seen in No. 8636, which shows the part of the wing immediately basad of that preserved in the type. In 8636 the stigma is only 4.5 mm. long, and is bounded by three cells below.

No. 8590 exhibits the triangle and adjacent parts, and appears to belong to *O. vectensis*. The triangle is 2.25 mm. long, five celled, formula 2, 1, 1, 1. It is formed as in *O. separata* Scudder, from the Florissant Miocene. The base of the triangle is bounded by one cell and a minute fraction of a second. The branches of the media arise below the middle of the arculus. Basal space without cross-veins.

Gurnet Bay (Brodie). British Museum, 8572 (type), 8636, 8590.

By the number of cells between R_s and the supplementary vein below, this resembles the European (Radoboj) fossil *O. metis* (Heer) and the Florissant *O. lapidaria* Cockerell and Counts. The triangle and adjacent parts resemble those of *O. separata*, and especially *O. lapidaria*. The long (*Boyeria*-like) stigma also associates the species with *O. lapidaria*, not with the living *O. armata*.

Megalestes anglicus Cockerell. Fig. 5.

Megalestes (?) *anglicus* Cockerell, Proc. U. S. Nat. Mus., **49** (1915), p. 498.

This name was based on part of the basal half of a wing, but a specimen now before us (Gurnet Bay, Brodie; Brit. Mus. 8548) appears to represent the apex of the wing of the same species. It has in general the characters of *Megalestes major* Selys, but the light brown pterostigma is more produced apically, its apical margin being long and very oblique, the apical point forming an angle of about 45°. The stigma therefore approaches the condition which is more exaggerated in *Amphipteryx*, but it is to be noted that the basal side remains quite unmodified from the *Megalestes* type. There are five simple cross-veins beyond the stigma, and the costal cells between the stigma and nodus are much longer than high. The ultranodal sector (between M_1 and M_2) begins only seven cells (in longitudinal row) basad of level of stigma; it is straight (not zigzag as in *Lestes*). Length of stigma about 2.3 mm.

Enallagma oligocena new species. Figs. 6, 7.

The type (Gurnet Bay, Brodie; Brit. Mus. 8631) consists of the bases of both wings. In the division of the Coenagrionines on the character of the postcosta, this falls entirely with *Enallagma* and the related genera, the postcosta leaving the margin of the wing at a distance from the basal postcostal cross-vein much greater than the latter is long (the actual distance, in the hind wing, is about 880 μ, the length of the cross-vein being

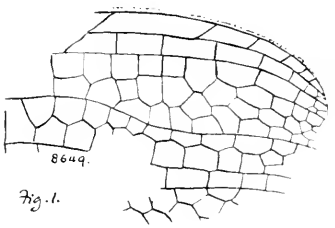

Fig. 1.

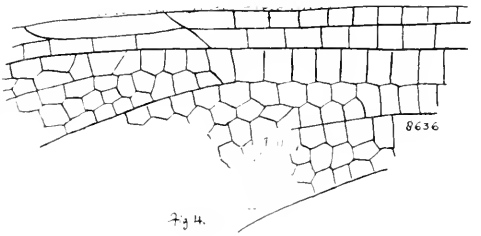

Fig 4.

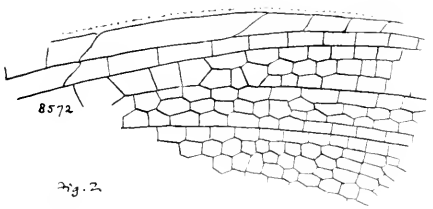

Fig. 2

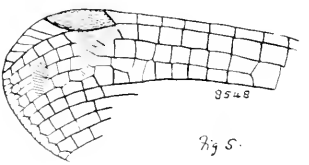

Fig 5.

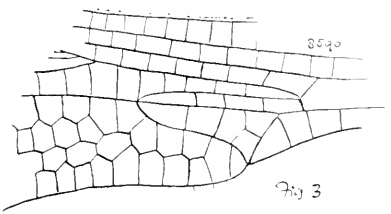

Fig 3

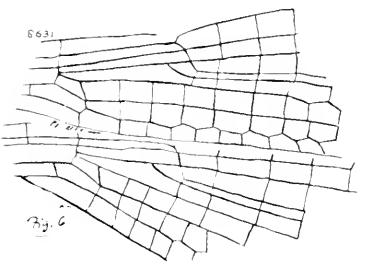

Fig. 6

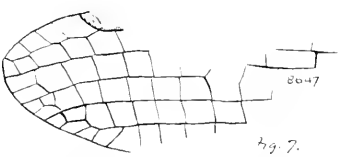

Fig. 7.

Fig. 1.—*Oligoaeschna anglica.*
Fig. 2.—*Oplonaeschna rectensis.*
Fig. 3.—*Oplonaeschna rectensis.*
Fig. 4.—*Oplonaeschna rectensis.*
Fig. 5.—*Megalestes anglicus.*
Fig. 6.—*Enallagma oligocena.*
Fig. 7.—*Enallagma oligocena.*

320). The characters in general are like those of modern species, the most noticeable peculiarity being the broad upper side of the quadrilateral in both wings; in the anterior wing the upper side of quadrilateral measures 624 μ, and the oblique apical side 656; in the posterior wing the upper side is 720 and the apical 560. The quadrilateral is also higher than in modern species, especially that of the anterior wing, the whole tendency being to approach the *Hesperagrion* type. The subnodus is not, at least in the anterior wing, in a straight line with the nodus, but makes a distinct, though extremely wide, angle with it. There are three cells in a longitudinal row between the quadrilateral and the vertical level of the nodus. Distance from arculus to nodus 4 mm. No. 8647, from the same source, is considered to be the apex of the wing of the same species. The stigma is light brown, and there are only three cross-veins beyond it, as may be seen in the living *E. exsulans*. There are four rows of square cells beneath the stigma, the arrangement here being as in *Telebasis salva* Hagen.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW TANTILLA FROM MEXICO.

BY THOMAS BARBOUR.

When Stejneger described *Tantilla wilcoxi* (Proc. U. S. Nat. Mus., 25, 1902, p. 156) he closed his notice with the words: "It would then be interesting to know what is Garman's *T. coronata* from San Luis Potosi." The specimen mentioned by Garman (Bull. Essex Inst., 19, 1887, p. 128) is now before me, and I believe represents a new form, near *T. wilcoxi* Stejneger, and also close to *T. bocourti* Günther, which unfortunately I have not seen, and which was very inadequately described. I imagine that this form may be an intermediate type, perhaps annectant between these two species. I naturally have submitted our specimen to Stejneger for comparison with the type of *T. wilcoxi*, and he writes me as follows, under date of March 28, 1916:

"I have looked at your Tantilla and compared it with the type of *T. wilcoxi*. The eye is smaller, though larger than in *T. coronata*. Top of head very similar, though supraoculars smaller, corresponding to eyes, head not so broad over temples. Color pattern practically identical. But then your specimen is smaller than the type. *However*, your specimen has first pair of lower labials broadly in contact behind mental as in *T. bocourti*, while in *T. wilcoxi*, they are separated by mental."

Günther, however, in describing *T. bocourti* (Biol. Cent., Am., Rept., 1894, p. 149) begins by saying of his species: "Vertical (= frontal) shield moderately broad, considerably longer than broad, much broader than the supraocular." This is not the condition in the example in hand, in which it is more than moderately broad. Unfortunately Günther makes no mention whatever of the size of the eye. *T. bocourti* Günther was collected by the veteran Dugès at Guanajuato. Pending

the possible future revision of the genus, I think it well to name the snake from San Luis Potosi, and it may be called

Tantilla deviatrix sp. nov.

Type, M. C. Z. No. 6195, from San Luis Potosi, Mexico, collected in March, 1878, by Dr. Edward Palmer.

Head narrow, not distinct from neck; eye rather small, scarcely more than one third the length of the snout; rostral wider than high, the portion visible from above less than the length of the internasal suture; internasals short, less than half as large as the praefrontals, the lower border of each of which is wedged down between the posterior nasal and the praeocular, but not to contact with the supralabials; frontal a hexagon, the anterior angle very obtuse, the posterior rather acute, the side borders converging very slightly backwards; its width slightly more than two thirds its length and about twice the width of the supraoculars, its length slightly less than the interparietal suture; supraoculars moderate, their width at the posterior end scarcely half that of the frontal; parietals slightly longer than their distance from tip of snout; nasals and praeocular of about equal size, the latter considerably in contact with the posterior nasal; one praeocular; two postoculars, the upper the larger; temporals 1 + 1 (on one side, the left, of the type, there is a tiny scale intercalated between the upper postoculars and the upper anterior corner of the first temporal); temporals long and narrow; supralabials 7, third and fourth entering the eye, seventh largest, almost square; infralabials 7, four in contact with anterior chin shields, first pair broadly in contact with each other behind mental; anterior chin shields slightly longer than the second pair; 15 rows of smooth scales; four pairs of scales between posterior chin shields and ventrals; ventrals 154; anal divided; subcaudals 63.

Color (in alcohol) very pale uniform reddish above (evidently much faded), yellowish white beneath; top of head brown, the dark color barely including the eyes and descending to the labial margin on the posterior half of the sixth and the entire seventh supralabial; a white semicollar just behind the parietals and taking in their posterior ends (about one sixth of the parietals being white), in general the white band covers a part of two rows of scales and it is followed posteriorly by a narrow brown band only about one scale wide; the latter band extending slightly and abruptly forward on the median line, thus narrowing the white semicollar at this point.

Total length, 170 mm., tail 39 mm.

It is well to state here that Günther says that *T. bocourti* has ventrals 172–176 and subcaudals 55, which is quite different from the count given above, while Stejneger gives for *T. wilcoxi* a count of, ventrals 152, tail imperfect. The size of eye, shape of head and arrangement of chin shields sets *deviatrix* well off from *wilcoxi*. A second specimen of *T. wilcoxi* was recorded by Van Denburgh (Proc. Cal. Ac. Sci. (4), 3, 1913, p. 424) from Ramsay Cañon in the Huachuca Mountains of Arizona. This example has 157 ventrals and 58 subcaudals.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PRELIMINARY DIAGNOSES OF FIFTEEN APPARENTLY NEW NEOTROPICAL BIRDS.

BY W. E. CLYDE TODD.

Further studies of the neotropical birds in the collection of the Carnegie Museum have brought to light a number of additional species and subspecies apparently new to science, which are described herewith, in a preliminary way. The present paper is the fourth of the series to appear in these Proceedings, and the author has again to acknowledge his indebtedness to Mr. Harry C. Oberholser for his kind assistance. Measurements are in millimeters.

Nemosia pileata hypoleuca subsp. nov.

Differs from all the other known forms of *Nemosia pileata* in having the entire under surface pure white in the male, with practically no bluish or grayish suffusion; size same as in *N. p. nana* Berlepsch.

Type, No. 49,420, Collection Carnegie Museum, adult male; Tucurinca, Santa Marta, Colombia, September 15, 1915; M. A. Carriker, Jr.

Amblycercus holosericeus centralis subsp. nov.

Similar in color to *Amblycercus holosericeus holosericeus* (Lichtenstein), but differing in relative proportions of the wing and tail, the former being decidedly longer than the latter, instead of the reverse. Wing (type), 106; tail, 100; exposed culmen, 32; tarsus, 15.5.

Type, No. 24,191, Collection Carnegie Museum, adult male; Rio Sicsola, Costa Rica, October 12, 1904; M. A. Carriker, Jr.

Basileuterus cabanisi indignus subsp. nov.

Similar to *Basileuterus cabanisi cabanisi* Berlepsch, but middle of crown without, or with but a trace of, Mars yellow, being merely plain dull lemon yellow.

Type, No. 41,927, Collection Carnegie Museum, adult male; La Tigrera, Santa Marta, Colombia, May 8, 1913; M. A. Carriker, Jr.

Myiarchus sordidus sp. nov.

Nearest apparently to *Myiarchus fortirostris* Todd, but size smaller, upper parts very much darker (dark olive), under parts slightly darker, and bill more flattened. Very distinct also from any of the forms of *Myiarchus ferox* (Gmelin), being much paler and dingier below. Wing (type), 89; tail, 83; exposed culmen, 16.

Type, No. 46,377, Collection Carnegie Museum, adult female; El Trompillo, Carabobo, Venezuela, April 27, 1914; Samuel M. Klages.

Empidonomus varius septentrionalis subsp. nov.

Similar to *Empidonomus varius varius* (Vieillot) of southern Brazil, Paraguay, and Bolivia, but darker above, more brownish, less olivaceous, and much more heavily streaked below. Still more different in this latter respect from *Empidonomus varius rufinus* (Spix) of northern and eastern Brazil and Guiana.

Type, No. 47,027, Collection Carnegie Museum, adult male; El Trompillo, Carabobo, Venezuela, May 16, 1914; Samuel M. Klages.

Idiotriccus secundus sp. nov.

Pileum yellowish olive, with narrow front and superciliaries dull whitish, becoming yellowish posteriorly; back warbler green, and rectrices with narrow external margins of the same color; indistinct inner margins of rectrices yellowish white; wings dusky, with narrow external margins of dull greenish, becoming citron yellow on the innermost; inner webs of remiges broadly pale yellowish white; middle and greater wing-coverts tipped with citron yellow, forming two bands across the wing; lores dusky; throat dull whitish, passing into olive yellow on the breast and sides, and this into barium yellow on the abdomen and under tail-coverts. Wing (type), 64; tail, 49; exposed culmen, 8.5; tarsus, 16.

Type, No. 43,788, Collection Carnegie Museum, adult female; Rio Surutu, Provence del Sara, Bolivia, September 6, 1910; José Steinbach.

Attila idiotes sp. nov.

Similar in general to *Attila citreopygus citreopygus* (Bonaparte), but pileum and sides of head brighter green; back paler brown; chin, throat, and breast strongly washed with pale lemon yellow; and bill smaller (exposed culmen, 20 mm.).

Type, No. 49,727, Collection Carnegie Museum, adult male; Fundacion, Santa Marta, Colombia, October 19, 1915; M. A. Carriker, Jr.

Tityra semifasciata heteromelæna subsp. nov.

Differs from all the other known races of this species in having the black of the crown extending far behind the eyes, to a point even with

that of the auriculars, while the white on the rectrices is much more restricted, both basally and terminally.

Type, No. 47,742, Collection Carnegie Museum, adult male; Sierra de Carabobo, Venezuela, June 19, 1914; Samuel M. Klages.

Leptasthenura andicola extima subsp. nov.

Similar to *Leptasthenura andicola certhia* von Madarasz, but upper parts in general, and the streaks on the pileum in particular, decidedly darker; wings more extensively rufescent.

Type, No. 45,391, Collection Carnegie Museum, adult male; Paramo de Macotama, Sierra Nevada de Santa Marta, Colombia, April 20, 1914; M. A. Carriker, Jr.

Synallaxis albescens perpallida subsp. nov.

Similar to *Synallaxis albescens hypoleuca* Ridgway, but forehead and upper parts more grayish, less rufescent; pileum and wing-coverts paler cinnamomeous; and size larger. Wing (type), 58; tail, 71.

Type, No. 45,548, Collection Carnegie Museum, adult male; Rio Hacha, Colombia, May 4, 1914; M. A. Carriker, Jr.

Synallaxis certhiola sp. nov.

Apparently nearest *Synallaxis albilora* Pelzeln, but smaller, darker and browner above, and lower parts paler and somewhat duller. Pileum olive brown, shaded with mouse gray, and passing into Prout's brown on the back; tail, wings externally, and wing-coverts auburn; throat white; rest of under parts strongly shaded with cinnamon buff. Wing (type), 57; tail, 64.

Type, No. 43,667, Collection Carnegie Museum, adult female; Santa Cruz de la Sierra, Bolivia, September 9, 1909; José Steinbach.

Chætura egregia sp. nov.

Above, including wings and tail, glossy black, the lower back, rump, and shorter upper tail-coverts pale gray in abrupt contrast; longer upper tail-coverts darker gray; under parts plain grayish brown, the throat paler and more grayish, the under tail-coverts almost Chætura drab. Wing (type), 120; tail, 40; tarsus, 10.5.

Type, No. 43,794, Collection Carnegie Museum, adult female; Rio Surutu, Bolivia, September 8, 1910; José Steinbach.

Veniliornis oleaginus exiguus subsp. nov.

Differs from any other known form of *Veniliornis oleaginus* (Lichtenstein) in its smaller size, duller coloration, and in having more white on the inner webs of the remiges. Wing (type), 91; tail, 53; exposed culmen, 22.

Type, No. 34,906, Collection Carnegie Museum, adult male; La Cumbre de Valencia, Venezuela, September 24, 1910; M. A. Carriker, Jr.

Glaucidium brasilianum medianum subsp. nov.

Brown phase: differs from *Glaucidium brasilianum ridgwayi* Sharpe in the much browner, less grayish tone of the upper parts, and in the decidedly more rufescent, less grayish, color of the streaks of the under parts. From *Glaucidium brasilianum phalænoides* (Daudin) it differs in its paler, more buffy brown color above, less heavily streaked under parts, and more decidedly and more regularly barred tail.

Type, No. 8940, Collection Carnegie Museum, adult male; Bonda, Santa Marta, Colombia, October 6, 1899, G. H. Hull.

Falco fusco-cœrulescens septentrionalis subsp. nov.

Similar in color to *Falco fusco-cœrulescens fusco-cœrulescens* Vieillot, but decidedly larger. Wing (female), 294; tail, 201; exposed culmen, 20; tarsus, 49; (male, type) wing, 267; tail, 180; exposed culmen, 22.5; tarsus, 47.

Type, No. 111,485, Collection U. S. National Museum; adult male; Fort Huachuca, Arizona, May 6, 1887; Lt. Harry C. Benson.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW PLANTS FROM OREGON.

BY C. V. PIPER.

A set of unusually interesting plants collected in the Umpqua Valley, Oregon, by the veteran collector, Mr. W. C. Cusick, contains several species heretofore undescribed. This valley is botanically noteworthy because it is the northernmost station of many California plants, but it also contains a considerable number of species with very circumscribed ranges.

Besides these Umpqua Valley plants there is described in this paper a new *Solidago* from the Wallowa Mountains and a new *Eucephalus* from Mount Jefferson. A new name also is proposed for a Washington species of *Aster*. The type specimens are in the possession of the author.

Asarum marmoratum n. sp.

Rootstocks slender, elongate, about 3 mm. in diameter; leaves cordate-reniform, longer than broad, acutish, ciliate, glabrous on both surfaces except along the principal veins, marmorate with white along the veins above, 8–12 cm. long: petiole slender, sparsely villous, mostly longer than its blade: calyx dull purple, campanulate, pubescent with scattered weak hairs, the lobes attenuate-filiform, 6 cm. long.

Umpqua watershed, W. C. Cusick No. 4587, April 28, 1915 (type); also collected near Wimer, E. W. Hammond No. 348, May 26, 1892: and at Anderson camp, alt. 1800 meters, J. B. Leiberg No. 4278, July 8, 1899.

This species is exceedingly close to *Asarum caudatum* Lindl., but differs at once in its white-mottled leaf-blades, which become longer than broad. *Asarum caudatum* is a very uniform species over its wide range, the green-leaf blades being never longer than broad.

Sidalcea cusickii n. sp.

Stellate puberulent throughout and without any long hairs; stems stout, 90–120 cm. high, scabrous puberulent; basal leaves orbicular, about 10

cm. broad, deeply cordate, shallowly about 13 lobed, the lobes each with 3–7 broad teeth, the petiole 3–4 times as long as the blade; intermediate leaves deeply 7–9 cleft, the lobes oblong, irregularly toothed or somewhat lobed, on petioles of about equal length: upper leaves 3–5 parted into oblong-linear entire or more or less toothed lobes: stipules subulate-lanceolate, somewhat scarious, usually purple, about 1 cm. long: inflorescence branched, the flowers numerous in dense erect spike-like racemes, 5–15 cm. long: pedicels 2–4 mm. long; bracts subulate, longer than the pedicels: calyx turbinate or at length campanulate, 8–10 mm. long, the erect lanceolate acute lobes as long as the tube; petals purple, 1.5–2 cm. long, notched and somewhat erose at tip; carpels whitish, glabrous or with a few puberulent hairs at tip, not at all reticulated, 3 mm. long.

In swales near Roseburg, Oregon, W. C. Cusick Nos. 4147 (type), 4205a, 4086, and 4200, all collected in June, 1914. Also collected by Howell, June 26, 1887, at the same place. Other specimens to be referred here are Applegate Nos. 2386 from Antelope Creek, and 2570 from Elk Creek, both in Jackson County, Oregon.

This species has been confused with *S. spicata* Regel, but differs from that in its stouter habit, its long many-flowered racemes and in the entire absence of hirsute pubescence.

Carum erythrorhizum n. sp.

Glabrous; stems slender, 60–100 cm. high, loosely branched above: tubers fusiform, fleshy and starchy, 4–6 cm. long, usually many in a cluster, the cortex red; leaves few, 15–30 cm. long including the petiole, pinnately or the lower bipinnately parted into 2–5 distant pairs of leaflets, these like the rachis, slender, terete, almost filiform, 2–5 cm. long: sheaths scarious-margined, those of the lower leaves 2–4 mm. broad; bracts reduced, filiform-linear; umbels small, 2–4 cm. in diameter, each with 6–10 unequal ascending rays, the longest rays 2.5–4 cm. long: involucre wanting or consisting of a few linear bracts, 3–4 mm. long; involucels of 3–6 linear bractlets, 2 mm. long: fruit orbicular, moderately compressed, 4 mm. long, nearly as long as the pedicels, only a few forming in each umbellet: ribs filiform; stylopodium low, conical, not as long as the oblong-ovate calyx-lobes; oil tubes large, solitary in the intervals.

Roseburg, Oregon, collected in 1914 by W. C. Cusick, Nos. 4325, July 15; 4468 (type), August 18; 4466, August 18; 4507, August 28.

Solidago cusickii n. sp.

Nearly glabrous, the stem pubescent especially in the inflorescence, and the leaves minutely ciliate; stems 10–50 cm. high, erect, slender: basal leaves spatulate-oblong, obtuse, crenate, thinnish, 3–5 cm. long, the margined petioles half as long as the blades; cauline similar, smaller, mostly acute, sessile; inflorescence narrow, loose, erect, 4–10 cm. long, subpaniculate, the heads solitary or few on slender spreading or ascending branches .5 to 4 cm. long; heads 8 mm. high, hemispheric, many-

flowered; tegules few, about 20, subequal, erect, loose, thin, oblong-linear, acute, ciliate, 6 mm. long; rays few, yellow; akenes pubescent.

A species of the granitic rocks of the Wallowa Mountains, Oregon, at 2000 to 2500 m. altitude, collected by Mr. W. C. Cusick and distributed under Nos. 1713, 1721, 3308 (type), 3310 and 3314. The species belongs to the Virgaurea group, but is very distinct from any heretofore described.

Eucephalus gormani n. sp.

A tufted perennial from stout woody creeping rootstocks: stems leafy, erect, simple, 10–15 cm. high; whole herbage minutely glandular-puberulent: leaves narrowly oblong to slightly oblong-lanceolate, sessile, acute, mostly cuspidate, ciliate, thickish, 1.5 to 2.5 cm. long, with a prominent midrib or occasionally triplinerved; peduncles very short: heads solitary, 1 cm. high: tegules in about 3 ranks, lanceolate to ovate-lanceolate, acute or acuminate, scarious margined and ciliate, green or somewhat chartaceous, the inner ones broadest: rays about 12, pinkish becoming white, 10–15 mm. long: akenes hirsute: pappus bristles capillary, tawny.

Dry rocky slopes, 5200 feet altitude, Mount Jefferson, Oregon, type collected by M. W. Gorman, No. 2851, July 24, 1907. Most nearly allied to *E. paucicapitatus* (Rob.) Greene, from which it differs in its lower habit; absence of the sparse short pubescence on the herbage; smaller heads; and especially in the firmer scarious-margined tegules, most of which are distinctly broadened near the base.

Aster okanoganus n. name.

Aster elmeri Piper, Bull. Torr. Club 29:645. 1902 (not *Aster elmeri* Greene Pitt. 2:170. 1891).

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW RALLIFORMES FROM TROPICAL AMERICA.

BY J. H. RILEY.

[By permission of the Secretary of the Smithsonian Institution.]

Mr. Robert Ridgway has called my attention to two apparently undescribed forms of Ralliformes in the collection of the U. S. National Museum and has kindly permitted me to describe them. I am indebted to the authorities of the American Museum of Natural History for the loan of the type and five specimens of the lately described *Fulica americana columbiana* Chapman. The two forms may be described as follows:

Fulica americana grenadensis subsp. nov.

Type, female adult, U. S. National Museum, No. 84,849, Isle de Rhonde, Grenada, B. W. I., May 9, 1881. Collected by J. G. Wells.

Similar to *Fulica americana columbiana* Chapman,* but the bill proportionally heavier and more wrinkled; the frontal shield more swollen. Wing, 184.5; tail, 47.5; culmen with frontal shield, 50.5; depth of bill at base, 17.5; tarsus, 56; middle toe, 72.

Remarks.—While this form is very close to the lately described *Fulica americana columbiana*, I think the differences are sufficient to warrant separation, especially as the ranges are widely separated. The type of *Fulica americana grenadensis* has the upper part of the bill rather deeply wrinkled longitudinally, showing that it must have been much swollen in life. While it is well known that the upper part of the bill and frontal shield become much swollen in the breeding season in the coots, I have found no specimen in the series of *Fulica americana americana* or *Fulica americana columbiana* where it occurs to the same extent. From *Fulica caribæa* the new form differs in the same way as *columbiana* does from that species and as Chapman has already pointed out the differences in his description of *columbiana* they need not be repeated here. The frontal shield in *Fulica americana grenadensis* is similar in shape and color to that of *F. a. americana*, but more swollen and larger and the bill much

* Bull. Am. Mus. Nat. Hist., xxxiii. 1914. 170.

heavier. In color there seems to be little difference in the four forms under consideration, except that *F. a. columbiana* appears to average slightly darker than *F. a. americana*, and the white edging on the outer primary and the white tips on the inner secondaries more restricted; in these respects *F. a. grenadensis* resembles *F. a. columbiana*. The measurements of the four forms are as follows:

	Wing.	Tail.	Culmen with frontal Shield.	Depth of bill at base.
Five females of *F. caribæa*	174.6	49	47	14.8
Six females of *F. a. americana*	177	50.3	42.7	13.5
One female of *F. a. grenadensis*	184.5	47.5	50.5	17.5
Three females of *F. a. columbiana*	186.3	49.5	51.2	16

Creciscus murivagans sp. nov.

Type, male adult, U. S. National Museum, No. 159,769, Lima, Peru, Oct. 1, 1889. Collected by J. Kalinowski.

Similar to *Creciscus salinazi*, but lighter both above and below and with the white bars on the back and wings more numerous and better defined.

Description.—Top of head blackish slate; nape mars brown, shading into russet on hind neck and upper back; back and scapulars fuscous washed with russet and crossed with numerous buffy and white bars; rump and upper tail-coverts fuscous narrowly barred with white and buff; tail fuscous-black narrowly barred with white; sides of face, throat, and breast deep neutral gray, slightly lighter on sides of face and throat; lores blackish slate with an indistinct lighter loral streak; abdomen pinkish buff with obscure dusky bars; anal region and crissum light pinkish cinnamon, with fuscous and white bars basally concealed; flanks fuscous with white or buffy white bars; bend of wing white; wing-coverts a little lighter than the back barred with white; remiges hair brown with irregular white spots on the outer web and elliptical spots of white on the inner webs, these spots increasing in size inwards; under wing-coverts white with a few dusky markings; thighs light pinkish cinnamon. Wing, 76; tail, 33.5; culmen, 15; tarsus, 22.5; middle toe, 24.5.

Remarks.—From *Creciscus jamaicensis* the above species differs in being lighter above, especially the hind neck, which is quite a different shade of brown (russet), carob brown in *Creciscus jamaicensis*. The bars on the back in *C. murivagans* are better defined and do not show a tendency to break up into spots as they do in *C. jamaicensis*.

The Museum possesses an immature female taken on the same day and place and by the same collector as the type. It differs from a female of *Creciscus salinazi* in about the same stage of plumage in being lighter both above and below, with the chin and throat more extensively whitish.

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PROCEEDINGS

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THREE INTERESTING ADDITIONS TO THE CRINOID FAUNA OF SAGAMI BAY AND SURUGA GULF, JAPAN.

BY AUSTIN H. CLARK.

During the last century the wonderfully rich marine fauna of southern Japan has received more attention than the fauna of any other portion of the vast Indo-Pacific area. The British steamer "Challenger" took a few dredge hauls there, the Swedish steamer "Vega" brought back some interesting specimens, while the United States steamer "Albatross" on two cruises sixteen years apart, and the Japanese yacht "Golden Hind" in investigations covering a long series of years, have done considerable intensive work. Individual effort has figured largely in increasing our knowledge of the Japanese fauna; among foreign investigators von Siebold, Stimpson, Hilgendorf, E. S. Morse, Alan Owston, Döderlein, Doflein and Haberer in particular have made extensive collections, while their work has been supplemented, especially in later years, by that of a large number of able and energetic Japanese naturalists.

And yet the possibilities of this fauna are by no means exhausted, for interesting new forms are constantly coming to light in all classes.

Of the three crinoids herein described two were collected by Professor Doflein, the third by Mr. Alan Owston; the last represents a genus, the other two specific groups in their respective genera, hitherto unknown from Japan.

Comantheria intermedia new species.

This species in general structure resembles *C. briareus*, *C. rotula* and *C. weberi*.

The arms vary in number from thirty-one to forty-eight, the average number being forty; the division series and brachials resemble exactly

those of *C. weberi*. The arms are from 130 mm. to 180 mm. long, the average length being about 145 mm.

The centrodorsal is thick discoidal, 7 mm. to 9 mm. in basal diameter, and from 4 mm. to 6 mm. across the concave dorsal pole; the cirrus sockets are arranged in two and a partial third closely crowded alternating rows.

The cirri reach a maximum of XXXII in number, but usually there are only a few well developed, the majority being more or less rudimentary; in general they resemble the cirri of *C. weberi* but they are much more slender, much less curved distally, and are composed of a larger number of segments; the proportionate number of more or less rudimentary cirri is greater in this form than in *C. weberi*. The cirri are from 18 mm. to 30 mm. in length (usually between 23 mm. and 25 mm.), and are composed of from 20 to 28 (usually 24–26) segments of which the longest, in the proximal portion, are about one third again as long as broad, and the outer, from about the eleventh onward, about twice as broad as long, the transition from the one type to the other being rather abrupt; the short outer segments have the dorsal surface convex in profile view, the maximum height of this convexity being at first at the distal end of the segments, but gradually moving proximally so that the distal segments are provided with low blunt median tubercles; the opposing spine is transversely elongate.

Type.—In the Zoological Museum, Munich, Bavaria, from Sagami Bay, Japan, down to about 150 meters (83 fathoms).

Paratypes.—Cat. Nos. 35,776 and 35,777, U. S. N. M., from the same locality.

Comantheria intermedia is most closely related to *C. weberi* A. H. Clark from the Lesser Sunda Islands.

Dichrometra dofleini new species.

The cirri are about XXX, 27–28, 30 mm. long; the segments in the proximal half are about as long as broad, and in the distal half slightly broader than long with small dorsal tubercles or short spines, these beginning on the twelfth segment.

In the type specimen there are forty-seven arms 130 mm. long, developed in 2, 2, 2, 2 order, or in 2, 1, 1, 2–2, 1, 1, 2 order on each ray.

P_2 is 16 mm. long with twenty-eight segments; P_3 is 18 mm. long with twenty-seven segments, most of which are twice as long as broad, the distal becoming much elongated.

Type.—In the Zoological Museum, Munich, Bavaria, collected by Professor Dr. Franz Doflein in Enoura Bay, Suruga Gulf, Japan, in about 150 meters (83 fathoms).

Dichrometra dofleini is most nearly related to *D. ciliata* A. H. Clark from the Ganjam coast of India in from 30 to 38 fathoms.

Prometra owstoni new species.

Centrodorsal discoidal, rather thick, the broad flat polar area 2 mm. in diameter and covered with numerous small uniform rounded tubercles; the cirri are arranged in two irregular alternating marginal rows.

Cirri XXVII, 16–21 (usually 18 or 19), 10 mm. long; the first segment is short, much broader than long, and the following gradually increase in length to the fourth or seventh (usually fifth or sixth) which, with the remainder, is about as long as broad; on the second or third segment the median portion of the distal dorsal edge becomes produced, this production on the two or three following involving the entire distal edge so that, viewed dorsally, it appears as a crescentic ridge with a serrate apex, the horns of the crescent touching the distal dorsal angles of the segments; gradually this crescent becomes straightened out so that beyond about the middle of the cirrus each segment bears a straight median serrate transverse ridge; viewed from the ends of the segments these transverse ridges usually show a more or less convex profile, though on some of the cirri they may be nearly straight; distally these ridges become gradually narrower, on the antepenultimate segments being commonly represented by slight median tubercles; the opposing spine is terminal or subterminal; erect, in height equal to about half the distal diameter of the penultimate segment, though sometimes longer; its base occupies nearly or quite all of the dorsal surface of the penultimate segment; the terminal claw is about as long as the penultimate segment, stout in the proximal third, but slender in the distal two-thirds, which portion usually is rather abruptly bent downward.

The ten arms are probably between 55 mm. and 60 mm. long.

The radials are even with the edge of the centrodorsal; the IBr_1 are short, about four times as broad as the median length, which is about one third less than the lateral length; the lateral edges are straight, and in apposition; the IBr_2 (axillary) is rhombic, broader than long; the first brachial is short, trapezoidal, twice as long exteriorly as interiorly, the inner edges united for about the proximal two-thirds; the second brachial is larger, irregularly quadrate; the third and fourth brachials form a syzygial pair which is slightly longer internally than externally, nearly or quite twice as broad as the lesser (exterior) length; the next two brachials are slightly wedge-shaped, three or four times as long as the median diameter, and the following become more and more pronouncedly wedge-shaped and after the fourteenth triangular, about as long as broad, and distally wedge-shaped again, and slightly longer than broad. Syzygies occur between the third and fourth brachials, again between the thirteenth and fourteenth (sometimes between the ninth and tenth or tenth and eleventh), and distally at intervals of from four to seven (usually five) oblique muscular articulations.

P_1 is 8 mm. long with fourteen segments of which the first is half again as broad as long, the second is slightly trapezoidal, half again as long as the distal diameter, the third is twice as long as broad, and the remainder are from three to four times as long as broad; the seventh and following have very prominently everted and spinous overlapping distal edges. P_2 is 8 mm. long with sixteen segments, similar to P_1 but with the segments proportionately slightly shorter; the sixth and following have very prominently everted and spinous distal edges. P_3 is 8 mm. long with fourteen segments, similar to P_2. P_4 is 5 mm. long with fourteen segments,

similar to P_3 but with the segments, especially the distal, proportionately shorter. P_5 is 6 mm. long with sixteen segments of which the outer become greatly elongated, and the third and following have prominently everted and spinous distal edges. The following pinnules resemble P_5, but gradually increase in length so that the distal pinnules are 8 mm. long, composed of seventeen segments most of which are about twice as long as broad, with produced and spinous distal edges; the two terminal segments of the distal pinnules are rather abruptly smaller and more slender than the preceding.

The color is purple, the cirri yellow, each segment with a median ventral purple saddle; regenerated arms are yellow.

Type.—Cat. No. 35,631 U. S. N. M., collected by Mr. Alan Owston in Sagami Bay, Japan, in 55 fathoms.

Prometra owstoni is most nearly related to *P. longipinna* A. H. Clark from the Philippine Islands in 58 fathoms.

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DESCRIPTIONS OF NEW THYSANOPTERA.

BY J. DOUGLAS HOOD.

Eleven new species of Thysanoptera are described below. Of these, eight are from the United States and one each from Cuba, Panama, and Southern Nigeria. A new genus is also erected for an odd species from Virginia and Maryland. All types are in the collection of the author.

The writer must express his obligations to Lt.-Col. Sir David Prain, Director of the Royal Botanic Gardens at Kew, England, for securing the determination of the food plant of the new *Physothrips* from Southern Nigeria; to Prof. Patricio Cardin, of the Estación Experimental Agronomica at Santiago de las Vegas, for material of the new Cuban species; and to the several other collectors who have contributed most of the specimens on which these studies are based.

Æolothrips annectans sp. nov.

Female (*macropterous*).—Length about 1.5 mm. Color dark blackish brown, with a reddish cast, due to crimson hypodermal pigmentation in the thorax, abdomen, and femora; antennæ with segment 3 and basal half of segment 4 pale yellowish white, the remainder of antennæ blackish brown.

Head about one and one-fourth times as wide as long, about equal in length to prothorax, not transversely striate, and with a few minute spines on occiput and cheeks; anterior margin straight, not at all emarginate by a forward prolongation of the eyes and without median tubercle; cheeks slightly swollen. Eyes less than half as long as head and about 0.6 as wide as their interval, prolonged as usual on ventral surface of head, and with the more dorsal facets separated by a distance much less than their own diameters. Ocelli more than twice the diameter of facets of eyes, nearly equidistant. Antennæ about 2.75 times as long as head, rather stout; segment 3 about 1.27 times as long as 1 and 2 combined and

about 4.7 times as long as wide; 4 about 0.8 the length of 3; 5-9 together very slightly longer than 3, the last four segments together nearly as long as 5, 9 shorter than 8; sensory area on ventral surface of segment 5 circular. Maxillary palpi three-segmented; labial palpi four-segmented.

Prothorax about two-thirds as long as greatest width, distinctly broadened behind. Mesothorax a little less than 1.4 times as broad as prothorax, anterior angles broadly rounded; mesoscutum closely transversely striate. Metathorax with sides roundly converging posteriorly; metascutum reticulate. Wings of fore pair moderately slender (about seven times as long as width at middle), slightly narrower in basal third; venation normal; basal fifth and apex white, remainder dark brown-gray, except a white spot occupying costal half of middle fifth; hind wings pale gray, darker in second and fourth fifths. Legs rather short and stout.

Abdomen stout, of normal structure.

Measurements of holotype: Length 1.51 mm.; head, length 0.149 mm., width 0.187 mm.; prothorax, length 0.144 mm., width 0.229 mm.; pterothorax, width 0.312 mm.; fore wing, length 0.960 mm., width near base 0.122 mm., at middle 0.132 mm.; abdomen, width 0.377 mm.

Antennal segments:	1	2	3	4	5	6	7	8	9
Length (μ)	36	53	113	92	66	14	13	14	10
Width (μ)	36	28	24	24	24	18	15	11	6

Total length of antenna, 0.411 mm.

Described from a homogeneous series of 7 females bearing the following data: ***Maryland:*** Great Falls (type locality), May 23, 1915 (1 female), on foliage of *Robinia pseudo-acacia* L. [J. D. Hood]; Beltsville, May 2, 1915 (1 female), on foliage [W. L. McAtee]. ***Virginia:*** Vienna, May 3, 1913 (3 females), on foliage of pear [R. A. Cushman]; Rockfish, June 6, 1915 (1 female), in flower of *Erigeron annuus* L. [L. O. Jackson]. ***New York:*** July 10 (1 female), on foliage of pear [H. Glasgow].

The color of the fore wings and antennæ and the proportionate lengths of the antennal segments separate this species very readily from its North American congeners. It is apparently very close to the European *Æ. melaleuca* Haliday, which can not now be secured for comparison.

Heterothrips azaleæ sp. nov.

(Pl. III, Fig. 1.)

Female *(macropterous).*—Length about 1.26 mm. Color dark blackish brown, with tarsi, distal ends of tibiæ, and third antennal segment pale grayish yellow; fore wings dark brownish gray except for a white transverse subbasal band.

Head about 1.4 times as wide as median dorsal length, distinctly shorter than prothorax, widest behind eyes, thence narrowing abruptly to eyes and tapering slightly to base; surface with a few minute spines, impressed and transversely rugose in front of anterior ocellus, smooth between ocelli, and with four or five anastomozing striæ on occiput;

frontal costa with deep U-shaped emargination; ocellar area not delimited by chitinous lines. Eyes setose, 0.6 as long as head, as wide as their dorsal interval. Ocelli of posterior pair twice the diameter of anterior ocellus, a little less than half as wide as their interval. Antennæ about 2.6 times as long as head; segment 3 subconical, about 2.5 times as long as wide, with deep incisions at basal fifth and basal two-fifths; 4 more than half as wide as long, roundly tapering to base; 5–8 more or less barrel-shaped, with sense cones; 9 a little more than twice as long as wide; segments 1 and 2 nearly concolorous with head; 3 pale grayish yellow, slightly infuscate apically; 4–9 blackish brown.

Prothorax about one and one-third times as long as head and about 1.66 times as wide as long, sides and posterior margin rounded, anterior margin straight; notum with a few short spines, its surface free from sculpture except for two or three anastomozing striæ near anterior and posterior margins. Wings of fore pair half as wide at middle as near base, the greatest subbasal width (exclusive of scale) about one-ninth the length of wing; costal margin, anterior vein, and posterior vein with about 32, 26, and 23 short, stout spines, respectively, these being closer together toward base of wing.

Abdomen stout; pubescence close, disposed on strong, anastomozing lines (much as in *H. pectinifer*, figured in Ins. Insc. Menstr., Vol. III, 1915, Pl. I, Fig. 7, but even closer); posterior margins of abdominal tergites 1–7 fringed at sides with contiguous, chitinous scales or plates, whose apical margins are evenly produced in long, slender spines, giving a comb-like appearance; median line of tergite of segment 1 with a few minute spines on posterior margin; segments 2–5 with a few slender spines at middle of posterior margin; 6 and 7 with a regular fringe of stronger spines between the lateral plates; sternites 2–6 fringed across their entire posterior margins with chitinous plates, which are divided apically into about ten slender spines.

Measurements of holotype: Length 1.26 mm.; head, length 0.114 mm., width 0.156 mm.; prothorax, length 0.156 mm., width 0251 mm.; pterothorax, width 0.305 mm.; fore wing, length 0.816 mm., width at base 0.090 mm., at middle 0.045 mm.; abdomen, width 0.372 mm.

Antennal segments:	1	2	3	4	5	6	7	8	9
Length (μ)	27	42	69	48	30	30	23	16	17
Width (μ)	31	29	27	29	21	19	15	11	7

Total length of antenna, 0.302 mm.

Described from 5 females taken in flowers of *Azalea nudiflora* L., at Beltsville, Maryland, May 2, 1915, by W. L. McAtee and L. O. Jackson.

This species bears a close resemblance to *H. arisæmæ*, but may be known by the curved lateral margins of segment 4 of the antennæ; the greater width of segment 5, which is distinctly more than half as wide as 4; the shorter and stouter terminal antennal segment; and the rather closely pubescent abdomen. The male, when discovered, will of course be found to lack the finger-like chitinous processes of the ninth tergite, which occur in *analis* and *vitis*.

Heterothrips lyoniæ sp. nov.

(Pl. III, Fig. 2.)

Female (*macropterous*).—Length about 1.1 mm. Color dark blackish brown with tarsi, distal ends of tibiæ, and third antennal segment pale grayish yellow; fore wings dark brownish gray except for a white, transverse, subbasal band.

Head about 1.7 times as wide as median dorsal length, distinctly shorter than prothorax, widest behind eyes, thence narrowing abruptly to eyes and tapering slightly to base; surface with a few minute spines, impressed and transversely rugose in front of anterior ocellus, smooth between ocelli, and with four or five anastomozing striæ on occiput; frontal costa with deep U-shaped emargination; ocellar area not delimited by chitinous lines. Eyes setose, two-thirds as long as head, as wide as their dorsal interval. Ocelli of posterior pair twice the diameter of anterior ocellus, a little less than half as wide as their interval. Antennæ about three times as long as head; segment 3 subconical, three times as long as wide, with deep incisions at basal fifth and basal two-fifths; 4 more than half as wide as long, roundly tapering to base; 5–8 more or less barrel-shaped, with sense cones; 9 about three times as long as wide; segments one and 2 nearly concolorous with head; 3 yellow, tipped with gray; 4 blackish brown, with an apical band of yellow and with middle of basal half paler; 5–9 blackish brown.

Prothorax about one and one-half times as long as head and about 1.5 times as wide as long, sides and posterior margin rounded, anterior margin straight; notum with a few short spines, its surface free from sculpture except for two or three anastomozing striæ near posterior margin. Wings of fore pair half as wide at middle as near base, the greatest subbasal width (exclusive of scale) about one-eighth the length of the wing; costal margin, anterior vein, and posterior vein with about 28, 25, and 18 short, stout spines, respectively, these being closer together toward base of wing.

Abdomen stout; pubescence very sparse, disposed on strong, anastomozing lines (much as in *H. flavicornis*, figured in Ins. Insc. Menstr., Vol. III, 1915, Pl. I, Fig. 3); posterior margins of abdominal tergites 1–7 fringed at sides with contiguous, chitinous scales or plates, whose apical margins are evenly produced in long slender spines, giving a comb-like appearance; median line of tergite of segment 1 unarmed; segments 2–5 with a few slender spines at middle of posterior margin; 6 and 7 with a regular fringe of stronger spines between the lateral plates; sternites 2–6 fringed across their entire posterior margins with chitinous plates, which are divided apically into about ten slender spines.

Measurements of holotype: Length 1.07 mm.; head, length 0.099 mm., width 0.149 mm.; prothorax, length 0.147 mm., width 0.223 mm.; pterothorax, width 0.284 mm.; fore wing, length 0.756 mm., width at base 0.090 mm., at middle 0.045 mm.; abdomen, width 0.396 mm.

Antennal segments:	1	2	3	4	5	6	7	8	9
Length (μ)	24	39	81	46	28	28	21	17	23
Width (μ)	30	27	27	27	20	16	12	10	7

Total length of antenna, 0.307 mm.

Male (*macropterous*).—Length about 0.8 mm. Color and structure essentially as in female. Tergite of abdominal segment 9 with 2 pairs of long, strong bristles behind middle, but without chitinous finger-like processes.

Measurements of allotype: Length 0.822 mm.; head, length 0.084 mm., width 0.129 mm.; prothorax, length 0.123 mm., width 0.199 mm.; pterothorax, width 0.240 mm.; fore wing, length 0.588 mm., width at base 0.078 mm., at middle 0.039 mm.; abdomen, width 0.216 mm.

Antennal segments:	1	2	3	4	5	6	7	8	9
Length (μ)	21	35	64	42	23	24	17	16	19
Width (μ)	28	24	22	22	18	14	11	10	7

Total length of antenna, 0.261 mm.

Described from 6 females and 1 male taken in flowers of *Lyonia mariana* L., at Browns Mills, New Jersey, June 3, 1915, by H. K. Plank.

The elongate third antennal segment, which is three times as long as its greatest width, allies this species to *decacornis* (described from Mexico), to *borinquen* (from Porto Rico), to *pectinifer* (known only from Arizona), and to *flavicornis* (a Panama species). The antennal coloration separates it at once from *flavicornis*, which, as the name indicates, has yellow antennæ; *decacornis* differs in the very long pedicel of the third segment of the antenna; *borinquen* is separable by the delimited ocellar area and the form of the chitinous abdominal plates; while *pectinifer* differs in the much longer and proportionately more slender fourth antennal segment.

Sericothrips baptisiæ sp. nov.

Female (*macropterous*).—Length about 0.9 mm. General color pale brownish yellow, with numerous, clearly defined, dark brown markings.

Head widest across eyes, uniform dark blackish brown in front of occipital line and on ventral and lateral surfaces to base of mouth-cone, abruptly pale yellow behind, about 1.5 times as wide as long and 2.2 times as wide as length in front of occipital line; cheeks straight, slightly converging posteriorly; frontal costa with broad, almost rectangular emargination; entire head transversely striate with close anastomozing lines, excepting the elevated ocellar region which is irregularly and minutely roughened; occipital line evenly arcuate, almost touching eyes or at least much closer to them than to base of head. Eyes nearly as long as the part of head anterior to occipital line, prominent, protruding, pilose, and about 0.8 as wide as their interval. Ocelli almost equidistant, pigment red. Antennæ about 2.4 times the length of head, dirty pale yellow in color, with extreme apex of 3, apical third of 4, pedicel and apical two-fifths of 5, and 6–8 smoky brown.

Prothorax about 1.1 times the length of head, or 1.7 times the length of head in front of occipital line, and about one and three-fourths times as wide as long, lateral and posterior margins rounded, anterior margin nearly straight; pronotum pale yellow except for a large, sellate, sharply defined, dark brown blotch occupying posterior two-thirds of median two-thirds, this blotch broadly emarginate in front and more narrowly

behind, the sides straight; coxæ dark brown, femora and tibiæ with a large brown blotch on outer surface at middle; pronotum with close, raised, transverse, anastomozing lines, and very minutely roughened between them, the sculpture slightly closer on the median blotch; bristles normal to the genus. Pterothorax dark blackish brown, with a pale yellowish girdle just behind middle coxæ; mesoscutum more closely striate than pronotum, the lines converging to three points on posterior margin; metascutum closely, longitudinally striate. Fore wings brown at extreme base, then with a white transverse band, the remainder of wing brownish gray, paler at middle and again at apex; nearly twice as wide just beyond scale as at middle, the greatest subbasal width (exclusive of scale) about one-tenth the length of wing; costal margin with about 28 equidistant bristles, anterior vein with about 24, and posterior vein with two widely separated ones near apex of wing. Middle and hind legs pale yellow in ground color, broadly marked with dark brown around middle of femora and along outer surface of tibiæ, coxæ dark brown.

Abdomen stout, about 1.6 times the width of prothorax; general color brownish yellow, darker toward base, with segments 7–10 dark brown; a black line extends across base of tergites 2–7 which are marked near base with three pairs of minute black dots (tergite 2 has only the inner two pairs), the inner two pairs approximate and just lateral to the median third; sternites 3–6 with two pairs of approximate similar dots at margins of median third; pubescence close and distinct, absent only from most of median third of tergite 1 and from apical half of median third of tergites 2–6; segment 10 divided above in apical two-fifths; bristles normal to the genus.

Measurements of holotype: Length 0.924 mm.; head, length 0.110 mm., length to collar 0.073 mm., width 0.165 mm.; prothorax, length 0.124 mm., width 0.216 mm.; pterothorax, width 0.276 mm.; fore wing, length 0.792 mm., width near base 0.078 mm., at middle 0.045 mm.; abdomen, width 0.360 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	21	37	49	47	40	46	9	14
Width (μ)	27	29	21	19	18	17	7	5

Total length of antenna, 0.263 mm.

Male (*macropterous*).—Length about 0.7 mm. Color as in female except that the tip of abdomen is brown only in segments 8–10, and that segment 8 also is marked at base with a black transverse line and three pairs of black dots.

Measurements of allotype: Length 0.696 mm.; head, length to collar 0.055 mm., width 0.140 mm.; prothorax, length 0.097 mm., width 0.190 mm.; pterothorax, width 0.216 mm.; fore wing, length 0.612 mm., width near base 0.057 mm., at middle 0.033 mm.; abdomen, width 0.228 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	17	32	44	42	35	41	8	12
Width (μ)	22	24	18	17	16	15	6	4

Total length of antenna, 0.231 mm.

Described from 10 females and 1 male, all taken by Mr. W. L. McAtee on *Baptisia tinctoria* L., at Mount Vernon, Virginia (type locality), June 27, 1915, and at Odenton, Maryland, June 20, 1915.

In many points of structure this species shows affinities with *cingulatus*, to which it is perhaps most closely related.

Frankliniella citripes sp. nov.

Female (*macropterous*).—Length about 1.6 mm. Color dark brown, somewhat paler anteriorly, with all tibiæ, tarsi, and most of fore femora, pale lemon yellow; segment 3 of antennæ, and at least basal half of 4 and 5, pale yellow; fore wings clear in basal third, brownish gray beyond, becoming paler toward apex.

Head about 1.2 times as wide as long, much narrowed behind; occiput with about three quite distinct, transverse, anastomozing lines and several fainter ones in front of them; interocellar bristles long, distinctly shorter than eyes, a large postocular pair two-thirds as long. Eyes about 0.6 the length of head, about two-thirds as wide as their interval. Ocelli subequal, those of posterior pair widely separated, distinctly behind middle of eyes. Antennæ of normal form and structure, about 2.2 times the length of head; segments 1 and 2 and 6–8 concolorous with head; 3–5 yellow, 4 infuscate in apical two-fifths and 5 in apical half.

Prothorax distinctly longer than head and about 1.4 times as wide as long, suborbicular in form with anterior margin straight; pronotum with a few very faint anastomozing lines along median portion of extreme anterior margin and with the posterior margin slightly transversely rugose; bristles unusually long, dark brown in color, of the same size, number, and arrangement as in *F. annulipes*.* Wings of fore pair about thirteen times as long as width at middle, set with unusually long, heavy, nearly equidistant brown bristles, of which there are about 30 on costa, 23 on anterior vein, and 18 on the posterior vein.

Abdomen broader than pterothorax; tergite of segment 1 with oblique anastomozing striæ, other segments with very indistinct striæ at sides; segment 10 divided above in apical two-thirds; abdominal bristles long, stout, nearly black.

Measurements of holotype: Length 1.60 mm.; head, length 0.172 mm., width 0.204 mm.; prothorax, length 0.196 mm., width 0.281 mm.; pterothorax, width 0.396 mm.; fore wing, length, 1.128 mm., width near base 0.120 mm., at middle 0.085 mm.; abdomen, width 0.456 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	33	54	75	69	46	58	11	15
Width (μ)	38	30	27	24	21	21	9	7

Total length of antenna, 0.361 mm.

Described from 5 females taken by Prof. Patricio Cardin, at Santiago de las Vegas, Cuba, April 23, 1915, in citrus flowers.

Allied to *F. annulipes* and *F. auripes*, but easily distinguished from

* See Ins. Insc. Menstr., Vol. III, Pl. II, Fig. 3; May, 1915.

the former by the color of the legs and from the latter by the longer prothorax and the long, strong bristles of the prothorax and fore wings The figure of *annulipes* cited above would serve almost equally well for the present species.

Physothrips pictus sp. nov.

Female (*macropterous*).—Length about 1.6 mm. Color bright yellow, with brown markings on pterothorax and antennæ, with fore wings brown in second and fourth fourths, and with abdominal tergites 2–4 and 6–7 fasciate with brown, 8 with a transverse brown blotch, and 9–10 dark brown beyond basal sixth of 9.

Head about 1.3 times as wide as long, slightly broadest behind eyes, sides evenly arcuate to eyes and to base; occiput with five transverse raised lines, only slightly anastomozing, the anterior one strongest, the remainder of head smooth; frontal costa narrow, with a very shallow notch; interocellar bristles prominent, brown, equal in length to eyes, situated well within the ocellar triangle, their bases being directly behind the lateral margins of anterior ocellus; all other cephalic bristles minute. Eyes 0.6 as long as head, and slightly narrower than their interval. Ocelli nearly equidistant, subequal in size, posterior pair about opposite posterior half of eyes; pigment bright red. Antennæ fully 2.5 times the length of head, of normal form and structure, segment 3 slightly longer than 4, the sense cones on 3 and 4 forked; segments 1–3 yellow, 1 and 2 darkened laterally with brown; 4 yellow in basal two-fifths, remainder brown, paler at apex; 5 yellow in basal third, thence brown, somewhat annulate with paler, the apex darkest; 6 a rich nut-brown in basal two-thirds, the remainder and all of 7–8 mouse-gray.

Prothorax about 1.2 times the length of head and about 1.5 times as wide as long; pronotum smooth; two strong dark bristles, distinctly longer than interocellars, at posterior angles; all other bristles small, brown in color, and quite distinct, the mediad posterior marginal pair and one or two sublateral pairs slightly larger. Wings of fore pair fifteen times as long as width at middle, pale yellowish with two dark brown bands occupying approximately the second and fourth fourths; fore vein with seven dark bristles near base (the last one just within the first dark band) and three widely separated ones in apical portion; hind vein with a series of about thirteen equidistant bristles beginning behind the last one in the basal series of the fore vein. Legs uniform lemon yellow.

Abdomen of normal form, almost without sculpture, lemon yellow in color, with dorsal dark brown blotches on each of tergites 2–4, occupying all except the posterior lateral angles; segment 5 uniform yellow; tergites 6 and 7 dark brown; 8 with a transverse, elliptical blotch occupying a little more than the basal half of the segment and extending well to the sides; 9 abruptly dark brown beyond basal sixth; 10 dark brown; segment 8 with a very fine regular, close, complete comb; segment 10 divided above almost to base; abdominal bristles long, strong, nearly black.

Measurements of holotype: Length 1.64 mm.; head, length 0.150 mm., width 0.192 mm.; prothorax, length 0.175 mm., width 0.268 mm.;

pterothorax, width 0.368 mm.; fore wing, length 1.02 mm., width near base 0.108 mm., at middle 0.068 mm.; abdomen, width 0.438 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	39	53	73	63	50	63	13	25
Width (μ)	36	32	25	24	21	20	8	6

Total length of antenna, 0.379 mm.

Male (*macropterous*).—Length about 1.2 mm. Color almost identical with that of female. Ninth abdominal tergite with three pairs of stout, strong, black spines (the second pair longest) whose bases form an almost perfect hexagon; sternites without the usual pale sensory areas.

Measurements of allotype: Length 1.22 mm.; head, length 0.122 mm., width 0.168 mm.; prothorax, length 0.156 mm., width 0.223 mm.; pterothorax, width 0.294 mm.; fore wing, length 0.768 mm., width near base 0.075 mm., at middle 0.048 mm.; abdomen, width 0.252 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	32	45	59	51	43	52	9	19
Width (μ)	30	29	24	22	19	18	7	5

Total length of antenna, 0.310 mm.

Described from 4 females and 2 males taken at Ibadan, Southern Nigeria, in flowers of *Melia azedarach* Linné, January 14, 1915, by Arthur W. Jobbins-Pomeroy.

An unusually pretty species, which may at once be known by its coloration.

Odontothrips pictipennis sp. nov.

(Pl. III, Fig. 3.)

Female (*macropterous*).—Length about 1.3 mm. Color blackish brown, with tarsi, fore tibiæ, and antennal segments 3 and 4 yellow; fore wings white, tipped with gray and with a dark gray band in middle third.

Head 1.28 times as wide as median dorsal length, cheeks almost straight and parallel; frontal costa very narrow, not emarginate; vertex transversely rugose, slightly impressed; occiput with several rather strong, transverse, anastomozing lines; interocellar bristles long and strong, nearly half the length of head; all other cephalic bristles minute. Eyes setose, about 0.6 as long as head and about 0.7 as wide as their interval. Ocelli subequal in size, with maroon pigment, posterior ocelli distinctly behind middle of eyes, and about 0.6 as far from anterior ocellus as from each other. Antennæ about two and one-third times as long as head; segments 1 and 2 concolorous with head; 3 and 4 yellow, the latter infuscate apically; 5–8 dark brown; sense cone on inner surface of segment 6 attached *at base only*.

Prothorax about 1.3 times as long as head and nearly 1.4 times as wide as long, suborbicular in form with anterior margin nearly straight; pronotum smooth; posterior angular bristles long and strong, about one-third the length of prothorax; other bristles small and inconspicuous. Wings of fore pair brown at *extreme* base, *white* beyond in basal third, gray in middle third, and with the apical third *white*, except for a small

gray spot at extreme tip of wing; fore wing about ten times as long as width at middle and about 1.36 times as wide just beyond scale as at middle; costal margin, anterior vein, and posterior vein with 24, 16, and 15 bristles, respectively, those of the anterior vein distributed evenly in basal two-thirds, except for two close to apex of wing, those of posterior vein equidistant, beginning at the fork. Legs stout; fore tibia with a long hook on lower outer surface of apex, and with a calcar on lower inner surface.

Abdomen moderately stout, smooth, broader than pterothorax; posterior margin of segment 8 with a broad median gap in the comb-like fringe of spines; segment 10 not divided above, though irregularly weakened along median line.

Measurements of holotype: Length 1.30 mm.; head, length 0.126 mm., width 0.161 mm.; prothorax, length 0.164 mm., width 0.224 mm.; pterothorax, width 0.300 mm.; fore wing, length 0.876 mm., width at base 0.090 mm., at middle 0.066 mm.; abdomen, width 0.358 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	33	46	53	49	36	51	10	18
Width (μ)	34	29	25	25	21	23	9	7

Total length of antenna, 0.296 mm.

Described from one female taken in a flower of *Azalea nudiflora* L., at Great Falls, Virginia, May 19, 1915, by W. L. McAtee.

The coloration of the wings and antennæ, and the mode of attachment of the sense-cone on the inner surface of the sixth antennal segment, separate this species quite sharply from its congeners. For the opportunity of comparing it with the described European forms, I must express my obligation to Mr. C. B. Williams.

Pseudothrips spadix sp. nov.

Female (*macropterous*).—Length about 1.4 mm. Color hazel-brown; legs yellow, shaded with brown; segment 3 of antennæ gray-yellow, 4–6 successively darker.

Head about 1.3 times as wide as long, slightly broadest across eyes, sides nearly straight, converging somewhat to base; vertex depressed; frontal costa narrow, not emarginate; occiput with a few anastomozing lines; interocellar bristles very long, half the length of head; a pair of approximate minute bristles in front of anterior ocellus and a similar pair near inner margin of eyes; postocular bristles minute, subequal. Eyes about two-thirds the length of head, distinctly narrower than their interval. Ocelli nearly equidistant, subequal in size, posterior pair slightly behind middle of eyes; pigment brick-red. Antennæ 9-segmented, 2.5 times as long as head, slender; segment 1 short, about as wide as long; 2 about 1.7 times as long as wide and 1.4 times the length of 1; 3 and 4 long and slender, about three times as long as wide, pedicellate, constricted at apex, with forked sense-cones; 5 slightly narrower than either 4 or 6, about 2.6 times as long as wide; 6–9 closely united, together nearly 1.2 times the length of 3; segments 1 and 2 concolorous with head;

3 grayish yellow; 4–6 successively darker; 7–9 slightly paler. Maxillary palpi three-segmented.

Prothorax 1.1 times as long as head and about one and one-half times as wide as long; pronotum smooth; one prominent dark bristle at posterior angle, about 0.8 the length of prothorax, and another pair half as long on posterior margin near median line; other bristles short and inconspicuous. Wings of fore pair about twelve times as long as width at middle, nearly uniform brownish gray; costa, principal vein, and posterior vein with about 27, 20, and 14 nearly equidistant, long bristles, respectively.

Abdomen of normal form, with a few very faint lines of sculpture at sides; tergites 2–6 with a gradually increasing number of slender spines along lateral portion of posterior margins; 7 and 8 with an uninterrupted posterior fringe of similar spines; segments 9 and 10 rather long, acutely conical, with long, prominent, dark bristles; 10 divided above in apical four-fifths.

Measurements of holotype: Length 1.36 mm.; head, length 0.140 mm., width 0.185 mm.; prothorax, length 0.156 mm., width 0.240 mm.; pterothorax, width 0.312 mm.; fore wing, length 0.840 mm., width near base 0.090 mm., at middle 0.067 mm.; abdomen, width 0.360 mm.

Antennal segments:	1	2	3	4	5	6	7	8	9
Length (μ)	36	50	72	62	49	48	9	11	15
Width (μ)	35	30	25	21	19	21	14	11	9

Total length of antenna, 0.352 mm.

Described from 4 females taken at Panama City, Panama, in 1915, "in blue flower on bush," by James Zetek.

A very distinct species, easily known by its large size and dark color.

Chilothrips gen. nov.

(Χείλος, a lip; Θρίψ, a wood worm.)

Body almost free from sculpture. Head short and broad, nearly twice as wide as long, broadest near base; vertex with an acute tubercle below anterior ocellus. Eyes small, shorter than cheeks and only about half as wide as their interval. Antennæ eight-segmented, inserted on lower surface of head below vertex; segments 3 and 4 with forked sense-cones. Mouth-cone very large and elongate, heavily chitinized, extending far onto mesosternum; maxillary palpi three-segmented, basal segment longest, middle segment shortest. Prothorax long, fully twice the length of head, only slightly widened behind, with sides nearly straight; posterior angles with one pair of short bristles. Wings slender, only slightly wider at base, bristles arranged as in *Oxythrips*. Abdomen of female sharply conical at tip, the tenth segment distinctly longer than ninth.

Type—Chilothrips pini sp. nov.

Closely related to *Oxythrips*, but separable by the enlarged mouth-cone, the short head, and the insertion of the antennæ below the vertex.

Chilothrips pini sp. nov.

Female (*macropterous*).—Length about 1.4 mm. Color amber-brown, tinged with rufous, with abdominal segments margined at based with a narrow, dark brown line; antennæ slightly paler in the three basal segments, legs paler at articulations; fore wings brownish drab.

Head nearly twice as wide as median dorsal length, broadest near base, cheeks nearly straight, slightly diverging behind, anteriorly abruptly rounded to eyes; occiput with about ten distinct anastomozing lines; interocellar bristles small and inconspicuous; other bristles minute. Eyes very minutely setose, shorter than cheeks and only about half as wide as their interval. Ocelli subequal in size, the posterior pair rather widely separated; pigment red. Antennæ three times as long as head, inserted below vertex, formed as in *Oxythrips;* segment 1 broader than long and about two-thirds the length of 2, which is about two-thirds as wide as long; apical segments quite slender. Mouth-cone very large and elongate, strictly conical and with sides straight, reaching about one-third across mesosternum.

Prothorax fully twice the length of head, sides straight, very slightly diverging posteriorly, where it is slightly wider than median dorsal length; posterior angles with one pair of short bristles; surface nearly smooth, with a few faint striae near posterior margin. Wings of fore pair pale brownish drab, slightly darker apically; costa with about 31 bristles; principal vein with a basal group of about four bristles, a group of three at the fork, and three spaced evenly in apical two-thirds; posterior vein with a nearly equidistant series of about ten, beginning just after the second group of the principal vein. Legs moderately slender; fore tarsus unarmed on outer lower surface of tip.

Abdomen slightly wider than pterothorax, smooth; segment 10 acutely conical, longer than ninth, not divided above; bristles moderately long, yellow.

Measurements of holotype: Length 1.38 mm.; head, length 0.096 mm., width 0.185 mm.; prothorax, length 0.204 mm., width 0.218 mm.; pterothorax, width 0.271 mm.; fore wing, length 0.900 mm., width near base 0.091 mm., at middle 0.063 mm.; abdomen, width 0.336 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	27	42	48	43	41	56	13	18
Width (μ)	34	27	21	20	19	20	8	6

Total length of antenna, 0.288 mm.

Described from 42 females, all taken on twigs and leaves of *Pinus virginiana*, as follows: Bladensburg, Maryland (type locality), April 8, 1915 (2 females) [L. O. Jackson]; Bladensburg, Maryland, April 12, 1915 (32 females) [L. O. Jackson, E. R. Kalmbach, and J. D. Hood]; Dyke, Fairfax County, Virginia, April 15, 1915 (8 females) [L. O. Jackson].

The extraordinary mouth-cone of this insect has prevented its assignment to the genus *Oxythrips*, with which it agrees, however, in many details of structure, particularly those pertaining to the antennæ and

wings. Mounted specimens invariably have the head tipped slightly downward, due to the forcing back of the mouth-cone by unavoidable pressure between the coverglass and slide; and this has, of course, affected the accuracy of the measurements and proportions given above, and may be partly responsible for the apparent insertion of the antennæ below the vertex.

Haplothrips malifloris sp. nov.

Female (*macropterous*).—Length about 1.6 mm. Color dark blackish brown, with fore tarsi, apices of fore tibiæ, and third antennal segment paler; fore wings clear, with the scale and the extreme base dark brown.

Head about 1.26 times as long as wide, with sides slightly arcuate, and nearly as wide at posterior margin of eyes as at base; vertex subconically produced over base of antennæ to far in front of eyes, the anterior ocellus overhanging and much surpassing frontal costa; dorsal and lateral surfaces with faint, close, anastomozing striæ and a few minute spines; postocular bristles pointed, about 0.8 the length of eyes. Eyes small, about 0.3 as long as head and 0.6 as wide as their interval. Ocelli anterior in position, the posterior pair opposite anterior third of eyes. Antennæ twice as long as head; segment 1 a little longer than wide; 2 about 1.7 times as long as wide; 3 about twice as long as wide, inner surface less arched than outer; 4 swollen, longest and widest in entire antenna, about 1.8 times as long as wide; 5 nearly twice as long as wide, obliquely truncate at apex; 6 nearly 2.4 times as long as wide, pedicellate, obliquely truncate at apex; 7 about 2.5 times as long as wide, broadest at middle, pedicellate, sides evenly arcuate; 8 subconical, with length more than twice the width, firmly united to 7; sense cones short, inconspicuous; formula: 3, 0–1; 4, 2–2; 5, 1–1+[1]; 6, 1–1+[1]; 7 with one on dorsum near apex; antennæ concolorous with body, except segment 3, which is paler in general color and distinctly yellowish along middle and at base.

Prothorax along median dorsal line about half as long as head and (inclusive of coxæ) 2.5 times as wide as long, surface smooth; all usual bristles present, pointed; the two pairs at posterior angles about equal in length to postoculars, the others much shorter. Wings distinctly narrowed at middle, the fore pair rather broadly expanded along costal margin near base, and with the scale and extreme base dark brown; third subbasal bristle long, pointed, the others very much shorter; no subapical accessory hairs on posterior margin. Tarsal tooth minute, arising at a right angle.

Abdomen only slightly wider than pterothorax; tergite 1 almost smooth; tergites 2–6 very faintly striate with subreticulate, anastomozing lines; distal tergites nearly smooth. Tube expanded basally, about two-thirds as long as head, a little more than twice as long as basal width, and slightly more than twice as wide at base as at apex. Bristles pointed, terminal ones light brown and distinctly shorter than tube, others colorless.

Measurements of holotype: Length 1.64 mm.; head, length 0.223 mm.,

width 0.178 mm.; prothorax, length 0.120 mm., width (inclusive of coxæ) 0.301 mm.; pterothorax, width 0.360 mm.; abdomen, width 0.392 mm.; tube, length 0.150 mm., width at base 0.069 mm., at apex 0.031 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	36	50	52	57	52	55	48	28
Width (μ)	29	29	27	32	28	23	19	12

Total length of antenna, 0.378 mm.

Male (*macropterous*).—Much like female and of nearly the same size, but with more slender antennæ. Fore legs scarcely more enlarged than in female; tarsi more strongly toothed, the tooth nearly equilaterally triangular.

Measurements of allotype: Length 1.62 mm.; head, length 0.228 mm., width 0.166 mm.; prothorax, length 0.128 mm., width (inclusive of coxæ) 0.302 mm.; pterothorax, width 0.360 mm.; abdomen, width 0.367 mm.; tube, length 0.162 mm., width at base 0.069 mm., at apex 0.033 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	36	50	54	58	56	57	49	28
Width (μ)	29	29	27	31	26	22	18	12

Total length of antenna, 0.388 mm.

Described from 22 females and 6 males taken from the flowers of apple, at Roswell, New Mexico, in May, 1912, by the late Mr. A. G. Hammar.

A very distinct species, remarkable for the produced vertex and the absence of accessory hairs on the posterior margin of the fore wings. It takes a natural place in the vicinity of *jonesii* and *halophilus*.

Trichothrips fuscicornis sp. nov.

Female (*macropterous*).—Length about 2 mm. Color blackish brown, paler posteriorly, with tarsi, apices of tibiæ, and tube paler, the tube with a decided suffusion of orange; antennæ concolorous with body.

Head about 1.17 times as long as wide, sides straight, abruptly rounded to eyes and slightly converging posteriorly, occipital region faintly subreticulate with anastomozing lines; postocular bristles pointed, about one and one-third times as long as eyes; other bristles minute. Eyes small, only about one-fifth the length of head. Anterior ocellus directed slightly forward, and somewhat overhanging; posterior ocelli opposite middle of eyes. Antennæ about 1.9 times the length of head; segment 1 about three-fourths as wide as long, tapering slightly to apex; 2 longer and narrower than 1, subequal in length to 3–5, which are abruptly pedicellate and successively narrower; 7 shorter than either 6 or 8; 8 lanceolate, pedicellate; sense-cones short and moderately stout; formula: 3, 1–2; 4, 2–2; 5, 1–1+[1]; 6, 1–1+[1]; 7 with one on dorsum near apex. Mouth-cone reaching fully two-thirds across prosternum; labrum just attaining tip of labium, which is rather broadly rounded.

Prothorax smooth, about 0.6 as long as head and (inclusive of coxæ) a

little more than twice as wide as long; all usual bristles present, the two pairs at the posterior angles longest, subequal in length to postoculars; coxal bristle somewhat shorter, midlaterals still shorter, anterior marginal and anterior lateral pairs only about half as long. Pterothorax slightly wider than prothorax, narrower posteriorly. Wings of equal width throughout, light gray-brown in color, slightly paler at either end; posterior fringe double for four or five hairs; the three subbasal spines on fore wing of equal length, pointed. Fore tarsus unarmed.

Abdomen of normal form and structure, wider than pterothorax. Tube 0.8 the length of head, slender, twice as wide at base as at apex, sides straight. Bristles yellow, moderately long and pointed, those on segment 9 slightly more than half as long as tube; terminal bristles about three-fourths the length of tube.

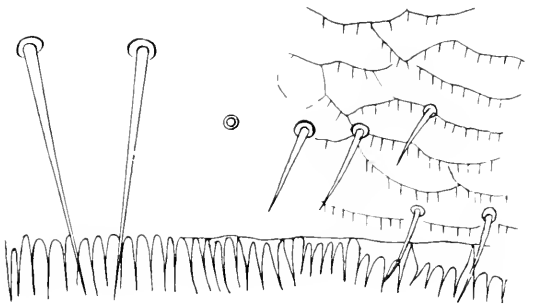
Measurements of holotype: Length 2.04 mm.; head, length 0.288 mm., width 0.246 mm.; prothorax, length 0.180 mm., width (inclusive of coxæ) 0.390 mm.; pterothorax, width 0.438 mm.; abdomen, width 0.498 mm.; tube, length 0.228 mm., width at base 0.087 mm., at apex 0.042 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	63	72	72	72	71	65	61	67
Width (μ)	46	39	43	42	39	37	28	19

Total length of antenna, 0.543 mm.

Described from one female taken at Annapolis, Maryland, May 8, 1915, by O. D. Knight and the writer. It flew aboard a naval launch well out in the River Severn.

The antennal coloration and the pedicellate eighth antennal segment, together with the unarmed fore tarsi and the long tube, distinguish this species quite readily.



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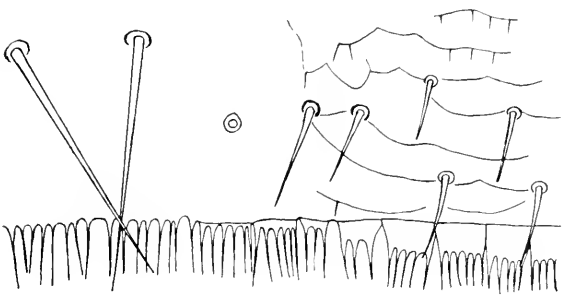

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Fig. 1.—*Heterothrips azaleæ*, posterior margin of sixth abdominal tergite at right of median line, female, paratype.

Fig. 2.—*Heterothrips lyoniæ*, posterior margin of sixth abdominal tergite at right of median line, female, holotype.

Fig. 3.—*Odontothrips pictipennis*, segments 6-8, right antenna, female, holotype.

Fig. 4.—*Odontothrips ulicis* (Haliday), segments 6-8, right antenna, female (England, ex collection C. B. Williams).

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

NOTES ON THE GENERA ISOTHRIX WAGNER AND PHYLLOMYS LUND.

Various species of Loncherinæ with soft or bristly (not spiny) pelage are currently referred to the genus *Isothrix* Wagner, but little attention has been devoted to cranial or dental modifications and such assignment seems, in several instances, open to question.

The genus *Isothrix*, as originally proposed by Wagner,* included three species: *I. bistriata*, *I. pachyura*, and *I. pagurus*, but no type was mentioned and I am unaware that one has been fixed upon by subsequent authors. The skull of *I. pachyura* was unknown to Wagner and the other species, while apparently congeneric, differ appreciably in dentition as figured by him.† In order, therefore, to abolish the resulting uncertainty, the first species listed, *Isothrix bistriata* (Natterer MS.) Wagner, from the Rio Guaporé and the Rio Negro is selected as the type of the genus *Isothrix* Wagner.

Comparison of the dentition of species ranging in Panama with this type (l. c.) reveals apparently important differential characters, especially the complete transverse divisions of the molar crowns which persist until advanced age, instead of the irregular reëntrant angles and enamel folds characterizing the genera *Isothrix* and *Loncheres* at similar stages of wear. While these species differ from *Isothrix*, and from *Loncheres* as typified by *L. cristatus* (Desmarest),‡ close agreement in dentition with *Phyllomys* Lund is evidenced by comparison with figures accompanying his second account.§ This generic name based on material from bone caves in southern Brazil, and treated by authors as synonymous with *Loncheres* Illiger, seems available for a group transcontinental in distribution. The Brazilian species of this group figured by Winge‖ as *Loncheres armatus* and said to have broad spines mixed with the fur, strikingly resembles *Loncheres labilis* Bangs and *Isothrix darlingi* Goldman in cranial details. The latter species differs in color and the dorsal armature is composed of narrow, finely grooved bristles instead of broad spines, characters appar-

* Wiegmann's Archiv. Naturgesch., 1845, Bd., I, pp. 145–146.

† Schreber's Saügthiere, Suppl. III, p. 335, Taf. 239 D, fig. 5.

‡ Type fixed by Allen, Bull. Amer. Mus. Nat. Hist., N. Y., XII, p. 258, 1899.

§ K. Danske Vidensk. Selskab., Kjöbenhavn, VIII, 243–244, pl. 21, figs. 12–13, 1841.

‖ E Museo Lundii, III, 1888, pp. 71, 80, pl. VI, figs. 3–4 and pl. VII, figs. 14–15.

ently specific in value, since they are not correlated with trenchant cranial or dental features. As nearly as can be determined by reference to published figures *Phyllomys brasiliensis* Lund (l. c.) is identical with the earlier described species currently recognized as *Loncheres armatus* (I. Geoffroy).

Species of the genus *Phyllomys* will therefore stand as follows:

PHYLLOMYS ARMATUS (I. Geoffroy).

Mus hispidus Lichtenstein, Darstellung neu. o. wenig. bekannt. Säugeth. (p. unnumbered) Taf. XXXV, fig. 2, 1827–1834. (Said to be from Cayenne.)

Nelomys armatus I. Geoffroy, Ann. Sci. Nat., Paris, ser. 2, X, p. 125, Aug. 1838 (new name for *Mus hispidus* Lichtenstein).

Phyllomys brasiliensis Lund (l. c.). (East slope Serra do Espinhaço, Minas Geraes, Brazil.

Loncheres armatus Winge (l. c.). (Brazil.)

PHYLLOMYS CANICEPS (Günther).

Loncheres caniceps Günther, Proc. Zool. Soc. London, 1876, p. 745, pl. 73. (Medellin, Antioquia, Colombia).

[*Isothrix*] *caniceps* Trouessart, Cat. Mamm., 1897, p. 606.

PHYLLOMYS LABILIS (Bangs).

Loncheres labilis Bangs, Am. Nat., XXXV, p. 638, August, 1901 (San Miguel Island, Panama).

[*Isothrix*] *labilis* Trouessart, Cat. Mamm., Suppl., 1904, p. 504.

PHYLLOMYS DARLINGI (Goldman).

Isothrix darlingi Goldman, Smiths. Misc. Coll., Vol. 60, p. 12, September 20, 1912. (Marraganti, Rio Tuyra, eastern Panama).

—*E. A. Goldman.*

THE GENERIC NAMES EPIMYS AND RATTUS.

The generic name *Epimys* Trouessart, 1881, for the Norway and black rats and their allies, is antedated in the same sense by *Rattus* Fitzinger, Sitz-ber. Akad. Wien, Vol. 56, pt. 2, p. 63, 1867; *Rattus* "S. D. W.," Analyst, Vol. 4, p. 72, 1836; *Rattus* Donovan, Nat. Repos., Vol. 3, pl. 73, text p. 1, 1834 [1827]; and by *Rattus* (misprinted *Ruttus*) G. Fischer, Das Nationalmuseum der Naturgeschichte zu Paris, Vol. 2, p. 128, 1803. The name *Epimys* must therefore give way to *Rattus* Fischer, 1803, type species *Mus decumanus* = *Rattus norvegicus* (Erxleben). While not vital in this connection, it is interesting to note that the type species of *Rattus* Donovan, 1827, is *Rattus rattus* (Linnæus) by tautonymy, and not *Rattus donovani*, a species of *Arvicanthis* (*Lemniscomys*). Donovan really creates for the "rat tribe" a new genus *Rattus*, in which he includes, besides the new species *R. donovani*, the old species *Mus arvalis*, *M. decumanus*, and *M. rattus*.

—*N. Hollister.*

PREOCCUPIED NAMES IN THE GENUS ANDRENA (HYMENOPTERA).

Following are some new names proposed to replace preoccupied names:

Andrena ciliatula n. n. for *ciliata* Schenck, Jahrb. Ver. Naturk. Nassau, **21** (375), 1867, not *ciliata* Gmelin, Linné: Syst. Nat. Ed. 13a **1** (2792), 1790.

Andrena viridescens n. n. for *cyanescens* Nylander, Not. Sael. Faun. & Fl. Fen. Förh. **2** (259), 1852, not *cyanescens* Haliday, Trans. Linn. Soc. Lond. **17** (321), 1836.

Andrena haemorrhoidula n. n. for *hattorfiana* var. *haemorrhoidalis* Kirby, Mon. Ap. Ang. **2** (141), 1802, not *haemorrhoidalis* Fabricius, Syst. Ent. (377), 1775.

Andrena interruptula n. n. for *interrupta* Schenck, Jahrb. Ver. Nat. Nass. **21** (300), 1867, not *interrupta* Panzer, Krit. Rev. **2** (196), 1806.

Andrena nitidella n. n. for *nitidula* Perez, Pr.-verb. Soc. Bord. **58** (lxxxvi), 1903, not *nitidula* Jurine, Nouv. Meth. Class. Hym. (231), 1807.

Andrena accepta n. n. for *pulchella* Robertson, Trans. Am. Ent. Soc. **18** (57), 1891, not *pulchella* Jurine, Nouv. Meth. Class. Hym. (231), 1807.

Andrena quadricinctula n. n. for *quadricincta* Brullé, Exp. Sc. Mor. Zool. **2** (354), 1832, not *quadricincta* Olivier, Encycl. Method. Ins. **4** (138), 1789.

Andrena succinctula n. n. for *succincta* Imhoff, Isis (1205), 1832, not *succincta* Fabricius, Spec. Insect. **1** (474), 1781.

Andrena morawitzella n. n. for *virescens* Morawitz, Fedt. Turk. Mell. **2** (209), 1876, not *virescens* Fabricius, Spec. Ins. **1** (474), 1781.

—*Henry L. Viereck.*

THE STATUS OF SIGMODONTOMYS ALFARI ALLEN AND ORYZOMYS OCHRACEUS ALLEN.

In revising species of the murine genus *Oryzomys* I find it necessary to transfer *Oryzomys ochraceus* Allen to the genus *Nectomys*, and it proves to be not only congeneric but specifically identical with *Sigmodontomys alfari* Allen.

The species and synonymy will therefore stand as follows:

NECTOMYS ALFARI (Allen).

Sigmodontomys alfari Allen, Bull. Amer. Mus. Nat. Hist., IX, p. 39, March 11, 1897. (Jimenez, Costa Rica.)

Oryzomys ochraceus Allen, Bull. Amer. Mus. Nat. Hist., XXIV, p. 655, October 13, 1908. (Rio Grande, Nicaragua.) —*E. A. Goldman.*

NOTE ON THE NAME CORYNORHINUS MEGALOTIS.

In Dr. Glover M. Allen's recent paper on the genus *Corynorhinus* (Bull. Mus. Comp. Zool., Harvard, LX, p. 333) the name *Corynorhinus megalotis* is adopted for one of the species, based on Rafinesque's *Vespertilio megalotis* of 1818. But the latter name is antedated and invalidated by Bechstein's *Vespertilio megalotis*,* dating from 1800, and the American bat should therefore apparently stand as *Corynorhinus rafinesquii* (Lesson), 1827. —*Oldfield Thomas.*

* Pennant's Uebers. Vierf. Thiere, II, p. 622.

NOTE ON SOME FOREIGN GRASSES.

The cultivated sorghums and their allies have been included in the genus *Andropogon* or have been segregated as a distinct genus under the name *Sorghum* of Persoon. The group appears to be of generic rank but under the method of establishing type species for genera, the name for the group should be *Holcus* instead of *Sorghum*. The type species of Linnæus' genus *Holcus* is evidently his *Holcus sorghum*,* consequently this name should be retained for the group which contains *Holcus sorghum*, if this group be recognized as distinct from *Andropogon*.

Under the title "*Andropogon halepensis* and *Andropogon sorghum*," Piper† has recently discussed these species and has described several new subspecies. The specimens submitted by the Office of Seed and Plant Introduction belong to the following subspecies as recognized under *Holcus:*

HOLCUS HALEPENSIS L., including the awnless form (*Andropogon halepensis anatherus* Piper).

HOLCUS HALEPENSIS MILIFORMIS (Schult.).
Andropogon miliformis Schult.

HOLCUS HALEPENSIS PROPINQUUS (Kunth).
Andropogon propinquus Kunth.

HOLCUS SORGHUM L.

HOLCUS SORGHUM EXIGUUS (Forsk.).
Holcus exiguus Forsk.

HOLCUS SORGHUM SUDANENSIS (Piper).
Andropogon sorghum sudanensis Piper.

HOLCUS SORGHUM EFFUSUS (Hack.).
Andropogon sorghum effusus Hack.

HOLCUS SORGHUM VERTICILLIFLORUS (Steud.).
Andropogon verticilliflorus Steud.

HOLCUS SORGHUM HEWISONI (Piper).
Andropogon sorghum hewisoni Piper.

HOLCUS SORGHUM DRUMMONDII (Nees).
Andropogon drummondii Nees.

Other specimens submitted for identification belong to species that have not been published under the generic names now used. These are:

ALLOTEROPSIS ECKLONIANA (Nees). South Africa.
Bluffia eckloniana Nees, Delect. Sem. Hort. Hamburg 8. 1834.

CHAETOCHLOA AUREA (Hochst.). South Africa.
Setaria aurea Hochst.; A. Br. Flora **44**: 276. 1841.

CHAETOCHLOA LACHNEA (Nees). Brazil.
Panicum lachneum Nees, Agrost. Bras. 248. 1829.

—*A. S. Hitchcock.*

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* See Contr. U. S. Nat. Herb. 12: 195. 1909.

† Proc. Biol. Soc. Washington **28**: 25. 1915. Synonymy and citations are given.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

OVIS SHELDONI, A NEW MOUNTAIN SHEEP FROM SIERRA DEL ROSARIO, SONORA, MEXICO.

BY C. HART MERRIAM.

When hunting mountain sheep in the Gila and Tule Ranges in southwestern Arizona and the Viejo and Pinacate Ranges in northern Sonora in 1913 and 1914, Charles Sheldon of New York noticed a low ridge, the Sierra del Rosario, lying parallel to, and to the southwest of the Gila Range (also known as the Sierra de las Tinajas Altas), from which it is separated by about 12 miles of desert. To the northwest, west, and south there are no mountains, the desert stretching all the way to the Colorado River and Gulf of California.

Sheldon knew that Carl Lumholtz had ridden out to El Rosario and reported seeing sheep tracks there. Believing that the complete isolation of the range in connection with the nature of the surrounding desert would prevent sheep from crossing to it, Sheldon felt that the animal would be likely to differ from that of the adjacent mountains. In the hope of determining this point, he undertook, in the early part of March of the present year, a special trip to El Rosario, carrying water from Tinajas Altas, 20 miles away. On his way back (March 15, 1916) he wrote me from Wellton, Arizona :

> I have just returned from a very hard hunt for sheep in the mountain of El Rosario. This mountain is parallel with the Gila Range, 12 miles distant, from which it is separated by a flat desert with six or seven miles of soft sand dunes. The part of the mountain large enough for sheep is five miles long and only 1500 to 1700 feet in altitude, and is of the honeycomb type like the Gilas. There is not a drop of water in the whole

range, and practically no cactus on or near it. The nearest water is 20 miles away in the Gilas. There are no signs of anybody having been there for a long time. Lumholtz rode a horse partly around it and reported sheep tracks.* This report induced me to go there, for I felt that if there were sheep on the mountain they would show the effects of long isolation and inbreeding. They must live without water other than that obtained from the scarce rains and scanty vegetation.

I rode over there from Wellton in three days, packed water from the Gila Range, and remained alone for eight days, climbing the crags and hunting for sheep. I soon found that sheep existed there, but only a very few, perhaps not more than five or six, certainly less than ten. At the north end I saw a ewe and lamb; at the south end a mature ram—no other fresh signs on the whole mountain. I undertook the needle-in-the-haystack task of hunting high along the crest for the ram, and finally killed him on the third day after seeing him. Also, I picked up a bleached skull of a mature ewe.

As I had expected, the ram shows the effect of the severe environment. It is a dwarf, the smallest I have ever seen in the United States, Mexico or Alaska. Its skull is very much smaller than skulls from the Gila Range, and shows marked differences. I have Gila skulls here for comparison. I think the ewe will show corresponding differences. Therefore on El Rosario we have the smallest sheep in America; whether you would record this fact in specific terms I do not know.

In another letter he says:

During the long periods between rains—commonly four or five months and sometimes more than eight months—the sheep must live without water for there are no rocks that will hold water more than three or four days. No rain fell between August, 1915, and the time of my visit in March, 1916. The bladder of the ram killed measured two inches and contained only traces of a discolored liquid.

The ram fell on a very steep slope. I had to spend a long time in building a platform of rocks in order to measure its length and height. Even then these measurements are only approximate. The only positive fact about them is that I was most careful to make them greater than they really were.

Examination of Sheldon's specimens confirms the correctness of his conviction that the El Rosario animal is a dwarf sheep previously unknown.

The new form may be characterized as follows:

Ovis sheldoni sp. nov.

Type No. 210585, ♂ adult, U. S. National Museum, Biological Survey Collection. From El Rosario, northern Sonora. Collected March 10, 1916, by Charles Sheldon and by him presented to the Biological Survey.

*New Trails in Mexico, by Carl Lumholtz, p. 316, 1912.

Characters.—Size smallest of the known mountain sheep—a dwarf depauperate desert species, with small skull, relatively large teeth, and small compactly incurved horns; hoofs of essentially the same size as in *gaillardi*.

Color.—Pelage of type specimen much worn and faded; rump stripe narrow; general color of body and legs drab brown, much paler than November and December specimens of *gaillardi* from the neighboring Gila Range. Compared with these, the face is apparently grayer, but owing to the fact that the skin of the head is turned inside out, and very hard and dry (not having yet been tanned), the colors of the head and face can not be satisfactorily made out. The rump stripe is much narrower than in *gaillardi*. There is a small elongate patch of new pelage on the median line where the neck joins the shoulders. Its color is almost slate gray (of Ridgway)—very different from the color of the same part in *gaillardi*.

Cranial characters.—Size small; frontal region markedly dished, rising strongly from facial plane to summit between horns; face and nasals rather short; nasals broadest in middle third; orbits not strongly outstanding; palatal bridge long anteroposteriorly for size of skull. Compared with adult rams of *gaillardi* from the neighboring Gila, Tule, and Pinacate Ranges: Skull very much smaller; frontal region more strongly dished; nasals reaching farther anteriorly and less broadly flattened in middle part; bullae larger; palatine bridge actually as broad or broader, relatively much broader; postpalatal notch shorter; molars essentially the same size, but relatively much larger. Length of molar series exceeds distance from front of series to front of premaxillae by fully ½ inch, while in *gaillardi* rams the two lengths are equal.

Compared with an adult female *gaillardi* (No. 202971) from Tule Mountains, Sonora, the skull of the female *sheldoni* No. 210586 from El Rosario differs in the following particulars: Size conspicuously smaller; orbital rings less outstanding; bullae slightly larger; palatine bridge decidedly larger (about 10 mm. longer anteroposteriorly), less deeply cut by postpalatal notch, and reaching anteriorly nearly to posterior plane of 1st molar [in old ♀ *gaillardi* reaching only to posterior plane of 2d molar]; posterior nares 10 mm. shorter; jugal arm of squamosal shorter; ramus of jaw about 15 mm. shorter, deeply bellied under posterior molars [in *gaillardi* nearly straight]; angle more broadly rounded [in *gaillardi* more squarely angular]; molariform teeth inserted more posteriorly and much less massive, but series of essentially same length; 3d lower premolar with outer sulcus much deeper, and posterior column narrower. Some of the above differences may be due to age, the female skull of *sheldoni*, while fully adult, being less old than the female *gaillardi*.

Flesh measurements of adult ram (the type) taken by Charles Sheldon: Total length including tail, under 52 inches; tail, 3⅞ in.; height at shoulders, under 30 in.; hind foot, 14 in. *Horns* (5 rings): Circumference at base (fresh), 13½ in. [now shrunken to 12⅝]; length, $29\frac{5}{16}$ [now 29⅛]; tip to tip, 12¼; widest outside measurement, 18.

Cranial measurements (millimeters)	♂ ad. 210585	♀ ad. 210586
Condylo-basal length	265	
Basilar length of Hensel	249	
Front of parietals to nasals	105	97
Greatest breadth across orbital rims	153	139
Least breadth of skull between orbits and horn cores	140	102
Least breadth face in front of orbits	86	83
Breadth at facial tubercles	88	84
Nasals, length	105	
Nasals, greatest breadth	45	35
Length palatine bridge (median)	22	24
Length posterior nares	57	55
Length underjaw, angle to middle incisor	217	195
Last molar to posterior margin jaw	53	48
Length upper molariform series	86	83
Length lower molariform series	90	88
Horns, greatest length around curve	735	325
Horns, circumference at base (dry and shrunken)	320	

Stomach contents of mountain sheep (7-year-old ram) killed by Charles Sheldon in the Rosario Mountains, Sonora, March 10, 1916.

From about a quart of coarsely chewed vegetable fragments the following plants were identified by Vernon Bailey and Paul C. Standley: Ground cherry (*Physalis*)—many seeds and a few husks; Joint-fir (Popotillo of the Mexicans, *Ephedra*)—two seeds and stems; Evening primrose (*Anagra*)—one woody capsule; Mallow (*Sphaeralcea*)—a few seeds; Brittle-bush (*Encelia*, two sp.)—stems, seeds, and heads common; Hosackia (*Lotus*)—one seed capsule; Spurge (*Croton*)—three seeds; Buckwheat bush (*Eriogonum*)—stems common; Bedstraw (*Galium*)—a few leaves and stems; Spiny bush (*Krameria*)—stems common; Iron tree (*Olneya tesota*)—leaves and stems common; Lichens—a few bits; Grass—no trace that Professor Hitchcock, the grass expert, could detect. More than half of the stomach contents is unidentifiable.

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PROCEEDINGS

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NINETEEN APPARENTLY NEW GRIZZLY AND BROWN BEARS FROM WESTERN AMERICA.

BY C. HART MERRIAM.

During the two years that have elapsed since the publication of my last descriptions of big bears,* a special effort has been made to obtain additional material, particularly from British Columbia, Yukon Territory, and Alaska. This effort has been more successful than expected, resulting in the acquisition of nearly 150 skulls. A critical study of these in connection with those previously examined, shows the existence of a number of additional forms and seems to prove conclusively that the Big Bears, like the smaller mammals, split up into an unexpectedly large number of species and subspecies.

The most surprising result is the discovery that Admiralty Island in southeastern Alaska appears to be inhabited by no less than five distinct species of bears, each of which is obviously related to and representative of an adjacent mainland species. The recognition of this very remarkable state of affairs makes it possible to clear up what before had seemed a most anomalous condition—namely, the extraordinary diversity or variability in the skulls and teeth of the island bears. It was not until the material essential for the determination of the mainland forms had been collected, that it was possible to properly recognize the island forms.

It is interesting to observe that in the case of the Admiralty Island Grizzly (*insularis*) the closest relationship appears to be with the geographically more remote Chichagof Island species (*eltonclarki*) rather than with the mainland *orgilos*. The infer-

* Descriptions of Thirty Apparently new Grizzly and Brown Bears from North America, Proc. Biol. Soc. Washington, XXVII, 173-196, August 13, 1914.

ence is, not that the Admiralty Grizzly is derived from the Chichagof Island species, but that the Chichagof Island form is a descendant of the ancestor of the one from Admiralty Island.

The varying degrees of divergence of the island forms furnish an interesting index to the relative time when each obtained a foothold on the island. In this connection it is well to bear in mind that the breadth of the strait separating Admiralty Island from the mainland is at its narrowest point not more than five miles.

The mainland Big Bears with their representatives on Admiralty Island here provisionally recognized are:

Mainland species	Admiralty Island species
Ursus dalli	*Ursus shirasi*
stikeenensis	*mirabilis*
orgilos	*insularis*
kwakiutl	*neglectus*
caurinus	*eulophus*

Descriptions of the heretofore undescribed bears follow:

Ursus apache sp. nov.

Type No. 212436 ♂ adult, U. S. National Museum, Biological Survey Collection. Killed on Whorton Creek on south slope of White Mts., eastern Arizona (a few miles west of Blue), April 3, 1913, by B. V. Lilly.

Cranial characters.—Skull of adult male (the type): Short, broad, and low, rather massive, moderately dished, with broad frontal shield and exceedingly broad outstanding postorbitals. Frontal shield broad, shallowly sulcate medially between orbits; very slightly and rather flatly swollen over orbits; long-pointed posteriorly, meeting short sagittal crest at fronto-parietal suture; rostrum short, high, and rather narrow; *zygomata strongly outbowed and outstanding anteriorly as well as posteriorly;* ramus of jaw rather short, bellied under last molars; coronoid blade high, sloping strongly outward, the apex overarching shallow coronoid notch, but not cutting plane of condyle; dentition moderate.

Cranial comparisons.—Old male apache compared with male adult absarokus, apparently its nearest relative, the skull of *apache* differs as follows: vault of cranium lower, less arched; frontal shield broader and flatter; postorbitals much broader and flatter, standing out more horizontally; naso-frontal region more depressed; rostrum shorter; *orbits notably smaller* (lower vertically); squamosal trough shorter anteroposteriorly; zygomata very much more strongly outbowed and conspicuously more outstanding anteriorly; lower jaw and inferior border of ramus shorter; coronoid blade of equal height; teeth slightly smaller (difference slight).

Old male apache (the type) *compared with adult male arizonae* (the type): Basal length, occipito-nasal length, length of palate, interorbital breadth, and occipito-sphenoid length essentially same; zygomata very much more outstanding and bowed instead of subtriangular; frontal shield less flat, of essentially same breadth as in *arizonae* interorbitally but very much wider across postorbital processes rising strongly from plane of rostrum; postorbital processes much more broadly outstanding; orbital rims more swollen; fronto-nasal region much less elevated; rostrum much smaller, narrower, less swollen, depressed basally, and horizontal instead of tapering; palate and postpalatal shelf much narrower. Lower jaw stronger; ramus broader vertically; coronoid blade higher; molars slightly smaller; heel of M^2 shorter, less distinctly emarginate on outer side (more tapering).

Skull measurements (♂ ad. type).—Basal length 325 mm.; occipito-nasal length 315; palatal length 171.5; zygomatic breadth 234; interorbital breadth 89.

Ursus arizonae sp. nov.

Type No. 177332 ♂ adult, east side Escudilla Mts., Apache Co., Arizona, September 3, 1911. C. H. Shinn.

Cranial characters.—Skull of adult male (the type): Size rather large; skull as a whole rather long and narrow, with broad rostrum; vault of cranium moderately elevated but not arched, highest about two-thirds distance from plane of postorbitals to fronto-parietal suture; frontal shield rather narrow, nearly flat, gently sloping in plane of rostrum, the posterior point in type specimen reaching to about 25 mm. in front of parietals [in older specimens shorter]; postorbitals broad and broadly rounded, nearly horizontal but not widely projecting; fronto-nasal region and rostrum elevated and swollen, continuing plane of frontal shield without trace of dishing, tapering anteriorly; zygomata not widely outstanding, bowed anterior roots swollen; palate rather short and broad; postpalatal shelf broad; meatus tube long; coronoid blade rather broad above, its recurved apex cutting plane of condyles. Teeth rather small for size of skull; canines of good size; molars rather small for size of skull, especially last upper molar.

Cranial comparisons.—Adult male arizonae (the type) *compared with old male apache* (the type): Basilar length, occipito-nasal length, length of palate, interorbital breadth, and occipito-sphenoid length essentially same; zygomata very much less outstanding and subtriangular instead of bowed; frontal shield flatter, of essentially same breadth interorbitally, but very much narrower across postorbital processes; postorbital processes much less broadly outstanding; orbital rims less swollen; fronto-nasal region much more elevated and swollen; rostrum much larger, broader, more swollen and tapering, instead of depressed basally, narrow and horizontal; palate and postpalatal shelf much broader. Lower jaw weaker; ramus less broad vertically; coronoid blade less high; molars slightly larger; heel of M^2 longer, more distinctly emarginate on outer side (less tapering).

Skull measurements (♂ ad. type).—Basal length 326 mm.; occipito-nasal length 323; palatal length 175; zygomatic breadth 208; interorbital breadth 82.

Ursus chelan sp. nov.

Type No. 205185 ♂ old, U. S. National Museum, Biological Survey Collection. From east slope Cascade Mts., northern Chelan Co., Washington. (Killed in Township 30 N, Range 16 East, Willamette Meridian, Wenatche National Forest.) Collected September 1, 1913, by D. S. Rice, Forest Ranger.

Cranial characters.—External characters unknown. *Skull of old male* (the type): Size medium or rather large; facial axis strongly deflected from basicranial axis; vault of cranium well arched, highest over posterior frontal region; sagittal crest long, high, arcuate, rising anteriorly above general level of top of cranium. Affinities apparently with *selkirki* on the one hand, and with *shoshone* and *pervagor* on the other. Frontal shield narrow, flattened, short pointed posteriorly, ending about midway between fronto-parietal suture and plane of postorbitals, slightly sulcate medially; postorbital processes rather broad, flat, outstanding horizontally (not depressed or decurved); fronto-nasal region including posterior two-thirds of nasals sloping strongly, forming part of long fronto-facial plane; rostrum small, short, somewhat depressed, sloping anteriorly to nares, gradually rising posteriorly into frontal plane; braincase long, arched, frontal part keeled into sagittal crest; palate arched antero-posteriorly, slightly concave; postpalatal shelf broad; zygomata broadly spreading, rounded and outbowed posteriorly, vertically expanded and strongly arched; mastoids of medium length, spreading; lower jaw massive; ramus swollen on outer side over roots of 2d and 3d molars, bellied under last molars; coronoid blade high, its anterior border rather strongly recurved, the apex overarching high coronoid notch but barely reaching plane of front of condyle; teeth rather small for size of skull (so badly worn in type specimen that proportions of canines can not be determined).

Cranial comparisons.—Old male *Ursus chelan* differs from all its relatives in the degree of deflection of the facial part of the skull, and exceeds all except *selkirki* in the arching of the palate. *Type skull of chelan compared with the type skull of pervagor:* Basal length slightly less; zygomatic breadth greater; frontal shield shorter-pointed and flatter; postorbitals flatter and apparently broader; sagittal crest longer, higher anteriorly and more convex; rostrum shorter and more strongly sloping anteriorly; nares more truncate; zygomata more strongly outbowed, more arched, more expanded vertically, squamosal arm longer (squamoso-jugal suture much longer); palate shorter and more strongly arched; lower jaw shorter, its inferior ramus much shorter; coronoid blade slightly higher and more falcate. Some of these differences may be due to age, the skull of the type of *chelan* being very old, while the type of *pervagor* is only adult. However, the type of *chelan* differs rather conspicuously from an

equally old male *pervagor* from Bridge River (No. 4 Provincial Museum, Victoria, B. C.) as will be seen from the following: Basal length 20 mm. less; occipito-nasal length slightly greater; zygomatic breadth less; facial part strongly deflected [in *pervagor* not deflected]; palate arched [in *pervagor* not arched]; frontal shield shallowly sulcate medially [in old *pervagor* broadly concave]; postorbitals broad, flat, horizontally outstanding [in *pervagor* long, peglike, uplifted and arched]; braincase and sagittal crest arched [in *pervagor* straight and nearly horizontal]; occipital overhang much greater; zygomata less widely outbowed.

Old male (the type) *compared with old male selkirki* (the type, No. 205170) from upper Columbia River, Selkirk Mts., B. C.: Size larger (basal length only slightly greater but occipito-sphenoid and occipito-nasal lengths much greater, and skull as a whole distinctly larger); vault of cranium decidedly more highly arched; facial angle more strongly deflected from basi-cranial axis; zygomata much more widely spreading and outbowed, and much more arched; frontal shield rising less abruptly from rostrum, more evenly sloping, rising higher posteriorly, and much shorter-pointed; braincase and sagittal crest much longer, the crest higher and convex or arcuate anteriorly; occipital overhang greater; palate more strongly arched (anteroposteriorly); mastoids longer and strongly spreading. Lower jaw longer and more massive, more swollen on outer side below middle and posterior molars; its inferior border more bellied posteriorly; coronoid blade very much higher.

Old male (the type) *compared with old male washake* (the type): Size slightly larger (basal length essentially same but upper part of skull much longer); vault of cranium more highly arched; frontal shield continuing to rise posteriorly (instead of flattened) and much shorter-pointed; rostrum decidedly broader; postorbital processes not elevated; lachrymal duct within orbit (not cutting rim as seen from in front); braincase compressed and keeled anteriorly (in *washake* depressed); sagittal crest much longer and convex instead of straight; squamosal arm of zygoma longer and more broadly expanded vertically; palate concave and arched anteroposteriorly, instead of flat; postpalatal shelf longer and less broadly flattened; occipito-sphenoid longer; mastoids longer and more spreading. Molars smaller.

Skull measurements (♂ old, type).—Basal length 314 mm.; occipito-nasal length 323; palatal length 170; zygomatic breadth 225; interorbital breadth 86.

Ursus cressonus sp. nov.

Type No. 206529 ♂ old, U. S. National Museum, Biological Survey Collection. Type from Lakina River, south slope of Wrangell Range, Alaska. Collected by Captain J. P. Hubrick of McCarthy, Alaska, 1914.

Range.—Chitina River Valley and adjacent slopes of Skolai and Wrangell Mountains, westerly doubtless through Chugach Mountains to the west side of Cook Inlet, where it occurs as far south as the Iliamna region.

Cranial characters.—Old male (the type): Skull peculiar and distinctive; size large (basal length 357 mm.); skull long, narrow, high and strongly dished; frontal shield highly elevated, rising abruptly from rostrum, rather broad, deeply sulcate throughout medially, swollen over orbits; short-pointed posteriorly; orbits nearly vertical; postorbital processes small and strongly decurved; fronto-nasal region sulcate and strongly dished; rostrum rather short and narrow; nasals horizontal except posteriorly, where they rise strongly; braincase exceedingly long; sagittal crest high posteriorly, straight, and long, reaching anteriorly to halfway between parietals and plane of postorbitals; zygomatic arches moderately spreading, subtriangular (not outbowed), expanded vertically; palate and postpalatal shelf relatively long and narrow for so large a skull; postpalatal notch rather narrow and short; occipito-sphenoid long (about 103 mm.); mastoids outstanding; anterior nares rather small, subtruncate and broader than high in type skull, higher and less truncate in the Iliamna skulls. Lower jaw absent in type specimen. But in an old male from Iliamna, on north side of Cook Inlet (No. 209885) which closely matches the type, the ramus is broadly flattened vertically, much broader posteriorly than anteriorly; coronoid blade high and rather vertical. In younger skulls from Iliamna the coronoid is broader basally and less high. Canines large and massive; molars moderate; M^2 large in the type, smaller and more cut away on outer side of heel in the Iliamna specimens. No. 209885 from Iliamna agrees with the type except that the nares are higher and less truncate, and the last upper molar smaller, with heel more cut away on outer edge.

Skull of old female (No. 209881) from head of Chitina River (80 miles from McCarthy), Alaska, collected by Capt. J. P. Hubrick: Size medium; cranium moderately arched; frontal shield broad, deeply sulcate anteriorly, strongly swollen over and posterior to orbits, the point lyrate and reaching parietals; postorbitals rather large, blunt, and somewhat decurved; fronto-nasal region strongly dished and depressed medially; rostrum rather large and high, nearly horizontal; palate and postpalatal shelf broad; postpalatal notch moderate and rather broad. Lower jaw long; coronoid blade high and rather narrow, its apex only slightly recurved. Dentition light; canines small and short; molars rather narrow, apparently normal (too badly worn to admit of description except that the heel of M^2 is moderately long and rather broadly rounded posteriorly).

Cranial comparisons.—Old male cressonus (type) *compared with old male dalli:* Size about same; vault of cranium and frontal shield much more elevated, less flat, less horizontal, and much more swollen over orbits; shield more deeply sulcate; postorbitals weak and decurved [in *dalli* larger and more horizontally outstanding]; fronto-nasal region more strongly dished; rostrum narrower and longer; zygomata much less widely outstanding and much less bowed; palate longer; molars very much larger.

Old male cressonus (type) *compared with adult male nuchek* (type): Size, elevation of vault of cranium, and zygomatic breadth about same;

frontal shield somewhat broader, much more highly arched, much more swollen over orbits, much more deeply sulcate medially, shorter and more acutely pointed posteriorly; postorbitals smaller and more decurved; fronto-nasal region strongly dished; rostrum more depressed; nares more truncate; last upper molar of normal form, large, and with long posteriorly rounded heel, differing widely from the short, broad-in-the-middle, obliquely truncate tooth of *nuchek*.

Skull measurements (♂ old, type).—Basal length 357 mm.; occipito-nasal length 354; palatal length 199; zygomatic breadth 244; interorbital breadth 97.

Ursus eximius sp. nov.

Type No. 122495 ♂ adult, U. S. National Museum. From head of Knik Arm, Cook Inlet, Alaska. Received from G. W. Palmer in 1903 (killed by a native).

Characters.—Size rather large; color uniform rich dark brown, suggesting seal brown; muzzle brown, paler than rest of head; back of head and neck lightly sprinkled with pale-tipped hairs; claws of medium thickness, only slightly curved, decidedly short, probably from wear, smooth, very dark horn color, becoming paler on sides toward tip. Skull long and narrow, with narrow highly arched frontals. Related to *kidderi*.

Cranial characters.—Adult male (the type): Skull long, extremely narrow in fronto-nasal region, rather highly arched and strongly dished. Frontal shield exceedingly narrow, convex, shallowly sulcate medially, strongly arched anteriorly, horizontal posteriorly, long-pointed, the point nearly reaching fronto-parietal suture; postorbital processes slender, peg-like, moderately outstanding; naso-frontal region strongly dished; rostrum long, narrow, high, compressed between nasals and canine roots; zygomata moderately outstanding, subtriangular; palate long and narrow; postpalatal shelf relatively broad; notch rather broad; mastoids long, strongly divergent; underjaw long, moderately massive, the ramus broad vertically; coronoid blade rather broad, the apex not strongly recurved; teeth of medium size; M^2 with rather long heel, not much narrowed posteriorly; M^1 relatively large and broad; PM_4 a single cone without distinct heel but sulcate posteriorly.

Adult female (No. 205176) *from type locality:* Skull long and narrow; vault of cranium moderately arched, the highest part forming a hump at fronto-parietal suture; frontal shield narrow, flattish, sulcate medially, the point reaching fronto-parietal suture; postorbitals weak, subtriangular, not decurved; fronto-nasal region moderately dished; rostrum narrow, compressed between nasals and canine roots; zygomata moderately spreading, subtriangular; postpalatal shelf relatively broad; notch moderate; inferior border of ramus convex from plane of front molar posteriorly; coronoid blade broad and low.

Cranial comparisons.—Ursus eximius appears to be related to only a single species, *Ursus kidderi* of Alaska Peninsula. *Adult male* (No. 122495, the type) *from Knik Arm, compared with a series of kidderi* from

various points on Alaska Peninsula: Size about the same; vault of cranium more highly arched; frontal shield narrower, more strongly convex in cross section, less deeply sulcate; postpalatal processes more slender, peglike and outstanding; frontal-nasal region more dished; rostrum more slender; nasals more completely wedge-shape, longer posteriorly, reaching posteriorly to plane of postpalatal processes; mastoids longer and more divergent.

Adult female (No. 205176) *from head of Knik Arm, compared with adult female kidderi:* Size materially smaller; frontal shield and rostrum much narrower; vault of cranium notably higher over fronto-parietal suture; braincase narrower; nasals longer posteriorly; lower jaw smaller and lighter.

Male adult eximius (the type) *compared with male adult alascensis* (No. 76466) *from Unalaklik River, Norton Sound, Alaska:* Skull much longer, more highly arched, and narrower throughout. Frontal shield much more elevated, narrower, and longer posteriorly; fronto-nasal region more strongly dished; rostrum narrower and higher; lambdoid crest much more strongly developed; palate and post-palatal shelf much longer; occipito-sphenoid much longer; mastoids much longer and strongly divergent; lower jaw longer; coronoid blade much higher; teeth larger; heel of M^2 much longer.

Adult female eximius compared with female alascensis: Length essentially same; skull narrower throughout; frontal shield lower, *much narrower and flatter*, rising less abruptly from rostrum; fronto-nasal region sulcate but less strongly dished; rostrum slightly more slender; postpalatal shelf narrower. Underjaw about same length; inferior border of ramus more evenly convex (less abruptly bellied); coronoid blade broader; canines about same size; molars somewhat larger.

Skull measurements (♂ ad. type).—Basal length 331 mm.; occipito-nasal length 319; palatal length 185; zygomatic breadth 215; interorbital breadth 71.

Ursus hoots * sp. nov.

Type No. 206136 ♂ adult, U. S. National Museum, Biological Survey Collection. From Clearwater Creek, a north branch of Stikine River, B. C., 1913. Collected by John Hyland; presented by Lincoln Ellsworth.

Cranial characters.—Size medium inclining to large; skull massive, slightly dished, rather short, low, and flattish, very broad across frontals and rostrum. Frontal shield broad, nearly flat, long-pointed; broadly and shallowly sulcate medially as far back as posterior plane of post-orbitals; postorbitals large, broad, and horizontally outstanding; fronto-nasal region sloping; rostrum broad; palate and postpalatal shelf broad; postpalatal notch moderate; sagittal crest short, ending at fronto-parietal suture; zygomata moderately outbowed, not broadly spreading; lower jaw rather massive; inferior border of ramus upcurved posteriorly; coro-

* *Hoots*, the native Indian name for the big brown and grizzly bears.

noid blade broad at base, curving strongly backward, the apex cutting plane of condyle; dentition remarkably light for so large a skull; canines and molars (both upper and lower) surprisingly small.

Remarks.—Ursus hoots is not related to any of the other mainland species so far as I am aware, but is related to *Ursus sitkensis* of Baranof and Chichagof Islands. It differs from *sitkensis* in somewhat smaller size; less elevated posterior frontal region; broader postorbital processes; less broadly spreading zygomata; shorter and less spreading mastoids; less vertical and more strongly recurved coronoid blade, the apex overarching a well defined coronoid notch; smaller molars (both upper and lower) and smaller upper incisors. The large lower premolar has the upturned heel of the Sitka bear, but lacks the posterior sulcus and pair of cusplets of the grizzlies.

Skull measurements (♂ ad. type).—Basal length 333 mm.; occipitonasal length 325; palatal length 179; zygomatic breadth 228; interorbital breadth 96.

Ursus eltonclarki insularis subsp. nov.

ADMIRALTY ISLAND GRIZZLY.

Type from Admiralty Island, southeastern Alaska. No. 205186 ♂ old, U. S. National Museum, Biological Survey Collection, 1914. Purchased from W. H. Case of Juneau.

Characters.—A Grizzly closely related to *eltonclarki* and like it having the Grizzly type of pm_4 only faintly developed. External characters unknown.

Cranial characters.—Skull similar in general to that of *eltonclarki*, agreeing essentially in basilar length, zygomatic breadth, length and narrowness of palate and postpalatal shelf, and narrowness of postpalatal notch, but differing materially in breadth of frontal shield, size of postorbital processes, and proportions of teeth. Frontal shield much broader (interorbitally 82 mm. contrasted with 69 mm.), less flat, shallowly sulcate medially; postorbital processes very much larger, broader, more widely outstanding (distance across processes 120 mm. contrasted with 101 mm.) and more decurved; rostrum shorter; nasals shorter (89 mm. contrasted with 105 mm.—probably not constant). Lower jaw more massive; inferior border of ramus longer and more swollen; outer side of ramus not depressed or excavated below anterior base of coronoid; coronoid blade narrower and higher. Canines (both upper and lower) somewhat shorter; molars, especially M^1, M_1 and M_2 decidedly larger.

Skull measurements (♂ old, type)—Basal length 311 mm.; occipitonasal length 310; palatal length 171; zygomatic breadth 216; interorbital breadth 82.

Ursus kluane sp. nov.

Type No. 204188 ♂ old, U. S. National Museum, Biological Survey Collection. From McConnell River, Yukon Territory, July 15, 1914. Collected by Smith and Geddis.

Cranial characters.—Skull of adult male: Size medium, rather long, narrow, somewhat arched and dished, with long braincase, long convex sagittal crest, and unusually broad decurved postorbitals. Frontal shield of medium width, strongly convex both transversely and anteroposteriorly, rising rather strongly from rostrum, slightly sulcate medially and moderately swollen over orbits; very short-pointed, the point ending about midway between parietals and plane of postorbitals; postorbitals remarkably broad, decurved, strongly convex anteriorly, concave posteriorly; fronto-nasal region somewhat depressed; rostrum high and narrow, rounded above (subterete); nares truncate; sagittal crest very long and arcuate; occipital overhang and inion well developed; zygomata not widely outstanding, somewhat bowed, rounded posteriorly; palate moderate, postpalatal shelf large and broad; notch rather broad and short; mastoids long and divergent; underjaw rather long; coronoid blade high and narrow, the apex rather strongly recurved; teeth too badly worn to admit of description (apparently large for size of skull).

Skull of adult female: Size small, nearly as small as female *pallasi;* fronto-nasal region moderately dished and usually sulcate; braincase moderately arched, highest just in front of fronto-parietal suture; temporal impressions meeting over anterior part of parietals (probably somewhat more anteriorly in old skulls); zygomata moderately outbowed, subtriangular; frontal shield of medium breadth, lyrate-pointed posteriorly; postorbital processes rather broad for so small a skull, moderately decurved; underjaw short; coronoid blade broad basally and rather short. Teeth (canines, incisors and molars) rather large for size of skull, decidedly larger than in *pallasi;* molars, both upper and lower, very much larger.

Cranial comparisons.—The only species requiring comparison with *kluane* are *toklat, latifrons* and *pallasi. Old male* (the type) *compared with old male toklat from Alaska Range*, near north base of Mt. McKinley: Size slightly larger; occipito-nasal length, length of braincase, and length of sagittal crest very much greater; frontal shield more convex transversely; postorbital processes much larger and broader; rostrum higher, more rounded on top; nares more squarely truncate; underjaw longer; inferior border of ramus more convex posteriorly; coronoid blade decidedly higher, narrower above, the apex more strongly recurved; teeth badly worn in both; but canines decidedly longer in *kluane;* molars apparently somewhat larger.

Adult female kluane compared with adult female toklat (comparison hardly necessary because of the great difference in size): Basal length at least 20 mm. less; vault of cranium and frontal shield lower; braincase less constricted anteriorly; posterior part of shield much longer and broader, reaching or passing the fronto-parietal suture; sagittal crest much shorter; postpalatal shelf less broad; lower jaw and inferior border of ramus shorter; coronoid blade about same height; canines about same size; molariform series (upper and lower) about same length but proportions of individual teeth differ: M^1 much larger; M^2 with shorter heel; M_1 larger.

Old male kluane compared with old male latifrons: Size essentially same; frontal region much narrower and more highly arched; postorbital processes much broader and more strongly decurved; sagittal crest longer, arched instead of straight; rostrum more elevated and more rounded above; nasals convex instead of flat in cross section. Zygomata less widely outspreading and less bowed; coronoid blade narrower.

Adult female kluane compared with adult female latifrons: Skull much smaller, shorter, and more delicate. Frontal shield much narrower; vault of cranium more arched over posterior frontals; rostrum lower; zygomata less widely outstanding; palate much narrower; lower molars and canines approximately same size; last upper molar much smaller. While the skull of female *kluane* is much smaller than that of *latifrons*, the lower jaw is nearly the same size.

Old male kluane (the type) *compared with old male pallasi* (the type): Size decidedly greater; skull about an inch longer and much more highly arched, with conspicuously longer braincase and longer sagittal crest; crest strongly arched instead of nearly straight; postorbitals very much larger, broader, and more strongly decurved; fronto-nasal region much more elevated and less dished; rostrum much higher, rounded above instead of depressed; palate much longer, more arched and more concave; lower jaw much longer; coronoid higher.

Adult female kluane compared with adult female pallasi: Skulls very much alike in size and appearance (that of *kluane* slightly larger) but teeth strikingly different. In *kluane* canines larger; molars very much larger.

Skull measurements (♂ old, type).—Basal length 317 mm.; occipito-nasal length 324; palatal length 177; zygomatic breadth 210; interorbital breadth 85.

Ursus kwakiutl sp. nov.

KWAKIUTL GRIZZLY.

Type No. 211748 ♂ adult, U. S. National Museum, Biological Survey Collection. From Jervis Inlet, coast of southern British Columbia. Collected May 17, 1916, by Fred Mansell.

Range.—Coast region of British Columbia from southwestern corner (Burrard Inlet, Howe Sound, Jervis Inlet) northwesterly to lower Skeena (Lakelse River).

Characters.—Size large; color dark; ears densely furred; claws unknown. Skull long, but little arched.

Color.—Skin of head of adult male (the type): Nose brown; head and face from front of eyes posteriorly very dark brown, darkest on ears, slightly grizzly on occiput by golden-tipped hairs.

Cranial characters.—Adult male (the type): Size large; skull long, rather low and narrow, with long high rostrum, gradually ascending frontal shield, rather low fronto-parietal region, and strongly outstanding postorbitals. Frontal shield of moderate breadth, shallowly sulcate medially, swollen over orbits, short-pointed posteriorly; rostrum long, high, and rather narrow; nasals flattened, nearly horizontal; fronto-

nasal region sloping gently in plane of shield; braincase long, its anterior part keeling into elongate sagittal crest; zygomata moderately spreading (becoming of course more strongly outbowed in old age); palate long, concave, slightly arched antero-posteriorly; postpalatal shelf large and broad, nearly square; dentition rather light for size of skull; underjaw long, its inferior border slightly sinuous (slightly bellied under last molars); coronoid blade broad at base, not very high, the apex slightly produced posteriorly but falling far short of plane of condyle. In old age, as shown by the Lakelse River skull, the frontal shield becomes more broadly and evenly concave, the posterior point even shorter, and the postorbital processes more elongate, peglike, and elevated.

Cranial comparisons.—The only described species requiring comparison with *kwakiutl* is the very different *pervagor* (type skulls, both males, of about same age). *Ursus kwakiutl* differs as follows: skull longer and less highly arched; braincase and rostrum materially longer; frontal shield posteriorly shorter-pointed; rostrum more elevated anteriorly, the nasals more horizontal; postpalatal notch longer; underjaw decidedly longer, but inferior border of ramus from symphysis to subangular tubercle of essentially same length; infra-angular border much longer. Dentition heavier (both upper and lower canines, incisors, and molars larger).

Skull Measurements (♂ ad. type).—Basal length 340 mm.; occipito-nasal length 330; palatal langth 184; zygomatic breadth 212; interorbital breadth 85.

Ursus kwakiutl neglectus subsp. nov.

ADMIRALTY KWAKIUTL GRIZZLY.

Type No. 209889 ♂ old, U. S. National Museum, Biological Survey Collection. From near Hawk Inlet, Admiralty Island, southeastern Alaska. Collected April, 1914, by W. H. Spaulding.

Characters.—Skull rather large and massive, flat-topped, with rather broad outstanding postorbitals. Frontal shield moderate, flattish, shallowly sulcate, rather short-pointed; fronto-nasal region elevated in plane of shield and slightly compressed; rostrum moderate, high; zygomata moderately outstanding and somewhat bowed; postpalatal shelf short and broad; notch rather broad. Underjaw rather short, ramus rather flat and broad vertically, especially posteriorly; strongly bellied posteriorly; coronoid blade high and narrow, its apex not reaching plane of condyle. Teeth moderate.

Cranial comparisons.—Old male (the type) *compared with adult and old male kwakiutl* from Jervis Inlet (the type) and Lakelse River (much older): Size smaller; postorbitals broader; shield more horizontal; fronto-nasal region elevated instead of depressed; zygomata less outbowed; nasals more produced anteriorly, projecting broadly over nares (about 7 mm. beyond premaxillae at point of contact; nares more truncate; underjaw much shorter; coronoid blade narrower. Upper canines and crown of last upper molar longer.

Old male (the type) *compared with old male warburtoni* from Atnarko and Iskoot Rivers and Chilkat Valley): Size decidedly smaller (but occipito-sphenoid length same); zygomata less outbowed; nasals more projecting anteriorly; palate shorter; postpalatal shelf broader, flatter and much shorter; mastoids shorter; underjaw slightly smaller; coronoid blade narrower and more vertical. Canines (especially upper) more slender; M^2 narrower and less massive.

Skull measurements (♂ old, type).—Basal length 322 mm.; occipito-nasal length 325; palatal length 177; zygomatic breadth 229; interorbital breadth 83.

Ursus kwakiutl warburtoni * subsp. nov.

WARBURTON PIKE GRIZZLY.

Type No. 210576 ♂ old, U. S. National Museum, Biological Survey Collection. From Atnarko River, B. C., July 15, 1915. E. H. Edwards.

Range.—Coast region of southeastern Alaska and adjacent parts of British Columbia from Chilkat River southeasterly to Atnarko River of the Bella Coola (Skulls of adult males examined from Atnarko River, Iskoot River near junction with Stikine, and Chilkat River Valley).

Cranial characters.—Skull of adult males: Large and massive, rather long and flattish on top—not arched. Similar to male *kwakiutl* but with much broader (less peglike) and flatter postorbitals, flatter frontal shield (not deeply concave in old age), much shorter sagittal crest, somewhat heavier dentition, especially broader and more massive M^2. Easily distinguished from *stikeenensis* of the same region by the much greater length of skull and lower jaw and lesser elevation of frontal region.

Skull measurements (♂ old, type).—Basal length 340 mm.; occipito-nasal length 324; palatal length 185; zygomatic breadth 233; interorbital breadth 85.

Ursus mendocinensis sp. nov.

Type from near Long Valley, Mendocino Co., Calif., No. 206625 ♂ old, U. S. National Museum, Biological Survey Collection. Obtained through Charles J. and Frank H. Hittell.

Characters.—Size rather large, about equalling *klamathensis* but apparently less than *californicus* and *colusus;* external characters unknown. Affinities with *klamathensis*, with which it may intergrade at the north.

Cranial characters.—Skull short, broad, highly arched and strongly dished, with widely outstanding zygomata and truncate occiput. Frontal shield of moderate breadth, short-pointed posteriorly, slightly convex between orbits, strongly sloping to rostrum; rostrum short, broad, and strongly depressed; postorbital processes moderate, sub-peglike, horizontally outstanding; sagittal crest high, thick, humped anteriorly, short posteriorly; occiput obliquely truncate; occipital overhang slight com-

* Named in honor of the late Warburton Pike, author of *The Barren Grounds of Northern Canada* and *The Subarctic Forest*, who obtained a fine large typical skull on the Iskoot, a few miles from its junction with the Stikine (No. 9 Provincial Museum, Victoria, B. C.).

pared with that of *californicus* and *colusus;* palate short and rather broad; postpalatal shelf of moderate breadth, flat; postpalatal notch moderate; mastoids rather short, directed anteriorly. Lower jaw absent. Teeth gone except left hind molar, which is short, heel small, obliquely truncate on outer side (as in *klamathensis*).

Cranial comparisons.—Similar in general to *klamathensis* but fronto-nasal region strongly dished, *rostrum shorter, broader, flatter on top, and depressed instead of elevated;* zygomata more widely outstanding; palate broader; occipital overhang less.

Skull measurements (♂ old, type).—Basal length 327 mm.; occipito-nasal length 323; palatal length 183; interorbital breadth 84.5.

Ursus mirabilis sp. nov.

Type No. 137471 ♂ adult, U. S. National Museum, Biological Survey Collection. From Admiralty Island, Alaska. Collected June 26, 1905, by Cyrus Catt.

Characters.—A true Grizzly, of medium size, related to *stikeenensis* of the mainland, and having the same high bulging forehead; external characters unknown.

Cranial characters.—Adult male (the type): Skull of medium size, short, with rather broadly spreading zygomata and highly arched (almost domed) frontal region. Frontal shield of moderate breadth, short-pointed posteriorly, rising abruptly from rostrum, convex both anteroposteriorly and transversely, slightly sulcate medially, moderately swollen on each side of sulcus; postorbital processes moderate, broader than peglike, slightly decurved (continuing convexity of frontals); fronto-nasal region strongly dished; rostrum high, narrow, strongly sloping; zygomata rather broadly outstanding, slightly bowed; palate and postpalatal shelf rather broad; underjaw short; ramus bellied posteriorly; coronoid blade high and rather vertical, the apex not reaching plane of condyle. Upper canines rather long; molars rather broad and short.

Cranial comparisons.—Ursus mirabilis requires comparison with only a single species—*stikeenensis* of the neighboring mainland. Compared with *stikeenensis:* Size smaller; frontal shield narrower and more bulging anteriorly, rising more abruptly from rostrum; rostrum narrower, materially higher, and more sloping; zygomata more widely outstanding; occipital overhang more pronounced; palate and postpalatal shelf similar; lower jaw less massive; coronoid blade narrower and higher. Teeth similar but heel of last upper molar much shorter.

Skull measurements (♂ ad. type).—Basal length 308 mm.; occipito-nasal length 310; palatal length 168; zygomatic breadth 230; interorbital breadth 81.

Ursus nuchek sp. nov.

Type No. 146459 ♂ old, U. S. National Museum, Biological Survey Collection. Type from head of Nuchek Bay, Hinchinbrook Island, Prince William Sound, Alaska. Collected Sept. 15, 1905, by C. Swanson.

Range.—Prince William Sound easterly to Mt. St. Elias; limits unknown.

Characters.—Size large; external characters unknown; skull long, narrow, and moderately high; molars peculiar.

Cranial characters.—Skull of adult male (the type): Large, elongate; frontal shield relatively narrow, flattish, moderately depressed between orbits; orbital rims thickened; postorbital processes broad and flattish, moderately outstanding; posterior part of shield broad, ending about two-thirds distance from plane of postorbitals to fronto-parietal suture; sagittal crest rather long, straight, high posteriorly; rostrum long, high, rather narrow; fronto-nasal region sloping in facial plane; nasals slightly elevated anteriorly; zygomata moderately spreading, subtriangular, not much expanded vertically; postpalatal shelf moderate, its sides rounded; notch long and narrow; anterior nares small; meatus tube short and large. Lower jaw massive; coronoid blade narrow and falcate. Teeth of medium size; molars broad (more massive than in *dalli*); last upper molar exceptionally short, broadest in middle, heel short and obliquely truncate on outer side; M^1 large, much broader posteriorly than anteriorly; middle lower molar peculiar: twin cusps of entoconid very small, low, and close together; main cusp of inner side large and high, reducing the posterior moiety of the tooth to about one-third length of crown instead of about one-half as usual.

Skull of yg-ad. female (No. 44049) from Chaix Hills near Mt. St. Elias, Alaska, killed July 4, 1891, by the late Prof. I. C. Russell. Skull long, narrow, rather low, with narrow frontals, narrow rostrum, and moderately outstanding subtriangular zygomata. Frontal shield flattish, medially depressed interorbitally, sloping gradually into rostrum, rather short-pointed posteriorly (ending about 15 mm. in front of parietals; in fully adult and old females it would be still shorter); postorbital processes moderate, horizontally outstanding, the tips rounded (not fully grown); palate concave, postpalatal shelf rather long and broad; notch rather narrow; basisphenoid strongly concave anteroposteriorly and transversely; lower jaw long and slender. Canines long and slender; molars and large premolars with rather high cusps; last upper molar short, much broader in middle than anteriorly, heel short and obliquely truncate on outer side.

Cranial comparisons.—Ursus nuchek evidently overlaps the range of *dalli* and may come in contact with *cressonus*, necessitating comparisons with both.

Adult male nuchek (the type) *compared with adult and old male dalli* (Nos. 75047 and 210293): Size about same; basal length essentially same, but occipito-nasal length decidedly greater; skull appearing longer and narrower; more elevated behind orbits and much more strongly sloping posteriorly; frontal shield narrower, the point broader posteriorly; vault of cranium higher and less horizontal; postorbitals less outstanding; fronto-nasal region less dished; rostrum longer and not depressed (appearing narrower); zygomata less outbowed (more triangular); palate somewhat longer; postpalatal notch longer and narrower; mastoids less

appressed, leaving wide post-glenoid space with correspondingly large open meatus [in *dalli* closer to glenoid process, pressing on and contracting meatus tubes]; coronoid blade narrower above (more falcate). Canines about the same; molars both upper and lower decidedly larger and more massive and in details quite different: M^2 exceptionally short and much broader in middle than elsewhere, heel short and obliquely truncate on outer side; M^1 large, much broader posteriorly than anteriorly; middle lower molar peculiar, the twin cusps of entoconid very small, low, and close together; metaconid exceptionally large and high, reducing the posterior moiety of the crown to about one-third its length, instead of about half as in *dalli* and most species.

Young-adult female nuchek (No. 44049) *from near Mt. St. Elias compared with female dalli* (No. 140085) *from Copper River Delta:* Skulls so strikingly different as not to require close comparison, that of *nuchek* being light, slender, narrow, with low narrow flattened frontal region, long slender rostrum, and light underjaw, while that of female *dalli* is massive, broadly arched or domed, and with massive underjaw. The teeth also differ strikingly.

Yg. adult female nuchek (No. 44049) *contrasted with old female cressonus* (No. 209881): Size slightly smaller (when fully adult probably same); frontal shield much narrower and flatter, much less deeply sulcate, much less swollen over orbits, and much shorter posteriorly; fronto-nasal region in same plane (in ♀ *cressonus* strongly dished); sagittal crest longer; nares smaller; canines (upper and lower) much longer; molars more massive; M^2 extremely short, much broadest in middle, with short obliquely truncate heel (in *cressonus* normal).

Female nuchek (No. 44049) *compared with female kenaiensis* (No. 133244): Basal length essentially same; cranium narrower with narrower braincase, narrower shield, and narrower rostrum; zygomata less broadly spreading (would be more broadly spreading with age); occipito-sphenoid shorter; palate essentially same length but narrower; postpalatal shelf narrower; ramus more slender (conspicuously thinner below M_2 and M_3); its inferior border straighter, less upcurved posteriorly; coronoid lower and less narrowed above; cusps of large premolars above and below much more highly developed; main cusp of upper premolars very much higher relative to posterior cusp; molar cusps also more strongly developed; last upper molar shorter and of peculiar form as in the male.

Skull measurements (♂ old, type).—Basal length 360 mm.;* occipito-nasal length 358; palatal length 191; zygomatic breadth 248; interorbital breadth 88.

Ursus ophrus† sp. nov.

Type No. 210252 ♂ old, U. S. National Museum, Biological Survey Collection. Type from eastern British Columbia (exact locality unknown). Collected in 1915 by E. W. Darbey.

Cranial characters.—Skull of adult male short, strongly dished, remark-

* Estimated.

† *Ophrus* with reference to the unusual brows.

ably high, the deeply sulcate frontal shield rising abruptly high over orbits, with thickened brows and large outstanding arched postorbital processes. Frontal shield of moderate breadth; deeply and broadly concave between orbits, swollen over orbits and passing out into strongly outstanding postorbitals, short-pointed posteriorly; naso-frontal region deeply sulcate; middle part of nasals flat; sagittal crest high and reaching anteriorly nearly midway from fronto-parietal suture to plane of postorbitals; rostrum rather small and narrow; palate rather narrow; postpalatal shelf rather broad; zygomata broadly and strongly outbowed; mastoids rather long; underjaw long, its inferior margin rather long and nearly straight; subangular tubercle considerably posterior to mental foramen; coronoid blade broad, its apex only moderately recurved, ending anteriorly to plane of condyle; canines of medium size, the lower ones rather massive; molars of medium size, the upper rather small for size of skull.

Skull of adult female (No. 75613 rather old) from Henry House, Alberta, Sept. 27, 1895, J. Alden Loring: Similar in general to skull of male with the usual sexual differences, but frontals much less elevated; top of skull rather low and flattish; frontal shield of moderate breadth, broadly depressed interorbitally, the point long and lyrate; naso-frontal region sulcate and strongly dished; postorbital processes large, elevated, and horizontally outstanding; sagittal crest short, covering only posterior half of parietal suture; braincase short and swollen; postpalatal shelf rather broad; zygomata moderately spreading, subtriangular, anterior roots somewhat swollen.

Skull measurements (♂ old, type).—Basal length 323 mm.;* occipito-nasal length 304; palatal length 175; zygomatic breadth 229; interorbital breadth 85.

Ursus pallasi sp. nov.

Type No. 205160 ♂ old, U. S. National Museum, Biological Survey Collection. From Donjek River, southwestern Yukon Territory. Collected August, 1913, by T. A. Dixon.

Cranial characters.—Skull of old male (the type): Size small, one of the smallest of the grizzlies; skull moderately elevated, flattish on top, with relatively broad frontal shield. Frontal shield flattish, exceedingly short-pointed posteriorly, faintly depressed medially between orbits, slightly swollen on sides of median depression, strongly sloping to rostrum; postorbital processes small, peglike, horizontally outstanding; naso-frontal region strongly dished; rostrum short, somewhat depressed and pugged; nasals rising anteriorly; nares small and subtruncate; sagittal crest long, reaching to halfway between fronto-parietal suture and plane of postorbitals; zygomatic arches moderately outstanding, narrow and slender, not expanded vertically; palate and postpalatal shelf short and broad; mastoids long and spreading. Underjaw long for size of skull; coronoid narrow above, the apex not reaching plane of condyle; teeth rather large for size of skull.

* Estimated.

Old female (No. 205162) *from St. Clair River, Yukon*, collected Sept. 6, 1914, by A. Hoyt: Size very small; frontal shield remarkably broad for so small a skull, convex and medially sulcate interorbitally; fronto-nasal region strongly dished; postorbitals small, outstanding; rostrum short and depressed; palate and postpalatal shelf short and broad; zygomata rather strongly outstanding, subtriangular. Lower jaw very small and light; coronoid moderate, apex strongly recurved; teeth very small, nearly as small as in *nelsoni*.

Cranial comparisons.—Old male pallasi (the type) *compared with old male kluane* (the type): Size decidedly smaller; skull about an inch shorter and much less highly arched, with conspicuously shorter brain-case and shorter sagittal crest; crest nearly straight instead of strongly arched; postorbitals very much smaller, narrower, and less strongly decurved; fronto-nasal region much less elevated and more dished; rostrum much lower, depressed above instead of rounded; palate much shorter, less arched and less concave; lower jaw much shorter; coronoid lower.

Adult female pallasi compared with adult female kluane: Size of skull essentially the same or slightly smaller; canines smaller; molars very much smaller.

Skull measurements (♂ old, type).—Basal length 302.5 mm.; occipito-nasal length 279; palatal length 159; zygomatic breadth 209; interorbital breadth 72.5.

Ursus selkirki sp. nov.

Type No. 205170 ♂ old, U. S. National Museum, Biological Survey Collection. From Upper Columbia River, Selkirk Mts., B. C. Collected June 4, 1914, by John Hurst.

Characters.—Size medium or rather small; skull long, low, flat, and narrow; naso-frontal region elevated, sloping in same plane with frontal shield; postorbitals broadly subtriangular.

Cranial characters.—Frontal shield narrow and flat, sloping gradually into rostrum, only faintly depressed interorbitally, rather long-pointed, ending posteriorly about 20 mm. in front of parietals; postorbital processes flat, very broad, concave anteriorly, convex posteriorly, not widely projecting; rostrum rather narrow, slightly rising posteriorly in frontal plane; nasals slightly elevated anteriorly; sagittal crest short; palate arched anteroposteriorly and concave transversely; postpalatal shelf broad and flat; zygomata moderately spreading, subtriangular; mastoids rather short; lower jaw rather weak; coronoid blade low, the apex abruptly recurved, defining a rather short coronoid notch.

Cranial characters of old female, assumed to be *selkirki*, No. 203162 female old, Wallowa Mts., Oregon. Collected May, 1909, by J. K. Carper and J. T. Jardine.—Size rather large in relation to male; cranium low and flat; frontal shield medium, flat (slightly depressed medially), the point ending at fronto-parietal suture; postorbitals large, rather broad, and horizontally outstanding; rostrum rather narrow, high, and short; zygomata subtriangular; postpalatal shelf broad and flat; ramus of jaw

nearly straight (inferior border); coronoid blade high, apex strongly recurved overreaching plane of condyle, defining coronoid notch. Canines small; molars (especially M^2) rather large.

Cranial comparisons (old males).—Similar in general to *Ursus chelan* but smaller; vault of cranium much lower; frontal shield longer-pointed posteriorly; postorbital processes broader; sagittal crest much shorter and not elevated above general level of top of skull; zygomata less outstanding and more sharply triangular; lower jaw smaller and lighter; inferior border of ramus shorter, less bellied posteriorly; coronoid blade much lower and more abruptly recurved.

Compared with *latifrons*, whose range it approaches on the north, *selkirki* is easily distinguished by slightly smaller size, very much narrower and flatter frontal shield, broader postorbitals (strongly convex posteriorly), more elevated and evenly sloping fronto-nasal region; less outstanding and more triangular zygomata; longer squamoso-jugal suture; broader postpalatal shelf; much shorter lower jaw, much shorter and less upcurved inferior border of ramus, and much lower coronoid blade.

Skull measurements (♂ old, type).—Basal length 305 mm.; occipito-nasal length 306; palatal length 169; zygomatic breadth 206; interorbital breadth 74.

Ursus townsendi sp. nov.

Type No. 216643 ♂ old, U. S. National Museum. From mainland of southeastern Alaska; exact locality uncertain but probably between Cross Sound and Alsek River delta. Purchased at Sitka in 1889 by Dr. Charles H. Townsend.

Cranial characters.—Skull large, long, massive, rather low and flat-topped, dished, with extremely small teeth. Shield broad, flat, slightly depressed medially, the point ending anterior to parietals, sides reaching out broadly into very broad postorbitals, strongly sloping to rostrum; rostrum moderate, flat or depressed on top; nares truncate; zygomata moderately outstanding and moderately bowed; squamosal base broadly and abruptly expanded vertically; palate and postpalatal shelf moderate; notch rather narrow; mastoids long; occipito-sphenoid 95 mm.; basi-sphenoid rather deeply concave. Underjaw long; ramus broad and flat vertically; coronoid of moderate height, narrowing above, sloping strongly backward, apex cutting plane of posterior part of condyle; upper two-thirds of anterior border strongly inflected.

Cranial comparisons.—Old male (the type) *compared with male caurinus* (apparently its only near relative): Skull much larger, broader, more massive, and less arched; teeth smaller. Frontal shield very much broader interorbitally and postorbitally (interorbitally 91 contrasted with 81 or less; across postorbitals 130 contrasted with 116); postorbitals very much broader and flatter; rostrum more horizontal; nares truncate instead of sloping; zygomata more widely outstanding and more broadly expanded vertically.

Skull measurements (♂ old, type).—Basal length 348 mm.; occipito-

nasal length 353; palatal length 183; zygomatic breadth 245; interorbital breadth 91.5.

Ursus washake sp. nov.

Type No. 213005 ♂ adult (rather old), U. S. National Museum, Biological Survey Collection. From North Fork Shoshone River, Absaroka Mts., western Wyoming (between Bighorn Basin and Yellowstone National Park). Killed September, 1913, by Col. J. A. McGuire.

Cranial characters.—Old male (the type): Size medium, about equaling male *shoshone* and male *horriaeus;* skull rather short and high, moderately arched, with broad, elevated postorbitals and rather broadly outbowed zygomata. Frontal shield rather narrow, sloping strongly upward anteriorly, highest at postorbital processes; horizontal posteriorly, broadly concave between postorbital processes; postorbital processes large, broad, subtriangular as viewed from above, outstanding, elevated and slightly arched, rising well above frontal plane and passing anteriorly into thickened orbital rims; fronto-nasal region dished (change of angle about middle of nasals); rostrum rather small, strongly compressed horizontally between nasals and roots of canines, making nasals appear elevated; anterior nares small; zygomata rather slender, broadly spreading, rounded and strongly outbowed posteriorly, only slightly expanded vertically; sagittal crest low; postpalatal shelf broad, flat, and rather short; occipito-sphenoid 87 mm. (=distance from front of canine to or slightly beyond middle of M^1). Lower jaw moderate; ramus bellied posteriorly; coronoid blade high and rather falcate, the apex cutting plane of condyle (line from apex to tip of angular process passing well behind condyle). Teeth moderate or rather large; M^2 large.

Cranial comparisons.—Old male washake (type) *compared with adult male shoshone* of same region: Size essentially same, but general appearance of skull very different; braincase broadly and rather flatly depressed anteriorly instead of narrowing to keeled crest; frontal shield more abruptly uplifted anteriorly, highest at postorbital processes [in *shoshone* rising gradually and highest midway between postorbitals and parietals]; postorbital processes large, massive, subtriangular, elevated and somewhat arched [in *shoshone* slender, peglike, and somewhat depressed]; rostrum more compressed horizontally below nasals; zygomata much more broadly outstanding; postpalatal shelf broader; angular process of lower jaw longer and more produced.

Compared with adult male ophrus from eastern British Columbia (the type): Size about the same but appearing smaller; frontal shield less elevated and less deeply concave; fronto-nasal region elevated instead of sulcate-dished; zygomata less widely outbowed; postorbitals much broader and less elevated; orbital rims less swollen; postpalatal shelf shorter and broader; mastoids shorter; nares smaller and lower. Lower jaw more massive; inferior border of ramus more swollen and much more bellied posteriorly; coronoid blade higher and more falcate, the apex reaching much farther posteriorly (cutting plane of hinder part of condyle).

Compared with old male selkirki from Selkirk Range, southeastern British Columbia (the type): Size somewhat greater; agreeing in great breadth of postorbital processes, but differing as follows: fronto-nasal region more dished; frontals rising more abruptly at orbits; frontal shield concave between postorbital processes; postorbitals elevated; upper part of orbital rim swollen and elevated; nasals more flattened and much more strongly dished; zygomata more broadly outbowed and more arched; coronoid blade much higher.

Compared with adult male canadensis from Moose Pass, eastern B. C. (No. 174511, the type) with which it agrees essentially in basal and occipito-sphenoid length: frontal shield less flat, more elevated laterally, highest at postorbitals instead of at posterior point; fronto-nasal region more dished; rostrum smaller, narrower basally, more strongly compressed below nasals; postorbital processes very much larger, broader, and more massive, elevated, arched and subtriangular, instead of slender and narrowly peglike; zygomata more outbowed and arched; sagittal crest low and straight instead of high and arched; inion less developed; braincase anteriorly broader and more depressed—not tending to 'keel' into sagittal crest as in *canadensis;* occipito-nasal length less, although basal length of skull is essentially the same in both. Lower jaw longer; inferior border of ramus shorter and more strongly bellied; coronoid blade higher and more falcate, its apex reaching farther posteriorly; distance from angle to subangular process much greater; diastema in both jaws much longer. Last upper and middle lower molars not quite so broad.

Compared with adult male absarokus from north end Bighorn Mts., eastern Montana (No. 67391, the type): Size smaller; vault of cranium decidedly lower; braincase anteriorly broadly depressed; frontal shield narrower, lower and flatter, concave instead of convex between postorbital processes; postorbital processes (viewed from above) *broadly triangular, uplifted and somewhat arched* instead of peg-shape; orbital rims more thickened and elevated; rostrum smaller, lower, more slender, and much more compressed horizontally between nasals and roots of canines, making the nasals appear elevated; sagittal crest lower; occipito-sphenoid shorter; occiput lower; anterior nares smaller. Lower jaw shorter; inferior border of ramus much shorter; coronoid blade more falcate, its apex reaching farther posteriorly; angular process more slender and more produced posteriorly (line connecting apex of coronoid with angle passing well behind condyle—in *absarokus* cutting condyle near middle). Molars smaller.

Compared with old male horriaeus from New Mexico (the type) with which it agrees in size, proportions, and general characters: Frontal shield rising more strongly anteriorly, highest at postorbitals [in *horriaeus* highest at point], longer pointed; postorbital processes broader at base and more definitely *triangular* as seen from above; fronto-nasal region more dished; sides of rostrum more compressed horizontally below nasals; skull broader across squamosals; squamosal shelf longer anteroposteriorly, its outer free edge straighter (less incurved); zygomata more

widely outstanding and less angular; squamosal arm less expanded vertically; palate and postpalatal shelf broader and flatter; sagittal crest shorter and less highly developed; inion shorter. Teeth somewhat larger.

Skull measurements (♂ ad. type).—Basal length 310 mm.; occipitonasal length 305; palatal length 170; zygomatic breadth 217; interorbital breadth 76.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW VESPER RAT FROM NICARAGUA.

BY E. A. GOLDMAN.

The vesper rats of the genus *Nyctomys* are restricted in distribution to the Central American Subregion, the combined ranges of known forms extending from central Vera Cruz, Mexico, to western Panama. They are handsome, arboreal rodents, characterized externally by bright ochraceous-buffy or ochraceous-tawny upperparts and sharply contrasting white underparts. The tail is rather short and well furred; the feet are short and stout as in the allied genus *Rhipidomys*, and the compressed, recurved claws exhibit adaptation for climbing.

Owing doubtless to arboreal habits comparatively few examples of the genus are obtained by collectors. Specimens taken by Dr. C. W. Richmond in the humid Atlantic coast region of Nicaragua more than 20 years ago represent a new form, described below:

Nyctomys sumichrasti venustulus subsp. nov.

Type from Greytown, Nicaragua. No. $\frac{33114}{45115}\frac{9}{3}$, ♀ adult, U. S. National Museum (Biological Survey Collection), collected by C. W. Richmond, February 10, 1892. Original number 17.

General characters.—Color of upperparts decidedly darker than in *N. s. sumichrasti*, *N. s. salvini*, *N. s. decolorus*, or *N. s. nitellinus;* skull very broad.

Color.—Type: Upperparts near tawny of Ridgway (1912), finely and rather inconspicuously mixed with black, the general tone darkest on top of head and over back, becoming somewhat paler along flanks and outer sides of limbs; underparts white; ears, orbital borders, and small antorbital areas black; fore feet dull white; toes and plantar borders of hind feet whitish, the median metapodial areas blackish as usual in the genus; tail unicolor, brownish black.

Skull.—Similar in general to those of *N. s. sumichrasti* and the other

forms of the genus, but braincase and posterior part of frontal region broader than in any of them; rostrum rather slender.

Measurements.—Type: Total length, 256; tail vertebræ, 125; hind foot, 25.5. *Skull* (type): Greatest length, 31.7; zygomatic breadth, 28.4; interorbital breadth, 6.6; greatest width between temporal ridges, 14.6; length of nasals, 10.6; length of anterior palatine foramina, 5.2; length of palatal bridge, 5.2; alveolar length of upper molar series, 4.6.

Specimens examined.—Total number 3, as follows:

Costa Rica: Pacuare, 1.
Nicaragua: Escondido River (45 miles from Bluefields), 1; Greytown (type locality), 1.

Remarks.—The members of the genus *Nyctomys* are slightly differentiated and clearly assignable to a single species recognizable subspecifically as follows:

Nyctomys sumichrasti sumichrasti (Saussure), eastern slope of mountains in State of Vera Cruz, Mexico.
Nyctomys sumichrasti salvini Tomes, Dueñas, Guatemala.
Nyctomys sumichrasti decolorus (True), Rio de las Piedras, Honduras.
Nyctomys sumichrasti nitellinus Bangs, Boquete, Panama.
Nyctomys sumichrasti venustulus Goldman, Greytown, Nicaragua.

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PROCEEDINGS

OF THE

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DESCRIPTIONS OF THREE NEW SPECIES OF AMPHIPODS FROM SOUTHERN CALIFORNIA.

BY C. R. SHOEMAKER.

In a large collection of Crustaceans from the Venice Marine Biological Station, of Los Angeles County, California, sent to the U. S. National Museum for determination, the following new species of Amphipods were found.

Family LYSIANASSIDÆ.

Aruga macromerus new species.

This species, which is represented by a single male specimen, does not agree in a few minute details with Holmes' genus *Aruga*, but these differences do not seem to me of enough importance for the creation of a now genus. There are a few small setae at the distal end of the inner plate of the first maxillae. Plates of the second maxillae are not particularly narrow.

Eyes large, oval, and black. Lateral lobes of the head with front margin slightly curved and bearing a few minute setules, anterior angle rounding. First antennae with first joint robust; second and third much smaller. Flagellum short, 7-jointed. Accessory flagellum 5-jointed. Second antennae with 4th joint slightly expanded below. Flagellum 8-jointed. Posterior lateral angle of third abdominal segment quadrate. No dorsal prominences. First gnathopod simple, dactyl small and weak. Fourth, fifth and sixth joints provided on their under sides with brushes of fine setae. Second gnathopod long and very slender. Fourth joint provided below with fine setae. Fifth and sixth joints densely covered with fine setae. Dactyl very small and weak. First and second peraeopods with fourth joint expanded and having the lower anterior angle produced downward. At the lower end of the sixth joint of the first two peraeopods is a small backward pointing scale which is about half the length of the dactyl. Third, fourth, and fifth peraeopods have the second joint expanded into a broad backward and downward projecting lobe. The fourth joint of these three peraeopods is greatly expanded into a backward projecting lobe, the lower posterior angle of which dips down nearly

to the lower end of the fifth joint. Second gnathopod and first and second peraeopods have styliform accessory branchal vesicles. Epistome projecting forward beyond the lip in an evenly rounded curve. Mandibles long and narrow with palp situated back of the middle. Cutting-edge curved inward with edge smooth. Lobe projecting forward just above the cutting-edge. Three setae situated between the cutting-edge and the small backward-pointing tooth. First maxillae, inner plate narrow with several small setae at apex. Outer plate with six large teeth, serrated on their inner edge. Second joint of palp long with end gently curved and crenulate. The palp is concave and fits around the outside of the outer plate. The plates of the second maxillae are narrowly oval and armed at their upper ends with spines. Maxillipeds, inner plates narrow, armed on the upper third of their inner edge with setae, one or two small spines on their upper ends. Outer plates broad and oval, seven or eight small spines on their inner edge, crenulate on upper part of inner edge. Fourth joint of palp dactyliform. First uropods longest. Rami styliform, somewhat shorter than peduncle, outer slightly longer. A few spines on upper surface of peduncle and rami. Second uropods shorter than first. Rami subequal, inner ramus with constriction containing small spine about one-third the distance from the end. Third uropod shortest, rami shorter than peduncle, outer ramus longer. Peduncle with upper posterior angle quadrate and produced. Telson short, sides slightly convex, end very obtuse angled with a small spine on each side midway between apex and side of telson.

Length.—5 mm.

Locality.—Venice, Southern California.

Type.—Cat. No. 49596, U. S. N. M.

Family AMPELISCIDÆ.

Ampelisca venetiensis new species.

Male.—Eyes four, upper pair very near front margin of head, lower pair at lower anterior corner of head. First antennae reaching beyond peduncle of second by about the length of last joint of second peduncle. First joint short and thick. Second joint slenderer and about twice the length of first. Third joint slenderer than second and a little shorter than first. Flagellum about three times as long as peduncle and composed of about 20 joints. Second antennae longer than body. Third joint short, fourth and fifth successively narrower and subequal in length. Flagellum very long and slender with many joints. The under surface of the second joint of the first antennae and the upper surfaces of third, fourth, and fifth joints of the second are provided with many tufts of fine setae. The under surfaces of the first joint of the peduncle and the first three or four joints of the flagellum of the first antenna are provided with many fine setae. The lower posterior margin of the third abdominal segment is broadly rounded and the middle, lateral margin deeply depressed. The fourth abdominal segment is saddle shaped, having a deep dorsal depression in the middle bordered at the front and back by promi-

nences. The one at the rear having two setules on the posterior border. First gnathopod with side-plate widened distally and lower corners broadly rounded. Lower margin provided with double row of fine setae. Dactyl with row of setules on back margin. Second gnathopod longer than first. Side-plate having sides nearly parallel and lower corners broadly rounded, double row of setae on lower margin. Dactyl having row of setules on back margin. First peraeopod with back margin of second joint provided with several long setae. Front and back margins of fourth, fifth, and sixth joints crowded with long plumose setae. Dactyl longer than fifth and sixth joints together. Second peraeopod having side-plate widest. Second joint with lower half of back margin provided with long plumose setae. The back margin of the third joint, and the front and back margins of the fourth, provided with plumose setae. Back margin of fifth joint, and front margin of sixth, provided with plumose setae. Dactyl longer than fifth and sixth joints together. Third peraeopod has front margin of second joint provided with a row of plumose setae. Fourth peraeopod has three or four plumose setae about the middle of the front margin of the second joint. Fourth joint of fifth peraeopod produced downward posteriorly into a deep lobe, the back margin of which is provided with long plumose setae. The fifth joint has a small notch containing several small spines about one-third the distance from the lower front edge. First uropod has the inner margin of the inner ramus provided with a row of spines. Second uropod has the inner margin of the inner, and the upper margin of the outer ramus provided with short spines. Inner ramus of third uropod slightly longer than outer. Both rami broad at the base, tapering to a point. Edges of rami smooth and provided with long plumose setae. Telson broad and oval and divided about two-thirds of the distance to the base. Lobes with outer edge evenly curved, each having a shallow notch containing two setules at its apex.

Female.—First antennae short, reaching beyond middle of fifth joint of second antennae. Flagellum 6-jointed. Second antennae with flagellum about twice as long as peduncle. Flagellum 32-jointed. The first two or three side-plates are bordered below by plumose setae. The posterior lobe of the fourth joint of the fifth peraeopod is somewhat longer than in the male, reaching almost to the bottom of the fifth joint. The dorsal depression in the middle of the fourth abdominal segment is not so deep as in the male. The outer edges of third uropods provided with setae which are not plumose. The inner edge of each lobe of the telson contains one or two setules.

Length.—Male about 7 mm.; female about 10 mm.

Locality.—Off Venice, Southern California.

Type.—Cat. No. 49594, U. S. N. M.

Family Photidæ.

Podoceropsis concava new species.

Male.—Eyes oval or slightly reniform. Antennae missing, all except a few basal joints. Gland cone of second joint of second antennae long,

slender, and pointed. Third abdominal segment, lower posterior angle broadly rounded with a small tooth at bottom, mid-lateral margin depressed. Fourth and fifth abdominal segments each with three small teeth on posterior dorsal margin. Each of these segments bears two setae, one from the base of either side of the middle tooth. First gnathopod with many long curved setae on the lower inside of second joint. Second gnathopod, fifth joint rather short. Sixth joint large and broadly oval. Palm oblique with prominent tooth near finger-hinge and two blunt teeth where palm and posterior margin of joint meet. Palm and posterior margin of sixth joint densely setose. Dactyl strong and curved with row of setules on inner margin. In some specimens the teeth on the palm are very obscure and in some the palm is quite smooth. First and second peraeopods slender, with fifth and sixth joints bearing evenly spaced setae on their hind margins. Third, fourth, and fifth peraeopods with second joint expanded behind into a broad lobe, the hind margin of which is convex in the third and fifth and concave in the second. Mandidle with palp situated at anterior end. Third joint of palp broad and truncated with an indentation near upper end. End and lower margin of third joint, and lower margin of second, provided with long curved setae. Molar prominent. First and second maxillae and maxillipeds as in the rest of the genus. Epistome produced forward into a point. Upper lip evenly rounded. Lower lip with side-prominences pointed and slightly curved upwards. First uropod longest, rami subequal, long, curved, spine on under side of peduncle at base of the rami. Second uropod slightly shorter than first, inner ramus longer. Third uropod shortest, rami subequal. The lower posterior margin of the sixth abdominal segment is produced backwards beneath the peduncle of the third uropod. Telson, simple, about as broad as long, with a shallow concavity in the upper hind margin bordered by two truncated lobes from the upper surface of each of which rises a long spine, and from the ends of which several smaller spines project backward. Lower hind margin of telson without concavity.

Length.—5–7 mm.

Locality.—Venice, Southern California.

Type.—Cat. No. 49595, U. S. N. M.

Female.—Like male except that second gnathopod is smaller, with sixth joint weaker, fifth joint is longer and narrower, and sixth joint is narrower with oblique palm and no palmar teeth.

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PROCEEDINGS

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A NEW MOSQUITO FROM THE EASTERN UNITED STATES.

BY FREDERICK KNAB.

The new species of *Culex* described below has been recently brought to light by Mr. Herman H. Brehme, well known in connection with the mosquito work in New Jersey.

Culex brehmei new species.

Female.—Occiput clothed with narrow curved scales, white and dense in a median line and along margins of eyes, the others bronzy brown and more sparse, numerous erect forked black scales; cheeks clothed with broader flat white scales. Clypeus dull blackish, nude. Proboscis moderately long and slender, nearly uniform throughout, black scaled, beneath with pale reflection most distinct medianly. Palpi less than one-fifth the length of the proboscis, black scaled.

Mesonotum deep brown, clothed with narrow curved scales, for the most part bronzy brown and rather sparse, the integument showing between them, slightly coarser and denser yellowish white scales along margins, in a pair of dots on the disk, and short broad stripes at sides of antescutellar area. Scutellum with yellowish white scales and three groups of black bristles. Pleuræ brownish gray, pruinose, tinged with greenish below, and with a few small patches of white scales. Postnotum dull yellow-brown, nude.

Abdomen depressed, truncate at tip; dorsal vestiture of dull black scales, the segments with broad yellowish white basal bands, that on second segment slightly produced in the middle, the others produced triangularly at the sides, broadly so and dorsally visible on seventh and eighth segments; venter clothed with dirty yellowish white scales, each segment with a ragged median patch of black scales.

Legs rather long and slender, black scaled, the femora white scaled beneath to apices; knees and tips of tibiæ narrowly white scaled; tibiæ with a line of pale scales along ventral surface, on hind legs continued to ends of tarsi. Claws simple.

Wings hyaline, slightly infuscated; second marginal cell long, about five or six times as long as its stem; second posterior cell distinctly longer than its stem; scales dusky, those on costa, first, third and fifth veins (exclusive of the upper branch of the last named) black, distinctly darker than those on the other veins; outstanding scales very narrow, the appressed scales narrowly elavate, broader and denser on the black veins. Halteres pale, with dusky knobs.

Length: Body about 4.5 mm., wing 5 mm.

Male.—Proboscis straight, with an indistinct pale ring just beyond middle. Palpi acuminate, exceeding the proboscis by more than the length of the last joint, clothed with long dark hairs nearly to base, denser and blacker on the two distal joints; scale vestiture blackish brown, the two distal joints with a patch of white scales dorsally at base and ventrally streaked with white. Antennæ plumose, the hairs brown and black with silky luster. Abdomen long, narrowed near base, depressed and somewhat broadened distally; dorsal segmental white bands broad, the eighth segment nearly wholly white scaled; lateral ciliation fine and abundant, pale brown with silky luster. Wings narrower than in the female, the fork-cells somewhat shorter, the scales sparser. Claw formula: 1.1–1.1–0.0.

Length: Body about 4.5 mm., wing 4.5 mm.

Larva.—Head transverse, bulging at the eyes. Antennæ large and rather stout, with a large tuft from a notch at outer third; shaft spinulose, darkened on outer half. Dorsal head-hairs in long tufts of several hairs. Lateral hairs on abdominal segments 3 to 6 single, subdorsal ones on segments 5 and 6 double. Lateral comb of eighth segment a patch of small very narrow scales. Breathing-tube long and slender, over six times its diameter at base, very gently tapering; pecten of small, very short, evenly spaced teeth, extending over basal fourth; four long tufts of few hairs along postero-lateral aspect of tube, the third out of line and at apical third. Anal segment ringed by the plate, longer than wide; ventral brush well developed, confined to the barred area. Anal gills lanceolate, about as long as anal segment.

Laurence Harbor, Middlesex County, New Jersey (H. H. Brehme).

Type: Cat. No. 20411, U. S. Nat. Mus.

Described from 7 females and 8 males, which issued from pupæ on April 29 and 30, 1916. It gives me great pleasure to dedicate this interesting species to Mr. Herman H. Brehme, who has had no small share in making the mosquito work in New Jersey world-famous. Mr. Brehme has kindly furnished the following notes on the habits of this species:

The larvæ, pupæ and eggs were found in a cold spring in the woods. The first pupæ were taken April 25; temperature of the water 38° F. (4.5° C.). The first males emerged April 29, the first female April 30. The first egg-boat of the new brood was found May 2, and the eggs hatched May 3. The first pupæ of the second brood appeared May 15, adults emerging May 17. A fresh egg-boat was found on May 19. Breeding has been going on steadily to date (July 17) and by all appearances will continue throughout the season. The egg-boat is about the size of that

of *Culex pipiens*. The female is very voracious and the sting is nearly as severe as that of *Psorophora sayi*. From the above data it is apparent that this species commences breeding much earlier in the season than the other species of *Culex*.

The adults of *Culex brehmei* closely resemble *Culex restuans* Theob. (=*Culex territans* Walk.)* and I do not venture to point out any character as diagnostic. The mesonotal scales are a trifle larger in *brehmei*, but the difference is not sufficient to be tangible. Well marked specimens of *brehmei* show a more ornate mesonotum, the lighter colored markings being more extensive and more contrasting on the darker ground. But the ornamentation is variable in both species, with a tendency to disappear, as indeed is the case in many other species. The venation and scaling of the wings is closely similar in the two species. The new species rests essentially upon differences in the male genitalia and larva. The latter suggests *Culex pipiens*, but differs in many details.

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* Walker's type of *Culex territans* agrees with *restuans* Theobald and not with the species generally so designated; according to the laws of priority the name *territans* supercedes *restuans*. The species generally known as *Culex territans* should now be called *Culex saxatilis* Grossbeck. (See Howard, Dyar & Knab, Mosq. of North & Centr. Amer. & W. Ind., iii, 300, 1913.)

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PROCEEDINGS

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ONE NEW GENUS AND FIVE NEW SPECIES OF ICHNEUMON-FLIES.

BY HENRY L. VIERECK.

The species considered in this paper are all indigenous to Washington, District of Columbia, and vicinity.

BRACONIDÆ.

Analostania new genus.

Related to *Aleiodes* Wesmael from which it differs especially in the anterior margin of the clypeus being convex instead of concave, in the head having a carina between the eye margin and the vertex, in the flaring occipital carina that is tangent to the hind ocelli, in the 21-jointed antennae with the joints of the flagel from nearly 3 times as long as thick to nearly 6 times as long as thick, in the notauli being represented by two oblique carinae on the anterior third of the mesonotum, in the scutel which is nearly as long as wide and bounded posteriorly and laterally by a distinct carina, in the hind femora being hardly more than half as long as the hind tibiae, in the slender hind tarsi, the first joint of which is at least 8 times as long as thick, in the exceedingly attenuated claws, in the open second discoidal cell with the subdiscoidal vein issuing from the middle of the second discoidal cell, in the lanceolate stigma that is at least 6 times as long as wide across the middle, in the transverse propodeum which is apparently twice as wide as long down the middle, and in the longitudinal median carina of the abdomen being confined to the first segment. On account of the clypeus this genus could be placed in the group polymorphi near *Dyscoletes* Westwood, because of the venation this genus could be placed in the Spathiinæ near *Chremylus* Haliday. Ignoring these points there is no difficulty encountered in placing this genus near *Aleiodes* Wesmael.

Type, *Analostania tenuipes* new species.

Analostania tenuipes new species

Type, Cat. No. 20455, U. S. National Museum. Analostan Island, Little River, District of Columbia, Oct. 3, 1915; collected by Mr. L. O. Jackson while sweeping over *Pontederia cordata*.

Female.—Length 2.5 mm.; mostly black and shining, head rugulose, cheeks and occiput and vertex granular, ocelli equidistant, the lateral ocelli distinctly nearer to each other than to the lateral ocelli, anterior edge of the clypeus with an apparently thin margin, mandibles heavy and stramineous with dark tips, rest of mouth parts stramineous, the palpi somewhat infuscated, maxillary palpi five-jointed, the third joint longest and the end joint shorter than the penultimate joint, pedicel with a stramineous tip, first joint of flagel stramineous at base; thorax granular and reddish except the metathorax and the posterior lower corner of mesopleurae which are blackish, surface of middle third of mesonotum uneven, mesopleurae with shallow, transversely striate sternauli, second abscissa of radius a little longer than the first transverse cubitus, third abscissa of the radius apparently as long as the two preceding abscissae combined, metapleurae cinereous with pubescence, wings tinged with brown, stigma and veins dark brown, legs including coxae and trochanters brownish stramineous, tibiae and tarsi dark brown, propodeum with the dorsal aspect divided by a longitudinal carina and rugulose, posterior aspect bounded above by a prominent carina below which are radiating carinae; first tergite with its basal facet about one-third as wide as the segment is wide at apex, rugulose, second and third tergites granular, separated from each other by an arcuate indistinctly foveolate furrow, third tergite elevated before the apex then sloping to end in a polished edge, fourth, fifth and sixth tergites mostly polished, third tergite apparently half as long down the middle as the second, ovipositor barely showing beyond the sixth tergite. In one paratopotype the thorax is somewhat blacker than in the type. In another paratopotype the thorax is black excepting the prothorax, which is reddish.

Three specimens examined. Male unknown.

Ascogaster erythrothorax new species.

Type, Cat. No. 20456, U. S. National Museum. Plummers Island, Maryland, June 29, 1913, W. L. McAtee.

Head, thorax and propodeum reddish brown.

Female.—Length 4 mm., head dullish, rugulose, cheek nearly twice as broad as the eye, somewhat striate, face dull rugulose, clypeus shining and punctured, its anterior edge subbidentate, scape a little longer than the first joint of the flagel, pedicel nearly as long as wide, mandibles concolorous with the face, their tips dark, palpi blackish, scape and pedicel more or less dark brownish, first to fourth joints of the flagel brownish stramineous, rest of flagel blackish; thorax dull, reticulate, wings with the basal half including the veins yellowish, the apicel half fuscous, first discoidal cell petiolate, tegulae blackish, all femora and fore tibiae dark brown, rest of legs blackish; propodeum sculptured somewhat like the thorax but more coarsely so, with two blunt equidistant elevations between the lateral prominent, rounded spines that are nearer to the lateral spines than to each other. Abdomen a little more than twice as long as wide in the middle, reticulated, basal sixth brownish stramineous, with a longitudinal

carina on each side; the tegument between the carinae fuscous, rest of carapace dark brownish to blackish. A paratype from near the type locality, July 1, 1914, W. L. McAtee, is somewhat lighter than the type with the sides of the basal sixth of the carapace yellowish.

ICHNEUMONIDÆ.

Viereckiana egregia new species.

Type. Collection Nathan Banks. Collected at Great Falls, Virginia, June 29.

Differs from its American congeners in having the petiole pale throughout.

Female.—Length 8 mm., black, clothed with faintly golden pubescence; face with poorly defined punctures, clypeus not so closely punctured as the face, its anterior margin narrowly truncate, slightly reflexed, front and vertex finely sculptured, occiput and cheeks, with indistinctly defined punctures more shining than on the face, postocellar line apparently as long as the ocellocular line but not much more if more than half the length of the ocellocipital line, eyes distinctly converging beneath, clypeocular line distinctly shorter than the mandibles are wide at base, scape and pedicel mostly yellow, brownish above, flagel 40-jointed, blackish, its first joint almost one and a half times as long as the second, mandibles yellow with blackish base and castaneous apex, palpi stramineous; pronotum partly striate, shining, mesonotum sculptured like the face, mesopleurae shining, sternauli present on the anterior third, mesopleurae divided transversely near the middle by a furrow, the upper half divided longitudinally by a shallow depression that is transversely striate, lower half of mesopleurae and anterior half of upper half polished, scutel more coarsely sculptured than the mesonotum, tegulae and base of wings yellow, the former with an outer almost colorless margin, wings with a yellowish brown tinge and with brownish stramineous veins and stigma, recurrent vein received distinctly before the middle of the areolet, second abscissa of discoidal vein nearly half as long as the third abscissa, nervulus arcuate and received by the discocubital cell well beyond the basal vein, nervulus angulate below the middle, coxae black, rest of fore and mid legs yellow except the tarsi which are rather brownish stramineous, their claws and empodia blackish, rest of hind legs more darkly brownish stramineous than fore and mid tarsi except hind femora, which are reddish, hind tibiae with the basal fourth yellow externally, hind claws and empodia colored like the others; propodeum with a basal transverse carina that is acutely angled medially and an apical transverse carina that is interrupted medially, propodeum finely wrinkled between the base and the basal transverse carina, rest of propodeum transversely striate above, rather reticulate laterally; neck of propodeum extending distinctly beyond the middle of hind coxae but not near to the apex; petiole with the appearance of yellowish amber, perfectly smooth and nearly twice as long as the post petiole, the latter nearly three times as long as the distance between the petiolar spiracles and reddish like the

rest of the abdomen, second tergite with a dark tinge, its spiracles about two-thirds the length of the segment from the base and removed from the lateral edge by about three spiracle widths, lunulae nearer the spiracle than to the base of the segment and distinctly longer than wide; exserted portion of ovipositor hardly as long as the apical truncature of the abdomen.

Allotopotype, October 3: Very similar to the type. Eyes not distinctly converging below; length 9 mm.; vervellus angulated close to the lower end, hind tibiae and tarsi mostly infuscated. A paratopotype male was collected June 25; female paratypes examined are from Falls Church, Va., May 10, Bluemont, Va., July 22, Black Mt., N. C., North Fork Swannanoa, May; male paratypes examined are from Plummers Id., Md., August 29, and Falls Church, Va., September 7.

The above material is all from the collection of Nathan Banks. There are three female paratypes in the collection of the Biological Survey from Plummers Island, Md., August 4, 1907, September 23, 1906 (A. K. Fisher), and Great Falls, Va., May 10, 1915 (L. O. Jackson).

Cymodusa distincta (Cresson).

Mesoleptus distinctus Cresson.
Limneria distincta Cresson.

Male.—Collection Nathan Banks. From Great Falls, Virginia, June 21. Length 8 mm.; antennae entirely blackish; eyes only a little nearer to each other below than above, fourth and fifth tergites entirely reddish, sixth and seventh blackish above, reddish laterally. In other particulars it agrees with the original description. Areola separated from the petiolarea by a distinct carina as in the female.

Cymodusa simplicicornis new species.

Type.—Collection of Nathan Banks. Collected at Falls Church, Virginia, May 26.

Related to *C. distincta* (Cresson) from which it differs especially in its entirely black flagel.

Female.—Length 5.5 mm.; black, covered with silvery pubescence, ocellocular line distinctly shorter than the postocellar line, the latter a little shorter than the ocelloccipital line, shortest distance between the eyes two-thirds as long as the distance between the eyes on a horizontal line drawn tangent to the anterior ocellus, clypeocular line apparently half as long as the mandibles are wide at base, head finely sculptured and shining, antennae 27 or 28-jointed, ratio of length of first joint of flagel to the combined length of next two as 7 is to 9, scape yellowish beneath, mandibles yellow with castaneous tips, palpi yellowish white; thorax finely sculptured and shining, the notauli represented by rugulose areas that unite back of the middle of the dorsulum in a rugulose area occupying most of the middle third of the posterior half of the dorsulum, mesopleurae punctured and shining, the posterior half divided transversely by a shallow impression above which the tegument is impunctate, tegulae, wing base,

most of fore coxae, fore and mid trochanters and distal, hind trochanter yellow, wings with a brownish tinge, stigma and veins brownish stramineous, the latter darker than the former, venation as in *Sagaritis provancheri* D. T., *i. e.*, with the recurrent vein received by the areolet a little before the middle, areolet petiolate and with the second abscissa of the discoidal vein longer than the third, all femora reddish, rest of fore legs brownish stramineous, the coxae which are mostly black, in the tarsi which are mostly fuscous and in the tibiae which have a subbasal and an apical dark brownish band, hind legs with their coxae and proximal trochanters mostly black, their tibiae yellowish with a subbasal and an apical brownish fuscous stain, their tarsi fuscous, their tibial spurs whitish; propodeum shining, with poorly defined punctures and well developed carinae, basal area sessile almost triangular, costulae complete, areola and petiolarea confluent, the petiolarea rugulose; abdomen black, with the apical edge of the second tergite yellowish, the vertical sides of the third to sixth tergites and all of the seventh tergite mostly reddish, third to sixth tergites dorsally with a brownish apical margin, petiole convex, with a distinct fossa on each side near the postpetiole, distance from the base of the petiole to the spiracle apparently twice the distance from the latter to the apex of the first tergite, the latter distance distinctly greater than the distance between the spiracles, postpetiole convex, apex of petiole with a median impression, second tergite with the thyridii elongate and nearer the lateral edge than to the base of the segment, spiracles of second tergite almost adjoining the lateral edge and half way between base and apex; sheaths of the ovipositor nearly as long as the first tergite.

A paratype from Wallops Island, Virginia, June 1, 1913, W. L. McAtee, has reddish color of the third tergite more extensive and fusing on the dorsum and the antennae 30-jointed.

Neogreenia Viereck.

This genus was described from a single female specimen collected in Pennsylvania. A study of a series of specimens of both sexes from Maryland and Virginia makes it certain that the transverse cubitus is sometimes present though less than half the length of the abscissa of the cubitus between the transverse cubitus and the recurrent vein and that in some specimens there are three abscissae to the discoidal vein, the second abscissa of the discoidal vein being in such cases less than half the length of the nervulus. The nervulus is sometimes interstitial with the basal vein although usually received by the discocubital cell a little beyond the basal vein.

Neogreenia picticornis Viereck.

Male. Collection Nathan Banks: Agrees with the type except in the antennae, which are uniformly blackish without a whitish annulus, flagel 21-jointed; hind coxae blackish with stramineous tips. In both sexes the mesonotum is in some specimens mostly reddish and the base of the flagel yellowish. In one female the petiole is stramineous with the

postpetiole brownish. Some males have the thorax including hind femora and coxae mostly stramineous and the propodeum mostly reddish. Flagel sometimes 20-jointed. Mr. Nathan Banks has collected males at Falls Church, Va., June 24, July 6, August 14 and at Glencarlyn, Va., May 30. Mr. Banks has collected females at the same localities on June 24 and May 30, respectively, he has also collected females at Chain Bridge, Va., June 14, and at N. Fork Swannanoa, Black Mt., N. C., in May. Mr. W. L. McAtee has collected pale males of this species at Plummers Id., Maryland, August 25, 1912, and at Great Falls, Md., August 15, 1915.

The above notes are the result of the study of twenty-nine specimens.

Sagaritis ruficoxalis new species.

Type, Cat. No. 20457, U. S. National Museum. Four-mile Run, Virginia, April 25, 1915, L. O. Jackson; June 17, 1914 (W. L. McAtee).

Superficially somewhat like *Campoplex ? subtenuis* Cresson.

Female.—Length 5.5 mm.; black, covered with silvery pubescence, ocellocular line distinctly longer than greatest diameter of lateral ocellus shorter than postocellar line, the latter shorter than the ocellooccipital line, inner edge of eyes almost parallel, slightly emarginate, malar line nearly as long as the mandibles are wide at base and longer than the clypeocular line, head finely sculptured, dullish, antennae 31-jointed, first joint of flagel distinctly longer than the second but shorter than the second and third combined, scape almost entirely blackish, mandible yellow with brownish tips, palpi yellowish white; thorax finely sculptured, not especially shining, the dorsulum almost uniformly sculptured throughout, most of the middle third of the posterior half alone a little coarsely sculptured, mesopleurae with a shallow fossa between the upper and lower half, the former more distinctly shining than the lower half and partly striate, sternauli developed nearly half way back on the mesopleurae wing base, tegulae, fore and mid distal trochanters yellow, wings with a brownish tinge, stigma and veins brownish stramineous, the former except on its anterior edge paler than the latter, venation as in *Sagaritis provancheri* D. T., legs including the coxae mostly reddish, fore and mid legs with their proximal trochanters, and base of their metatarsi yellowish, fore and mid tarsi with first two joints stramineous, the following joints fuscous, fore tibiae stramineous, mid tibiae yellowish at base and near the middle, elsewhere brownish stramineous, hind tibiae brownish stramineous with a subbasal and an apical dark brown band, hind tarsi fuscous with the base of the joints stramineous, beyond the metatarsus inconspicuously so, hind tibial spurs pale stramineous, propodeum shining, finely sculptured, the areola hexagonal, finely reticulated and separated from the petiolarea by a poorly defined carina, petiolarea transversely striate, basal area about twice as wide at base as at apex, costulae well developed, areola hardly more than half as long as the petiolarea; abdomen black, with the apical edge of the postpetiole stramineous, second and third tergites black at base, reddish elsewhere, the thyridii reddish, and transversely oval, nearer the lateral edge than

to the base, spiracle of second tergite a little nearer to the apex than to the base of the tergite, fourth tergite blackish at apex, in the middle and elsewhere reddish, fifth mostly black, reddish laterally, sixth and seventh tergites entirely black, sternites beyond the petiole partly yellowish and fuscous, mostly stramineous, abdomen obliquely truncate at apex, exserted portion of the sheaths of the ovipositor hardly as long as the apical truncature, petiole with a fossa near the postpetiole.

Allotype.—Essentially as in the type, scape, mostly pale brown, antennae 34-jointed. Collected somewhere between Glencarlyn and the mouth of Four-mile Run along Four-mile Run, Va., June 17, 1914 (W. L. McAtee).

Paratypes are from Plummers Island, April 28, 1915 (L. O. Jackson); Washington, D. C., Mar. 6, 1913, in grass (W. L. McAtee); Maryland near Plummers Island, June 7, 1914, and April 28, 1915 (W. L. McAtee); Anacostia, D. C., Aug. 9, 1914 (W. D. Appel) and Ardmore, S. Dak., Aug. 13, 1915 (E. G. Holt). The female paratype from Anacostia has the scape pale brown beneath, a quadrangular subsessile areolet, and the post petiole with its apical half reddish; the Ardmore female paratype has the post petiole mostly reddish and the scape pale brown beneath. Judging from a study of eight females, the scape is usually pale brown beneath; what probably represents an extreme variety is a female from Maryland near Plummers Id., May 9, 1913 (W. L. McAtee), in which the areolet is subsessile, the second tergite is black with a reddish apical band, the third tergite black with a reddish apical band that broadens laterally and in the fourth and fifth tergites having the former mostly reddish but black dorsally and the latter mostly black with the outer fourth reddish.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DISTRICT OF COLUMBIA DIPTERA: SYRPHIDÆ.

BY NATHAN BANKS, C. T. GREENE, W. L. McATEE, AND R. C. SHANNON.

INTRODUCTION.

Because of the conspicuous coloration of many forms, their frequency about flowers, the wonderful similarity of certain species to wasps and bees, the remarkable larvae of *Eristalis* and *Microdon*, the connection of one form with the Bugonia myth, and the economic importance of various species, the Syrphidæ are considered one of the most interesting of the families of Diptera. The excellent revision* of the family by Dr. S. W. Williston has made them available for study to all who collect flies; it is therefore natural that the list of Washington Diptera should begin with this family.

The habits of the Syrphidæ are of such a varied nature that it is not possible to thoroughly investigate the Syrphid fauna of a given locality in a few years. Certain species occur very sparingly in the early spring, when little collecting is done, while others occur only late in the fall. A number are very local, and if the right spot is not examined at the right time the species will not be found in years of collecting. Various species appear to be really rare. A considerable number are very expert on the wing, and the collector, by no means, captures all he sees. Moreover in recent years it has become apparent that in several genera there are more species than have been customarily recognized, some of which are not easily distinguished in the field. The area covered by the present list is

* Bul. 31, U. S. Nat. Mus., 335 pp., 12 pls., 1886.

that ordinarily considered as belonging to the flora and fauna of the District of Columbia, namely, all localities within about a 15-mile radius from the Capitol. However, insect collecting has not been done with equal thoroughness in all parts of this region. The Potomac Valley and the Falls Church region have been much more extensively collected than other parts of the vicinity. It is, therefore, certain that this list is far short of completeness. It compares favorably, however, with lists given for entire States, and therefore is entirely adequate for indicating the character of the fauna of an area so limited as ours.

Collecting Syrphidæ in the vicinity of Washington dates back many years; Baron C. R. von Osten Sacken collected here from 1856 to 1862, and perhaps occasionally later, and from this material several species were described by Hermann Loew. Their material is in the Museum of Comparative Zoology. Later Mr. Theo. Pergande collected generally around here, largely in the Potomac valley; he sent his Syrphidæ to Dr. Williston and the specimens are now in the National Museum. About 1890 Mr. C. H. Tyler Townsend collected near Washington and published a list of 18 species of Syrphidæ; his specimens are in the University of Kansas collection. Later, the senior author began collecting here and in succeeding years was joined by the others. The material collected by Banks is in his private collection; that collected by Greene in the collection of Forest Insects, Bureau of Entomology, and the records are made available through the kindness of Dr. A. D. Hopkins. The specimens gathered by McAtee, Dr. A. K. Fisher, Messrs. W. D. Appel, L. O. Jackson, and a few others, are in the Biological Survey. Those obtained by Shannon are in the National Museum, and here also are specimens collected by various other entomologists during the last 15 or 20 years. Among these may be mentioned D. W. Coquillett, H. S. Barber, D. H. Clemons, J. C. Crawford, F. Knab, J. R. Malloch, and W. V. Warner. Mr. F. R. Cole has generously furnished us with the records of Syrphidæ collected by him, and Mr. W. R. Walton has kindly read the manuscript and added notes on the basis of his collection.

Every collector who examines his vicinity carefully, comes to the conclusion that he is on the border of zoological regions; for he finds species he did not expect, whose previously known distribution was wholly southern, northern, western or eastern.

Washington is no exception. For example, *Xylota marginalis* is of such a distinctly northern distribution, its capture here was a great surprise; similarly *Volucella vesiculosa*, *V. obesa*, and *Meromacrus cruciger* are so characteristically southern that none would expect them here; likewise *Eristalis latifrons* and *Platychirus chactopodius* are typical of western conditions.

However, there are cases in which of two closely allied forms occurring in the north, only one is found here. For example, *Eristalis meigenii* and *E. arbustorum* are closely related and occur together in various parts of the north; nevertheless all specimens we take here (and commonly) are *E. arbustorum*; *Helophilus latifrons* and *H. similis* present another case; all we get here (and also commonly) are *H. similis*. Yet from the known distribution one would expect both species here. There are evidently laws of distribution; but distribution depends on such a complicated set of conditions, even outside of temperature and moisture, that we can not with present knowledge predict occurrence.

The total number of species in the present list is 136. There are also 2 named varieties. Of this number three, namely, *Paragus dimidiatus*, *Xanthogramma divisa*, and *Helophilus divisus*, are of uncertain specific standing; two, *Sphegina campanulata* and *Helophilus lunulatus*, are not certainly identified (although the latter, whatever its identity, is additional to the other species of the genus listed); and one, *Merodon equestris*, does not have an absolutely clear title to a place in the list. The net total of species may therefore be placed at about 131. For comparison it may be stated that the number of species of Syrphidæ listed for New Jersey* is 132, with 2 named varieties. The latter list contains two synonyms, namely, *Chilosia tristis* and *Xylota tuberans* (perhaps *Helophilus divisus* should be added), so that the net total is about 130.

Members of the Washington Biologists' Field Club have planned and have in part accomplished the cataloging of the fauna of Plummers Island, Md., the home of the club. The present list obviates the need of a publication on the Syrphidæ. Seventy of the species herein cataloged have been taken upon Plummers Island. The records quoted indicate which species

*Johnson, C. W. in "The Insects of New Jersey," Ann. Rep. N. J. State Museum, 1909 (1910), pp. 762-771.

these are, except in the case of the forms of general distribution for which no specific records are given. All of these common species have been collected on the island, except *Microdon fuscipennis*, *Helophilus distinctus* and *H. chrysostomus*, and these three have all been taken on the Maryland shore near the island. The number of additional species (including the three just mentioned) that have been collected along the Potomac River from Great Falls to Little Falls, the area most closely related faunistically to Plummers Island, is 39. Specific records for all of these are given.

The 27 species not included in the above categories are almost equally divided between Beltsville, Md., Washington, D. C., and Falls Church, Va., an indication of the number of types of collecting grounds in our area.

ANNOTATED LIST OF SPECIES.

Microdon Meigen.

M. AURULENTUS Fabricius.—Great Falls, Va., June 27, 1906, D. H. Clemons.

M. COARCTATUS Loew.—Originally described from the District of Columbia. Glencarlyn, Va., June 11, in open meadow; Falls Church, Va., June 11, 1916, Banks. Larvae collected by T. E. Snyder in an ant's nest under bark of chestnut oak log at Difficult Run, Va., July 4, 1916, pupated July 5, and adults emerged from July 10 to 12, Greene.

M. CRAIGHEADI Walton.—Beltsville, Md., July 26, 1914, L. O. Jackson.

M. FUSCIPENNIS Macquart.—Apparently the most common species of the genus; has been taken in all sections of our territory from June 12 to September 27. Flies low, hardly over a foot above the ground.

M. GLOBOSUS Fabricius.—Virginia, June 27, 1880, Theo. Pergande; Great Falls, Va., June 25, 1915, September 26, 1913, Greene; Glencarlyn, Va., July 2, 1916, Banks; Plummers Id., Md., July 6, H. S. Barber; Lakeland, Md., June 25, 1906, D. H. Clemons.

M. MEGALOGASTER Snow.*—The only definite record is Dixie Landing, Va., June 1, this specimen being the type of *M. bombiformis* Townsend, by whom it was collected. A specimen labeled District of Columbia, but with no date nor name of collector, is in the collection of the U. S. National Museum.

M. RUFICRUS Williston.—Great Falls, Va., June 25, 1915, Greene; Chain Bridge, Va., June 5, Falls Church, Va., June 14, Glencarlyn, Va., June 7, Banks; Chain Bridge, Md., June 9, 1905, D. H. Clemons; Beltsville, Md., June 18, 1916, in copula, McAtee; Bladensburg, Md., June

* See also p. 203.

13, 1916, F. R. Cole. Also flies low. All Microdon larvae so far as known occur in ant nests.

M. SCITULUS Williston.—Beltsville, Md., July 6, Banks, F. R. Cole, Greene; July 9, McAtee; July 14, abundant, pairing, F. R. Cole, Shannon, H. L. Viereck; July 30, in copula; August 6, McAtee; all dates 1916. This species found among vegetation bordering open spots in sphagnum bogs. The whole series differs in the color of the metallic reflections from the purplish blue Florida specimens; in our form the males have chiefly fiery coppery reflections and the females greenish. It deserves a varietal if not a subspecific name.

Mixogaster Macquart.

M. BREVIVENTRIS Kahl.—Glencarlyn, Va., July 2 and 11, Banks; July 25, 1906, D. H. Clemons; Falls Church, Va., July 25, Banks. Rests on herbage in partial shade. Both localities where *Mixogaster* was collected contain *Bittacus* and *Panorpa virginica;* the two records for Glencarlyn are seven years apart.

Callicera Meigen.

C. JOHNSONI Hunter.—Falls Church, Va., April 22, 1914, Greene; flies very close to ground.

Chrysotoxum Meigen.

C. PUBESCENS Loew.—Not common but has been taken in numerous localities from April 24 to September 26, rarely however in June, July or August. Always found in bright sunlight, frequently resting on low foliage or near the base of trees. *Chrysotoxum ventricosum* Loew (Centuria quinta, p. 44), in connection with the original description, was recorded from Washington. This was misinterpreted by Osten Sacken and Williston to mean Washington City, while in reality Washington State was intended as shown by the locality labels "W. T." on the type specimens. (See Johnson, 1907, p. 77.)

Chrysogaster Meigen.

C. GREENEI Shannon.*—Great Falls, Va., on flowers of *Amelanchier* and of *Salix sericea*, April 20, 1916, McAtee; Falls Church, Va., April 27, 1915, Greene; Mount Vernon, Va., on flowers of *Amelanchier*, May 7, 1916, L. O. Jackson.

C. NIGRIPES Loew.—Fairly common May 9 to July 6; is attracted to light, visits flowers of *Amelanchier*, *Salix*, *Ceanothus*, and once occurred in great abundance on chinquapin flowers at Falls Church, Va.

C. NITIDA Wiedemann.—More common than last; April 23 to October 31; in copula, July 14; on various flowers, as *Ceanothus* and wild carrot.

* For description of this species see appendix, p. 195.

Paragus Latreille.

P. ANGUSTIFRONS Loew.—Falls Church, Va., July 24, 1913, Greene; April 26, June 11, 16, 22, and July 6; Glencarlyn, Va., June 23, Banks; Virginia near Plummers Id., Md., June 18, 1916, H. L. Viereck; Rock Creek, Md., June 15, 1913, Shannon; Maryland near Plummers Id., June 2, 1916, McAtee; Beltsville, Md., July 4 and 9, 1916, McAtee.

P. BICOLOR Fabricius.—Maryland near Plummers Id., April 23, 1914, Cabin John, Md., August 18, 1914, Linnieville, Md., July 4, 1913, Rosslyn, Va., May 18, 1913, Shannon; Falls Church, Va., July 21 to August 1, 1913, Greene; June 16, July 6, August 9 and September 7; Chain Bridge, Va., June 14, Banks; Vietch, Va., July 18, 1915; Four-mile Run Valley, Va., June 11, 1916, McAtee.

P. DIMIDIATUS Loew.—Originally described from the District of Columbia (Centuria quarta, p. 63). Knowledge of this form seems not to have advanced since Williston published his Synopsis. He then said: "The structural differences given for this species may justify its separation from *P. tibialis*, but in the examination of a considerable material which I have compared with specimens of the latter from Europe I have not been able to satisfy myself of differences sufficient to justify specific separation" (p. 20).

P. TIBIALIS Fallen.—More common than the other species of the genus; April 18 to October 30. The species of *Paragus* fly close to ground in slightly moist places near or in partial shade, but occur also on flowers.

Pipiza Fallen.

P. ALBIPILOSA Williston.—Plummers Id., Md., April 23, 1914, Maryland near Plummers Id., May 8, 1914, Cabin John, Md., April 18 and 29, 1916, Shannon; April 30, 1915, A. H. Pottinger; C. & O. Canal, Seven-Locks, Md., April 27, 1915, April 30, 1916, L. O. Jackson; Great Falls, Va., April 28, 1915, Shannon; May 12, 1911, S. A. Rohwer; April 30 (one specimen, doubtfully belonging here; I do not think this can be the *P. femoralis*, Banks).

P. CALCARATA Loew.—Washington, D. C., June 13, 1916; Maryland near Plummers Id., April 28, 1914, Shannon; Great Falls, Va., April 20, 1913, F. Knab. Loew's description of this species mentions the occurrence of processes only on the hind coxae. There are processes on the middle coxae also of the two specimens from this region and of another in the National Collection from New Hampshire. The type may have these structures obscured. European dipterists assign species with similar structures and with the hypopygium conspicuously set off from the remainder of abdomen to the genus *Cnemodon*. All the characters used, however, are secondary sexual ones, hardly suitable for the separation of genera. The females are in no way peculiar.

P. FEMORALIS Loew.—Dead Run, Va., May 9 and 19, 1916, May 23, 1915, Shannon; Great Falls, Va., May 2, 1916; Plummers Id., Md., May 10, 1916, McAtee.

P. FESTIVA Meigen.—Falls Church, Va., May 24, Great Falls, Va., June 21, Banks; May 2, 1916, McAtee; Dead Run, Va., May 9 and 19, 1916, Shannon; June 28, Banks; Rosslyn, Va., May 11, 1913, Shannon; Plummers Id., Md., April 21, 1907, May 10, 1916, on flowers of buttercup, McAtee; Maryland near Plummers Id., May 8, 1915, J. C. Crawford; Cabin John, Md., April 29, 1916, Shannon.

P. NIGRIPILOSA Williston.—Cabin John Bridge, Md., April 28, 1912, F. Knab and J. R. Malloch; Dead Run, Va., April 24, 1915, Shannon; Falls Church, Va., September 5, Banks; Virginia near Plummers Id., Md., June 2, 1916, McAtee; June 4, 1916, H. L. Viereck; Plummers Id., Md., May 10, 1916, McAtee.

P. PISTICA Williston.—Great Falls, Va., August 11, 1915, McAtee; Plummers Id., Md., April 28, 1914, April 29, 1916, Shannon; May 10, 1914, J. C. Crawford, on flowers *Sedum ternatum;* May 19, 1914, at light, Maryland near Plummers Id., August 29, 1915, Dead Run, Va., May 21, 1916, June 19 and August 29, 1915, Shannon; Glencarlyn, Va., June 7 and 30, Banks. The last-named specimens are females; males taken at Falls Church, Va., August 23 agree with *P. pubescens* Loew and *P. pistica* may be this species. *P. radicum* Walsh is an older name, but *P. modesta* Loew is doubtless the same and still older.

P. PISTICOIDES Williston.—Chain Bridge, Va., May 23 and 28, Great Falls, Va., April 27 and 30, May 25, and June 12, Banks; September 25, 1913, Shannon; Falls Church, Va., September 1, Banks; Beltsville, Md., April 30, 1916, McAtee.

P. PULCHELLA Williston.—Falls Church, Va., May 3, 10, and 23, June 14, and August 17; Great Falls, Va., May 25, Banks (these are all females; two males from Falls Church, in May, agree with *P. nigribarba* Loew, which I think is the same species, Banks); Bladensburg, Md., June 23, 1916, Shannon.

Chilosia * Meigen.

C. CAPILLATA Loew.—Originally described from the District of Columbia. Anacostia, D. C., May 4, 1913, P. R. Myers; Plummers Id., Md., April 16, 1915, swarming above small tree tops, Shannon; Maryland near Plummers Id., April 16, 1916, H. L. Viereck; Dead Run, Va., April 18, 1915, Shannon; Great Falls, Va., April 20, 1916; Mount Vernon, Va., April 18, 1916, McAtee.

C. CYANESCENS Loew.—Cabin John Run, Md., June 29, 1916, F. R. Cole.

C. PALLIPES Loew.—Originally described from the District of Columbia. Plummers Id., Md., June 15, 1915, Shannon; Dead Run, Va., July 25, 1915, Shannon; August 19, 1916, H. L. Viereck; Virginia near Plum-

*For a key to local species of *Chilosia*, synonymy of *C. tristis*, and description of *C. similis*, see Appendix, pp. 196-198.

mers Id., Md., flowers of *Aruncus*, June 2, 1916, McAtee; June 4, 1916, H. L. Viereck; Falls Church, Va., May 30, June 7, 11, and 23, on *Ceanothus*, and November 6; Glencarlyn, Va., May 30, on flowers of chinquapin, Banks.

C. PRIMOVERIS Shannon.—This species described from Plummers Id., Md., by one of the authors of this list is abundant in early spring, March 27 to April 27, on flowers of bloodroot, violets, spring beauty and *Dentaria*.

C. SIMILIS Shannon.—Cabin John, Md., October 30, 1915, Shannon; Virginia near Plummers Id., September 29, 1915, McAtee; Dead Run, Va., October 28, 1915, Shannon; Spring Hill, Va., September 29, 1911, F. Knab; Difficult Run, Va., September 8, 1914, Shannon; Great Falls, Va., October 3 and 21, Banks; October 3, 1915, McAtee; Glencarlyn, Va., October 4, on *Solidago;* males taken on this date with the females are very dark-winged, Banks.

Chalcomyia Williston.

C. AEREA Loew.—Dead Run, Va., May 9, 1916, Shannon; Falls Church, Va., April 25, on bark of stumps, Banks; May 1, 1913, W. Middleton; May 7, 1915; Great Falls, Va., April 19, 1915, Greene; April 28, 1915, on dead sycamore log, Shannon; Cabin John, Md., April 28, 1915, F. Knab and J. R. Malloch.

Myiolepta Newman.

M. NIGRA Loew.*—Falls Church, Va., May 22, 1915, in pocket† at base of tulip tree, Greene; May 30, Banks; Great Falls, Va., June 21, Glencarlyn, Va., May 30, Banks; Cabin John, Md., May 15, 1904, F. Knab; Beltsville, Md., June 14, 1914, McAtee.

M. STRIGILATA Loew.—Falls Church, Va., April 27 to May 1, 1915, sometimes at base of trees, also on blossoms of *Viburnum*, Greene; May 7 on *Viburnum*, Banks; Mt. Vernon, Va., on flowers of *Amelanchier*, May 7, 1916, L. O. Jackson; Maryland near Plummers Id., May 14, 1915 (var.), Shannon; April 20, 1916, on flowers of *Prunus americanus*, L. O. Jackson; Beltsville, Md., on apple blossoms, April 30, 1916, McAtee.

M. VARIPES Loew.—Washington, D. C., April 26, F. R. Cole; May 4, 1913, May 12, 1914, F. Knab; May 22, W. R. Walton, May 22, 1908, H. O. Marsh; May 25, 1912, McAtee; Bethesda, Md., April 27, 1915, R. H. Hutchinson; Falls Church, Va., April 27, 1915, May 3, 1913, Greene; May 7, 21, and 26, June 28; Chain Bridge, Va., May 21, Banks; Dead Run, Va., May 21, 1916, Shannon. Captured about bases of trees and on flowers of *Viburnum;* larvae in pocket in tulip tree, Greene.

* For synonymy of *Xylota tuberans* see Appendix, pp. 198-199.

† The term pocket as used in this paper means a hollow place or blind hole either in the side or in a crotch of a tree. Such pockets are always filled with dead leaves or other decaying vegetable matter, and keep quite moist from rain water or sap from the tree.

Baccha Fabricius.

B. COGNATA Loew.—Dead Run, Va., June 22, 1915, in shady woods, Shannon.

B. CLAVATA Fabricius.—Falls Church, Va., June 16, Banks; District of Columbia, July, 1902.

B. FASCIPENNIS Wiedemann.—Falls Church, Va., September 4, 1915, Greene; August 22, Great Falls, Md., July 21, 1916, Banks; Bladensburg, Md., September 23, 1915, in open woods, Shannon; Plummers Id., Md., June 28, 1905, July 27, 1907, Fisher; Anacostia, D. C., July 26, 1914, W. D. Appel.

B. FUSCIPENNIS Say.—Everywhere May 28 to October 11. Most of the Bacchas are found hovering near flowers or near tips of branches, frequently of pine trees. *Ocyptamus longiventris* Loew (Centuria septima, p. 66), described from the District of Columbia is considered a synonym.

B. LUGENS Loew.—Great Falls, Va., July 17 and 31, Glencarlyn, Va., October 10, Banks; Plummers Id., Md., July 14, 1913, and August 6, 1915, Maryland near Plummers Id., August 5, 1913, Shannon; Cabin John, Md., July 12, F. Knab.

B. TARCHETICUS Walker.—Odenton, Md., July 18, Banks; Beltsville, Md., July 30 and August 6, 1916, McAtee; Hyattsville, Md., August 4, F. Knab; Plummers Id., Md., July 28, 1907, A. K. Fisher; August 11 and 24, 1907, McAtee; August 25, 1907, A. K. Fisher; September 1, 1907, McAtee; Virginia near Plummers Id., Md., June 19, 1909, McAtee; Dixie Landing, Va., August 19, C. H. T. Townsend; Pimmit Run, Va., August 1, 1908, F. Knab; Falls Church, Va., July 25, 1913, September 11, 1912, Greene; September 17; Great Falls, Va., July 23 and 31, Banks; Washington, D. C., July 5, 1909, A. K. Fisher. Bred from Aphid colony, Greene.

Platychirus St. Fargeau and Serville.

P. CHAETOPODIUS Williston.—Rosslyn, Va., August 25, 1912, F. Knab and J. R. Malloch; Chain Bridge, Va., May 28 and September 17, Banks; Maryland near Plummers Id., July 30, 1914, Shannon. The species of this genus occur on flowers sometimes in marshy places.

P. HYPERBOREUS Staeger.—Almost if not quite as common in its season as *P. quadratus*, and similar in habits; April 20 to August 6.

P. QUADRATUS Say.—Common; April 6 to November 5; on many kinds of flowers.

Melanostoma Schiner.

M. MELLINUM Linnaeus.—About as common as *M. obscurum*, but the various records are given. Beltsville, Md., June 18, 1916, McAtee; Maryland near Plummers Id., April 23, 1914; May 7, 1913, Shannon; April 23, 30, June 18, 1916, L. O. Jackson; May 10, 1916, McAtee; May

28, 1916, H. L. Viereck; Cabin John, Md., June 14, 1913; Great Falls, Va., April 20, 1913; April 22, 1915, Shannon, April 20, 1913, F. Knab; May 2, 1916, McAtee; Washington, D. C., April 30, 1915, G. E. Quinter; Rosslyn, Va., May 1, 1913, Shannon; Falls Church, Va., April 28, 1913, Greene; June 16 and July 7, Banks; Four-mile Run, Va., April 25, 1915.

M. OBSCURUM Say.—Very common; on many kinds of flowers; April 10 to October 26.

Didea Macquart.

D. FASCIATA Macquart.—Plummers Id., Md., June 11 and 20, 1912; June 1, 1913, in wasp's burrow, H. S. Barber; October 7, 1906, A. K. Fisher; Washington, D. C., June 6, 1912, McAtee; Chain Bridge, D. C., September 15, 1912, F. Knab and J. R. Malloch; Hyattsville, Md., May 13, 1913, A. Busck; Lanham, Md., May 3, 1915, F. H. Loomis; Somerset Heights, Md., July 11, 1903, E. S. G. Titus; Washington, D. C., September 20; Falls Church, Va., July; Banks; Veitch, Va., September 23, 1913, Greene. Generally on foliage in sunny places; larvae attack aphids.

Syrphus Fabricius.

S. AMERICANUS Wiedemann.—Everywhere, occurring continuously throughout the season; extreme dates are April 8 to November 2.

S. ARCUATUS Fallen.—Falls Church, Va., April 22, and May 26 to 30, 1913, Greene; May 4 and 25, Banks; Great Falls, Va., April 19, 1915, Greene; Glencarlyn, Va., June 14, Banks; Washington, D. C., May 16, 1913; May 29, 1913; College Park, Md., May 25, 1913, F. Knab; Beltsville, Md., May 2, 1915, L. O. Jackson; Hyattsville, Md., July 9, 1909, pupa collected on leaf, fly emerged later, McAtee; Plummers Id., Md., October 7, 1906, A. K. Fisher; Maryland near Plummers Id., April 15, 1915, McAtee. Usually near pine trees, as also *S. perplexus;* larva feeds on aphids on pine twigs.

S. FISHERI Walton.—Glencarlyn, Va., July 14, Banks.

S. KNABI Shannon.*—Falls Church, Va., June 22, 1912, Greene; June 21, 1914, F. Knab; July 4, August 30 and September 13, Banks; Glencarlyn, Va., June 24, Great Falls, Va., June 25, Dead Run, Va., June 23, Banks; August 3, 1915, Difficult Run, Va., July 7, 1915, Shannon; Virginia near Plummers Id., Md., April 28, 1907, Beltsville, Md., June 18, 1916, McAtee; Lanham, Md., May 3, 1915, F. H. Loomis; Plummers Id., Md., June 7 and 28, 1914, June 14, 1908, McAtee; June 1, 1913, stored by wasp in its burrow in a log, June 20, 1912, June 30, August 6, H. S. Barber; June 19 and 30, July 19, August 6, Shannon; August 11 and 24, 1907, A. K. Fisher; September 5, 1915, McAtee; Maryland near Plummers Id., June 18, 1916, L. O. Jackson; Cabin John Bridge, Md., July 29, 1916, McAtee; Washington, D. C., September 30,

* For a key to the section of *Syrphus* containing this species and descriptions of *S. knabi*, *S. ribesii vittafrons* and notes on *S. rectus*, see Appendix, pp. 199-202.

1906, McAtee. Common; season April 28 to September 30; hovers over flowers and in sunny spots.

S. PERPLEXUS Osburn.—Plummers Id., Md., April 4, 1915; April 16, 1915, May 7, 1916, Shannon; Great Falls, Va., April 28, 1915, Greene; Falls Church, Va., April 26, October 6; Great Falls, Va., April 15, Banks.

S. RECTUS O. S.—Washington, D. C., no date, D. H. Clemons; Bladensburg, Md., September 23, 1915; Rosslyn, Va., April 23, 1913; Falls Church, Va., April 22, 1913, Shannon; Plummers Id., June 4, 1915; May 8, 1915; June 22, 1903, E. A. Schwarz; September 29, 1912, P. R. Myers; Dead Run, Va., June 22 and 29, 1915; October 28, 1915; Cupids Bower Id., Md., May 30, 1915; Great Falls, Va., April 28, 1915, Shannon; September 12 and 28, Banks; Beltsville, Md., June 14, 1914, McAtee; Plummers Id., Md., August 4, 1907, A. K. Fisher; Virginia near Plummers Id., Md., April 23, 1916, H. L. Viereck; September 29, 1915, McAtee.

S. RIBESII Linnaeus.—Marshall Hall, Md., September 17, 1908, F. H. Chittenden; Beltsville, Md., June 14, 1914, July 30, 1916, McAtee; Plummers Id., Md., April 12, 1908, A. K. Fisher; Washington, D. C., October 2, 1906, McAtee; May 17, 1916; Falls Church, Va., June 8, and 16, September 19, and October 6, Banks; August 23 to 29, 1913, Greene; Glencarlyn, Va., June 21; Great Falls, Md., July 12, Banks; Great Falls, Va., April 20, 1916, McAtee. *S. ribesii* var. *vittafrons* Shannon.—Lakeland, Md., November 11, 1909, F. Knab; Maryland near Plummers Id., April 17, 1903, W. V. Warner; April 22, 1903, H. S. Barber; Cabin John, Md., September 13, F. Knab; Great Falls, Va., September 25, 1913; April 20, 1913, Shannon; September 24, Banks; Rosslyn, Va., April 23, 1913, Shannon.

S. TORVUS Osten Sacken.—Common and widely distributed; extreme dates of collection for spring are: March 26 to June 1 and for fall September 6 to December 9. No specimens taken during the summer months.

The species of *Syrphus* are mostly not found on flowers, but hovering in air in sunny places sometimes ten or more feet above the ground. The larvae are aphid feeders.

S. XANTHOSTOMUS Williston.—Plummers Id., Md., May 23, 1911, P. R. Myers.

Xanthogramma Schiner.

X. AEQUALIS Loew.—Virginia near Plummers Id., July 20, 1912, P. R. Myers.

X. DIVISA Williston.—One from Falls Church, Va., June 2, Banks, agrees well with type, but it is hardly more than a variation of *felix*, the spots being smaller and consequently farther apart.

X. EMARGINATA Say.—Maryland near Plummers Id., August 5, 1913, Shannon; Cabin John, Md., May 15, 1904, F. Knab; Falls Church, Va., August 26, 1913, Greene; Glencarlyn, Va., June 17; Chain Bridge, Va., May 21, Banks; Great Falls, Va., October 3, Banks.

X. FELIX Loew.—Falls Church, Va., June 16, Banks.

X. FLAVIPES Loew.—Occurs everywhere and is fairly numerous; extreme dates of collection are: May 3 to October 10. Flies among herbage seldom more than a few feet above the ground.

Allograpta Osten Sacken.

A. OBLIQUA Say.—Very common; May 3 to October 26. Occurs on *Ceanothus* and other flowers; was seen swarming in large numbers in open pine growth at Dead Run, Va., June 29, 1915, Shannon. Larvae feed on aphids, Greene.

Mesogramma Loew.

M. GEMINATA Say.—Omnipresent and very abundant, April 23 to October 14.

M. MARGINATA Say.—Omnipresent and very abundant; April 4 to November 14. In copula as late as October 25. The species of *Mesogramma* occur near or on flowers and near aphid-infested plants; the larvae feed on aphids.

M. POLITA Say—Very abundant and widely distributed; June 22 to October 28. Oviposition seems sometimes to be very carelessly done, specimens observed near Little Falls, D. C., August 22, 1915, were extruding eggs wherever they alighted, on any leaf, and even on the observer's hands and clothing (McAtee).

Sphaerophoria St. Fargeau and Serville.

S. CYLINDRICA Say.—Omnipresent and very abundant; has been taken from April 6 to October 21. Often about flowers, known to visit those of *Salix humilis*, *Brassica*, *Ceanothus*, *Daucus*, and *Anthemis cotula*. In copula May 31.

S. SCRIPTA Linnaeus.—Great Falls, Va., October 21, Banks; Maryland near Plummers Id., May 28, 1914, Shannon; Cabin John, Md., May, 1915, J. C. Crawford; Chevy Chase, Md., May 9 and 13, 1915, G. E. Quinter.

Pelecocera Meigen.

P. PERGANDEI Williston.—Virginia, November 16, 1879, Theo. Pergande, the type specimens probably collected at Chain Bridge; Great Falls, Va., October 21, Banks, October 22, 1915, Greene; flying over low plants about 15 inches from the ground; has also been taken on flowers of wild mustard.

Sphegina Meigen.

S. CAMPANULATA Robertson.—Great Falls, Va., April 28, 1915; Virginia opposite Plummers Id., May 11, 1916, Greene, flying near base of tulip tree or hovering near low foliage along a stream; Dead Run, Va., May 9 and 19, 1916, Shannon. (In my opinion the *Sphegina* here recorded as *campanulata* are merely specimens of *S. rufiventris* that have not attained full color, McAtee.)

S. KEENIANA Williston.—Dead Run, Va., May 5, 1915, May 9, 1916, Shannon; June 23, Banks. Five other specimens which may be only very dark forms of *keeniana* were taken at Cabin John Bridge, Md., April 28, 1912, F. Knab and J. R. Malloch; Plummers Id., Md., May 10, 1914, Shannon; Virginia near Plummers Id., May 2, 1909, McAtee; and Dead Run, Va., June 19 and 22, 1915, Shannon.

S. LOBATA Loew.—Plummers Id., Md., May 18, 1915, Shannon; Maryland near Plummers Id., April 24, 1916, May 8, 1915, J. C. Crawford; May 28, 1916, H. L. Viereck; Great Falls, Va., April 28, 1915, Greene; April 20, 1916, McAtee; Chain Bridge, Va., June 4, Falls Church, Va., June 26, Banks; Virginia near Plummers Id., Md., June 2, 1916, McAtee; June 4, 1916, J. C. Crawford; Dead Run, Va., May 11, 19, and June 20, 1916, Shannon.

S. RUFIVENTRIS Loew.—Plummers Id., Md., May 10, 1916, McAtee; June 19, 1913, Shannon; Maryland near Plummers Id., May 8, 1915, on *Washingtonia*, J. C. Crawford; May 10, 1916, McAtee; Dead Run, Va., May 11, 1916, Shannon; Virginia near Plummers Id., June 2, 1916, McAtee; June 4, 1916, H. L. Viereck and J. C. Crawford; Falls Church, Va., June 6; Chain Bridge, Va., June 9; Great Falls, Va., May 25, Banks. Immature specimens of this species are pale yellow. *Sphegina* occur on flowers especially on those of *Aruncus*.

Neoascia Williston.

N. DISTINCTA Williston.—Rosslyn, Va., May 1, 1913, Shannon; Falls Church, Va., April 26, resting on a flower a few inches from the ground; June 4, 1916, Banks.

N. GLOBOSA Walker.—Washington, D. C., July 14, A. N. Caudell; Falls Church, Va., October 3, May 17, July 4; Great Falls, Va., June 21; Dyke, Va., May 14, Glencarlyn, Va., May 30, 1916, Banks; seen hovering around herbage about a foot from ground.

Rhingia Scopoli.

R. NASICA Say.—Common; April 27 to October 21, in damp places, often in partial shade, and at flowers of *Impatiens*, *Viola*, *Nepeta glechoma*, and *Hydrophyllum*.

Brachyopa Meigen.

B. FLAVESCENS Shannon.*—Dead Run, Va., April 9 and 24, 1916, May 23, 1915; June 9, 1915, May 19, 1916, Shannon; hovering near chestnut log on rocky hillside with northern exposure; originally described from the locality cited.

B. VACUA Osten Sacken.—Maryland near Plummers Id., April 28, 1914, on blossoms of wild cherry, wild pear, etc., Shannon; Virginia near Plummers Id., April 25, 1909, McAtee; Dead Run, Va., April 24, 1916,

* For description of female of this species see Appendix, p. 202.

Shannon; Great Falls, Va., April 30, flying near trunk of large tree, Banks; Falls Church, Va., larvae under dead tulip bark in the late fall, emerged the next spring, Greene.

Volucella Geoffroy.

V. EVECTA Walker.—Numerous records, May 25 to July 23; occurs around flowers. The variety *sanguinea* Williston also occurs (Beltsville, Md., June 11–18, W. R. Walton).

V. OBESA Fabricius.—Falls Church, Va., May 20, at *Ceanothus;* Glencarlyn, Va., June 28, Banks.

V. VESICULOSA Fabricius.—Plummers Id., Md., June 24, 1916; remains of one in spider web in insectary, August 17, 1914, Shannon; Glencarlyn, Va., June 20, at *Ceanothus*, Banks; Clarke's Station near Rosslyn, Va., July 11, 1913, Shannon; Washington, D. C., August 19, 1911, F. Knab.

Sericomyia Meigen.

S. CHRYSOTOXOIDES Macquart.—Cabin John Run, Md., October 10, 1915, J. Silver; Virginia near Plummers Id., October 5, 1913, Shannon; Dead Run, Va., May 24, 1916, Shannon; Great Falls, Va., May 19, 1915, McAtee; April 30, Banks; Beltsville, Md., June 9, 1915, McAtee.

Eristalis Latreille.

E. AENEUS Fabricius.—Washington, D. C., September 18, 1914; October 4, 1915, Shannon; March 29, 1907; October 22, 1914, McAtee; November 14, 1914, L. O. Jackson; Dixie Landing, Va., Washington, D. C., May, July, August, November, C. H. T. Townsend; Falls Church, Va., August 2, and July, Banks.

E. ARBUSTORUM Linnaeus.—Common everywhere; taken from April 4 to October 30; in copula, July 14, occurs on a great variety of flowers.

E. BASTARDI Macquart.—Washington, D. C., May 27, C. H. T. Townsend.

E. DIMIDIATUS Wiedemann.—Fairly common, season March 16 to September 23; on various flowers as those of shadbush, willow and wild plum.

E. FLAVIPES Walker.*—Washington, D. C., April 10, 1903; received from A. A. Doolittle of the Washington High Schools.

E. SAXORUM Wiedemann.—Beltsville, Md., July 30, 1916, on flowers of *Tofieldia racemosa*, McAtee.

E. TENAX Linnaeus.—Very common; taken everywhere and in every month from March to December, inclusive; often on flowers.

E. TRANSVERSUS Wiedemann.—Common; taken from April 7 to October 26; rests on flowers, often on yellow flowers. Pupa has been found in pocket of tulip tree, Greene.

* See also p. 203.

Meromacrus Rondani.

M. CRUCIGER Wiedemann.—Dead Run, Va., July 15, 1915, Shannon; probably a stray specimen as this species has a more southern range.

Tropidia Meigen.

T. ALBISTYLUM Macquart.—Washington, D. C., May 16, 1916, McAtee; June 19, 1915; Marlboro, Md., June 19, 1915, Shannon; Falls Church, Va., June 19, 1914; June 26 and 29, 1912; August 3, 1914, Greene; May 5 and 24, July 10, October 21, Banks. Not on flowers but resting on leaves or hovering a foot or more from ground in sunny places.

T. QUADRATA Say.—Washington, D. C., August 19, 1911, F. Knab.

Helophilus Meigen.

H. CHRYSOSTOMUS Wiedemann.—Common in its chosen habitat along streams and in marshes; May 3 to August 3.

H. DISTINCTUS Williston.—Common in same situations as last species; the two often taken at same time; May 21 to August 3.

H. DIVISUS Loew.—Originally described from the District of Columbia (Centuria quarta, p. 78). It seems by no means certain that this species and *H. laetus*, recorded below, are really distinct. The latter name has page priority.

H. LAETUS Loew.—Plummers Id., Md., on flowers of *Cornus stricta*, June 11, 1916, H. L. Viereck.

H. LUNULATUS Meigen?—Maryland near Plummers Id., April 23, 1914, Shannon.

H. SIMILIS Macquart.—Common; season April 12 to October 30; usually near water where it basks in sunshine; has also been taken at flowers of *Salix* and *Potentilla monspeliensis.*

Mallota Meigen.

M. CIMBICIFORMIS Fallen.—Piney Branch, D. C., no date, D. H. Clemons; Washington, D. C., May 10, 1911, McAtee; May 17, C. L. Marlatt; June 18, 1908, F. H. Chittenden, July 8, 1913, J. D. Hood; Arlington, Va., July 10, Wm. Palmer; Falls Church, Va., May 7, Banks; July 23, 1913, Greene; Maryland near Plummers Id., June 26, 1902, H. S. Barber; Plummers Id., Md., May 18, 1912, A. K. Fisher. Larvae have been found in pocket in tulip tree, Greene.

M. POSTICATA Fabricius.—Bladensburg, Md., June 7, 1916, L. O. Jackson; Plummers Id., Md., June 14, 1908, McAtee; Maryland near Plummers Id., May 21, 1916, J. C. Crawford; May 28, 1916, L. O. Jackson, H. L. Viereck; Virginia near Plummers Id., May 21 and 28, 1916, H. L. Viereck; June 2, 1916, June 19, 1909, McAtee; Dead Run, Va., May 23 and 25, 1915, May 24, 1916, Shannon; Rosslyn, Va., July 7, F. Knab;

Glencarlyn, Va., May 7 to 18, 1913, Greene; May 9, Banks; Falls Church, Va., May 26, 1913, May 31, 1914, Greene; May 25 and June 30, Banks; Mt. Vernon, Va., June 4, 1916, McAtee. The larvae of the rat-tail type have been found in pockets in living chestnut tree, Greene.

Merodon Meigen.

M. EQUESTRIS Fabricius.—This species frequently has been bred from material held up for inspection in the greenhouses and insectary of the Department of Agriculture. One specimen however is labeled simply, Washington, D. C., August 4, 1907. The lack of indication that it is a bred specimen makes it probable that the specimen was captured in the free state. Moreover, the records of the Bureau of Entomology do not show that any flies of this species were bred at any date near that given.

Teuchocnemis Osten Sacken.

T. BACUNTIUS Walker.—Great Falls, Va., April 28, 1915, Greene; April 30, rests on dead leaves in moist spots in woodland, Banks; Dead Run, Va., May 19, 1916, Shannon; Beltsville, Md., May 8, 1916, C. H. T. Townsend.

T. LITURATUS Loew.—Plummers Id., Md., April 14, 1906; April 10 and 14, 1910, A. K. Fisher; Falls Church, Va., April 25, 1913, Greene; May 1; Great Falls, Va., April 30, Banks. Sometimes rests on oak bark.

Pterallastes Loew.

P. THORACICUS Loew.—Plummers Id., Md., June 30, 1907, A. K. Fisher; Virginia opposite Plummers Id., September, 1909, J. C. Crawford; Offuts Id., Md., September 8, 1914, Shannon; Falls Church, Va., August 30, 1912; August 19, 1913, Greene; July 13, 1913, F. Knab; June 14, July 24, and September 7, Banks; Great Falls, Va., October 3, 1915, McAtee; Glencarlyn, Va., June 14, October 4; Beltsville, Md., June 9, Banks; July 4, 1916, McAtee. Rests on foliage near ground in sunny places.

Syritta St. Fargeau and Serville.

S. PIPIENS Linnaeus.—Everywhere, April 14 to October 26; in copula, July 9; often about or on flowers.

Xylota Meigen.

X. ANGUSTIVENTRIS Loew.—Beltsville, Md., May 28, 1916, McAtee; July 6, 1916, F. R. Cole; Plummers Id., Md., May 23, 1914; Maryland opposite Plummers Id., July 25, 1914, Shannon; Virginia near Plummers Id., Md., June 18, 1916, H. L. Viereck; Dead Run, Va., July 18 and 25, 1916, Shannon; Four Mile Run, Va., May 30, 1910, F. Knab; Glencarlyn, Va., June 5; Falls Church, Va., June 14, July 17, and 24; Great Falls, Va., May 25 and July 21, Banks. This species and *X. elongata* sometimes rest on the inner leaves of bushes, where it is extremely difficult to get them.

X. ANTHREAS Walker.—Beltsville, Md., July 30, 1916, flowers of *Ceph-*

alanthus; Plummers Id., Md., June 14, 1908, McAtee; Great Falls, Va., June 5, Banks; Four-Mile Run, Valley, Va., June 11, 1916, on *Ceanothus*, McAtee.

X. BICOLOR Loew.—Beltsville, Md., July 6, 1916, F. R. Cole; August 6, 1916, McAtee; Marlboro, Md., June 19, 1915, Shannon; Cabin John, Md., May 23, 1911, P. R. Myers; Maryland opposite Plummers Id., June 13, 1914; Plummers Id., Md., June 20, 1916, Shannon; Dead Run, Va., June 9, 1915; Great Falls, Va., June 1, 1915, Shannon; Great Falls, Va., June 25; Chain Bridge, Va., June 5, June 23, 1916; Glencarlyn, Va., May 31, June 16, Banks.

X. CHALYBEA Wiedemann.—Plummers Id., Md., May 8, 1915; June 4, 1915; June 13, 1915; June 17, 1913, J. D. Hood; July 16, 1916, H. L. Viereck; July 25, 1916, A. K. Fisher; July 28, 1912, McAtee; Maryland near Plummers Id., May 24, 1916, J. C. Crawford; College Park, Md., May 25, 1913; Dead Run, Va., May 23, 1915; May 24, 1916; June 9, 1915; Linneville, Md., July 5, 1913, Shannon; Falls Church, Va., June 21, 1914, F. Knab; Great Falls, Va., June 27, 1913, Greene; May 19, June 25, and July 21, Banks; Glencarlyn, Va., May 9, Banks; Washington, D. C., May 22, C. H. T. Townsend; rests on leaves in bright sunshine several feet from ground, also on moist logs in sunshine.

X. ELONGATA Williston.—Glencarlyn, Va., June 17, and July 2, Banks; Beltsville, Md., July 6, 1916, F. R. Cole.

X. EJUNCIDA Say.—Dyke, Va., May 14, F. R. Cole; Rosslyn, Va., July 11, 1913; Linneville, Md., July 5, 1913, Shannon; College Park, Md., May 25, 1913, F. Knab; Beltsville, Md., June 18, July 4, and August 6, 1916; Plummers Id., Md., June 14, 1908; July 11, 1909, McAtee; July 24, Banks; Dead Run, Va., June 9, 1915; June 29, 1915, Shannon; Falls Church, Va., May 23, June 2, 18, 23, 28; Odenton, Md., July 18; Glencarlyn, Va., June 16 and July 2; Great Falls, Va., July 21; Banks; rests on leaves.

X. FACIALIS Coquillett.—Beltsville, Md., June 25, 1915, Shannon.

X. FRAUDULOSA Loew.—Glen Echo and Cabin John, Md., April 23, 1914; Dead Run, Va., April 21 and May 9, 1916; April 21 and August 3, 1915; Rosslyn, Va., April 23, 1913, Shannon; Great Falls, Va., April 20, 1916, flowers of *Amelanchier*, McAtee; Marlboro, Md., June 19, 1915, Shannon; Beltsville, Md., July 30, 1916, flowers of *Cephalanthus*, McAtee.

X. MARGINALIS Williston.—Maryland opposite Plummers Id., May 14, 1915, on pine log; Great Falls, Va., April 15, Banks; April 28, 1915, on dead sycamore log, Shannon.

X. METALLICA Wiedemann.—Falls Church, Va., June 7, Banks. In general similar to *X. ejuncida*, but the pale femora will readily separate it.

X. PIGRA Fabricius.—Washington, D. C., May 22, C. H. T. Townsend; Falls Church, Va., July 5 and May 23. Larvae have been found under dead pine bark (Greene).

X. SUBFASCIATA Loew.—Washington, D. C., April 15, 1910, A. Busck; Bladensburg, Md., September 23, 1915; Dead Run, Va., May 23 and 27, 1915; June 19, 1915; March 13, 1915, April 3, 1915, on maple log, Shannon; Falls Church, Va., June 28; Glencarlyn, Va., June 16, Banks. Very close to *X. ejuncida*, but differs in shape of abdominal marks, in the color of arista, and of the front.

Chrysochlamys Rondani.

C. DIVES Osten Sacken.—Plummers Id., Md., August 11, 1912, McAtee; June 19, 1913, Shannon; Veitch, Va., June 14, 1912, at sap on trunk of chestnut, Greene; Falls Church, Va., July 18, Banks. Very possibly this may prove to be the *C. buccata* Loew.

Brachypalpus Macquart.*

B. FRONTOSUS Loew.—Originally described from the District of Columbia; Plummers Id., Md., April 14, 1914; Shannon; April 20, 1916, H. L. Viereck; Dead Run, Va., April 11 and 18, 1915, Shannon; Cabin John Bridge, Md., April 28, 1912, F. Knab; Vienna, Va., April 14, 1915, on *Benzoin aestivale*, J. C. Crawford; April 11 and 14, 1915, on willow, R. A. Cushman; Falls Church, Va., April 3, 1913; April 25, 1913, and April 11 to 25, 1914, Greene; April 12 and 18; Great Falls, Va., April 15, Banks. Adults rest on tree trunks; a female was seen to deposit eggs on water, in pocket of living chestnut, Greene.

B. RILEYI Williston.—Great Falls, Va., April 20, 1916, McAtee; Dead Run, Va., March 1 and 2; April 4, 1915, on rotten log in swamp; March 21 and 24, 1916, April 11 and 24, 1915, common, resting on an oak log lying in small sphagnum swamp, Shannon. Pupae have been found in frass in an insect gallery in cedar, Greene.

Merapioidus Bigot.

M. VILLOSUS Bigot.—Dead Run, Va., March 13 and 14, 1915, at sap of sugar maple, March 24, 1916, Shannon; March 18, 1915, at sap on beech trunk and on sugar maple, Greene; Plummers Id., Md., March 14, 1915, on red maple flowers, McAtee; Falls Church, Va., March 14, on fresh cut maple stump, also on maple flowers and resting on beech trunk, Banks.

Criorhina Hoffmannsegge.

C. VERBOSA Harris.—Falls Church, Va., April 3, 1913; April 5, 1916, Greene; resting on maple blossoms.

Blera Billberg.

B. BADIA Walker.—Plummers Id., Md., June 20, 1916; Dead Run, Va., May 23, 1915, May 24, 1916, June 20, 1916, July 9 and 29, 1915, around chestnut logs and resting on leaves in partial shade, Shannon.

* For a key to the species of Brachypalpus see appendix, pp. 202–203.

B. PICTIPES Bigot.—Dead Run, Va., May 19, 1916, May 23, 1915, Shannon; Chain Bridge, Va., May 23 and 29, rests on leaves in partial shade of open woods, Banks; Beltsville, Md., April 30, 1916, flowers of *Aronia arbutifolia*, McAtee.

B. UMBRATILIS Williston.—Falls Church, Va., April 22, 1913; April 23, 1913, on flowers of *Viburnum*, Greene; Chain Bridge, Va., May 21, flying among plants about two feet from ground, Banks; Mt. Vernon, Va., May 7, 1916, flowers of *Amelanchier*, L. O. Jackson; pupae have been found in pocket in a sycamore, Greene.

Somula Macquart.

S. DECORA Macquart.—Washington, D. C., Walton; Plummers Id., Md., June 4, 1915, May 23, 1914, H. S. Barber; May 5, 1913, Shannon; Maryland near Plummers Id., May 21, 1916, H. L. Viereck; May 23 and June 9, 1915; Virginia near Plummers Id., June 2, 1916, McAtee, June 4, 1916, H. L. Viereck; Dead Run, Va., May, June and July, 1915, 1916; common in Sphagnum swamp, Shannon; Rosslyn, Va., May 11, 1913, F. Knab; Falls Church, Va., April 22 to May 29, 1913; June 6, 1913; Chain Bridge, Va., June 23, 1915, Greene; Falls Church, Va., May 25 and 30; Dyke, Va., May 14; Great Falls, Va., May 19 and 25; Chain Bridge, Va., May 28; Glencarlyn, Va., May 10, Banks. Sometimes taken at large trees which have some loose bark; also resting on leaves in sunny places. Larvae of rat-tail type have been found in pocket of living tulip tree (Greene).

Milesia Latreille.

M. VIRGINIENSIS Drury.—Common, June 4 to October 9; in copula Plummers Id., Md., August 4, 1907, A. K. Fisher. Often seen about *Ceanothus*, *Rhus* and other shrubs when in bloom, but not actually upon the flowers.

Spilomyia Meigen.

S. FUSCA Loew.—In the Osten Sacken collection at Cambridge there is a specimen labeled District of Columbia (McAtee).

S. HAMIFERA Loew.—Washington, D. C., July 1, F. C. Pratt; Beltsville, Md., on flowers of *Sambucus*, July 4, 1916, McAtee; Maryland near Plummers Id., June 20, 1916, Shannon; June 26, 1902, H. S. Barber; Dead Run, Va., June 29, 1915, Shannon; Plummers Id., Md., July 5, 1909, McAtee; Falls Church, Va., June 26, 1913, on leaves of maple in shade; also on low flowers, Greene; July 16; Great Falls, Va., June 27, July 21, 1916, in copula, Banks.

S. LONGICORNIS Loew.—Beltsville, Md., September 12, 1915, L. O. Jackson; Bladensburg, Md., September 23, 1915, Shannon; Dixie Landing, Va., October 5, C. H. T. Townsend; Falls Church, Va., July 27, 1912, Greene; June 23, September 1 and 7, July 24, August 22, September 18; Glencarlyn, Va., July 2; Great Falls, Va., June 27, September 28, and October 3, Banks. Rests often on flowers of golden rod, sometimes in partial shade.

Sphecomyia Latreille.

S. VITTATA Wiedemann.—Plummers Id., Md., May 9, 1915, specimen seen flying around bases of trees, Shannon; Maryland near Plummers Id., May 6, 1914, in copula, H. Weld; May 21, 1916, H. L. Viereck; Cabin John, Md., April 29, 1916, Shannon; Washington, D. C., April 23, 1909, F. Knab; Falls Church, Va., June 22, 1907, April 22, 1913, and May 2, 1914, on blossoms of *Viburnum*, Greene; Great Falls, Va., May 10, 1915, Mt. Vernon, Va., May 7, 1916, on flowers of *Amelanchier*, L. O. Jackson.

Temnostoma St. Fargeau and Serville.

T. BOMBYLANS Fabricius.—Beltsville, Md., May 28 and June 18, 1916, McAtee; Plummers Id., Md., June 7 and 20, H. S. Barber; June 7, 14, 15, and July 7, 1908, McAtee; Maryland near Plummers Id., May 21, 1916, H. L. Viereck; Virginia near Plummers Id., April 18, 1913, bred from hickory log, H. S. Barber; June 2, 1916, McAtee; Dead Run, Va., May 14 and June 28, issuing from rotten maple log, May 9, 24, and June 20, 1916, Shannon; Washington, D. C., D. H. Clemons; Rosslyn, Va., May 4, 1913, from rotten willow log, Shannon; May 11, 1913, under bark of willow log; Falls Church, Va., June 21, 1914, F. Knab; Glencarlyn, Va., May 18; Dead Run, Va., June 23; Falls Church, Va., May 3, Banks. This species breeds in logs generally in low damp places. It flies with its black fore tarsi extending straight out and while hovering in this position it has a great resemblance to a wasp (Shannon).

T. EXCENTRICUM Harris.—Cabin John Run, Md., June 29, 1916, F. R. Cole; Plummers Id., Md., June 4 and July 6, 1915, Shannon; June 11, 1916, H. L. Viereck; Dead Run, Va., May 23 and June 20, 1915, May 10 and 21, 1916, reared from elm log, June 20, 1916, Shannon; June 23, at rotten log in partial shade, Banks; Falls Church, Va., May 26, 1913, resting on grass at base of tulip tree, Greene. This species has habits very similar to those of *T. bombylans*. It should be pointed out that the length (6 mm.) given for this species by Williston is erroneous. In the original description (Insects Injurious to Vegetation, Ed. of 1862, p. 609) Harris gives from $\frac{6}{10}$ to $\frac{8}{10}$ inch.

T. PICTULA Williston.—Plummers Id., July 20, 1912, H. S. Barber; May 19, 1916, June 18, 1914, Shannon; Washington, D. C., May 17, 1908, H. O. Marsh.

Ceria Fabricius.

C. ABBREVIATA Loew.—Falls Church, Va., May 22, from larva on oak bark, Banks.

C. WILLISTONI Kahl.—Plummers Id., Md., May 8, 1915, J. C. Crawford; Falls Church, Va., May 18, 1913; April 27, 1915; Great Falls, Va., April 28, 1915; resting on maple trunk, on leaves of May apple, in sun; also flying close to ground, Greene; Falls Church, Va., March 27, from pupa on oak bark, Banks.

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Banks, Nathan.

Note on Ceria willistoni Kahl. Proc. Ent. Soc. Wash. 5, No. 4, June, 1903, p. 310.

Pupa collected at Falls Church, Va., adult emerging, March 27. Known previously from Florida, Texas, and Kansas. Describes puparium.

Captures of diptera. Ent. News 18, No. 10, December, 1907, p. 450.

Notes on 8 rare species from vicinity of District of Columbia, including 2 Syrphids; *Volucella obesa*, Glencarlyn, June 28, and *Pterallastes thoracicus*, Glencarlyn, June 14.

At the Ceanothus in Virginia. Ent. News 23, No. 3, March, 1912, pp. 102–110.

Records 27 species of Syrphidæ from Falls Church and vicinity, p. 109.

Miscellaneous Notes. Proc. Ent. Soc. Wash. 17, No. 3, September, 1915.

Syrphus fisheri Walton recorded from Glencarlyn, Va., July 14.

Barber, H. S.

Notes on a wood boring Syrphid. Proc. Ent. Soc. Wash. 15, No. 4, December, 1913, pp. 151–152.

Temnostoma bombylans reared from a hickory log. The locality though not stated in the article is Virginia, near Plummers Island, Md. The structure and habits of larva are discussed and the suggestion made that *T. bombylans* is a composite species.

Johnson, C. W.

Some North American Syrphidae. Psyche 14, pp. 75–80, August, 1907.

On page 77 he explains the confusion regarding place of collection of type specimens of *Chrysotoxum ventricosum* Loew, which has been erroneously recorded from the District of Columbia.

Greene, C. T.

Capture of Callicera johnsoni Hunter. Proc. Ent. Soc. Wash. 17, No. 1, March, 1915, p. 1.

At Falls Church, Va., April 22, 1914.

Loew, H.

Diptera Americae septentrionalis indigenae. Centuria quarta. Berlin Ent. Zeitschr. 7, 1863, pp. 275–326 and in the complete work, Berlin 1872, Vol. 1, pp. 159–210, contains the original descriptions of *Paragus dimidiatus Chilosia capillata*, *C. pallipes*, and *Helophilus divisus* from the District of Columbia.

Centuria quinta, Berlin Ent. Zeitschr. 8, 1864, pp. 49–104. Complete work 1, pp. 211–261, similarly contains *Chrysotoxum ventricosum* and *Microdon coarctatus*.

Centuria septima. Berlin Ent. Zeitschr. 10, 1866, pp. 1–54. Complete work 2, pp. 61–114, contains *Ocyptamus longiventris*, and

Centuria decima. Berlin Ent. Zeitschr. 16, 1872, pp. 49–124. Complete work 2, pp. 225–288, contains the original description of *Brachypalpus frontosus* from the District of Columbia.

In all cases the District of Columbia is the sole locality given. It has been shown that the locality for *Chrysotoxum ventricosum* is the State, not the City of Washington. Of the other species *Ocyptamus longiventris* has been put in synonymy.

Osburn, R. C.

Studies on Syrphidae I—Syrphus arcuatus Fallen and a related new species. Journ. N. Y. Ent. Soc. 18, No. 1, March, 1910, pp. 53–57, Pl. 1.

Records *S. arcuatus* from the District of Columbia.

Studies in Syrphidae IV. Species of Eristalis new to America, with notes on others. Journ. N. Y. Ent. Soc. 23, No. 2, June, 1915, pp. 139–145.

Shows that *E. arbustorum*, not *E. Meigenii* as formerly supposed, is the common form about the District of Columbia, as well as in many other eastern localities.

Osten Sacken, C. R.

A list of the North American Syrphidae. Bull. Buffalo Soc. Nat. Hist. 3, Art. V, pp. 38–71, November, 1875.

Records 9 species from the District of Columbia.

Shannon, R. C.

Captures of the Syrphid fly, Merapioidus villosus Bigot. Proc. Ent. Soc. Wash. 17, No. 3, September, 1915, pp. 147–148.

At Dead Run, Va., Plummers Id., Md., and Falls Church, Va.

An eastern Chilosia with hairy eyes (Diptera, Syrphidæ). Proc. Ent. Soc. Wash. 17, No. 3. September, 1915, p. 168.

Chilosia primoveris n. sp. Type locality Plummers Id., Md., recorded also from Maryland and Virginia, near Plummers Id., and from Cabin John and Great Falls, Md.

A new eastern Brachyopa. Ins. Insc. Mens. 3, Nos. 11–12, November-December, 1915, pp. 144–145, December 31, 1915.

Brachyopa flavescens n. sp., described from Dead Run, Va., May 23 and June 9, 1915.

Townsend, C. H. Tyler.

Contributions to the Dipterology of North America—I. Syrphidæ. Trans. Am. Ent. Soc. 22, pp. 33–55. March, 1895.

Records 18 species from the vicinity of the District of Columbia. One described as new, *Microdon bombiformis*, Dixie Landing, Va., June 1, is now considered the same as *M. megalogaster* Snow.

Williston, S. W.

Eine merkwurdige neue Syrphiden—Gattung. Wiener Ent. Zeitung 3, 1884, pp. 185–186, fig.

Euceratomyia pergandei gen. et sp. nov., District of Columbia, by Theo. Pergande, November 16, 1879. Now placed in genus *Pelecocera*.

Synopsis of the North American Syrphidae. Bul. No. 31, U. S. National Museum, 1886, 335 pp. 12 pls.

Fifteen species recorded from District of Columbia and vicinity.

APPENDIX.

SYSTEMATIC AND SYNONYMIC NOTES.

By R. C. Shannon.

Chrysogaster greenei new species.

Male: Shining, dark steely blue. Face fairly prominent, very dark greenish black with a broad gentle swelling in the middle; the parts of the transverse, silvery pollinose band extending outward to the eyes from below the base of the antennae are very narrow. Wings shaded very slightly. Length 6.5 mm.; wing 5.5 mm.

Female: Body very broad; very dark greenish black. The longitudinal, median ridge down the frons rather broad. Face shining, very dark green; rather prominent; the epistoma well developed; the transverse band on each side between the eye and antennae narrowed. Mesonotum with very sparse, insignificant, whitish pile. Abdomen very broad, ovate. Wings clouded apically. Length 7.5 mm.; wing 6.5 mm.

Described from two males and two females: Falls Church, Virginia, April 27, 1915 (C. T. Greene); for records of paratypes see p. 177.

Type Cat. No. 20453, U. S. N. M. Male type; female allotype.

This species falls into "group four" in my table of species for this genus (Proc. Ent. Soc. Wash. XVIII, 1916, pp. 102, 103). The male is distinguished from the males of *nigripes* and *inflatifrons* by its shining dark steel blue color but is very close to *texana*. *Texana* has the face shining steely blue and more flattened; the band a little broader between the eyes and antennae; and its wings more clearly hyaline. The female is readily recognized by its very broad appearance. *Texana*, female, has slightly more abundant pile on the frons; the longitudinal ridge down the frons narrower; the face more bluish, less prominent; the transverse band broad and even all the way across; the mesonotum more bluish and with more abundant pile; and the wings clear hyaline.

This species is named in honor of Mr. Charles T. Greene, who has done extensive collecting and rearing in the Syrphidæ.

Key to the Local Species of **Chilosia.**

1. Eyes and face hairy. . . . . *primoveris* Shannon.
   Eyes bare, face with pile only along eye margins . . . . . 2.
2. Scutellum without marginal bristles; body with light pile. *capillata* Loew.
   Scutellum with marginal bristles . . . . . 3.
3. Arista long-plumose, shining steely blue species . . *cyanescens* Loew.
   Arista short-pubescent . . . . . 4.
4. Legs mostly yellow; female with face, humeri and scutellum in part yellow . . . . . *pallipes* Loew.
   Legs mostly black, tibiae partly yellow; female with face, humeri and scutellum black . . . . . *similis* n. sp.

Chilosia pallipes Loew.

This species was described (Cent. IV, 70, 1861) from females collected in the District of Columbia. The male has never been authentically recorded from this region. The writer believes that males from the Eastern States, which have usually been called *C. tristis*, are in reality *pallipes*, as the records and material invariably show only males for *tristis* and females for *pallipes*. The difference between the sexes is considerable but the same dimorphism occurs in the sexes of true *tristis*, undoubtedly correctly associated, and described from the Red River of the North. A description of local males, which are undoubtedly *pallipes*, is here given:

Pile on ocellar triangle, dull rufous and with a few black hairs, on the frontal triangle black. Antennae small, reddish yellow; arista blackish, minutely pubescent. Face shining black, the epistoma not at all produced. Mesonotum shining metallic greenish black; humeri yellow tinged, with white pollen; the pile rather long, dull yellowish brown; lateral margins of mesonotum with long and short black bristly hairs; pleurae with whitish and luteous pile. Dorsum of scutellum with yellowish brown pile, the margin with long, slender, black bristles and downwardly directed long white pile. Legs mostly yellow; front and middle femora and hind tibiae with dark median bands, the hind femora black with yellow base and apex; tarsi yellow, the last joint blackish; first joint of hind tarsi exteriorly blackish, lighter at base and apex. Abdomen rather slender, brightly metallic bronzy black, the second segment opaque black except at the exterior angles, the third opaque black on the posterior half; pile on first segment and lateral margins of second white, rufous yellow on posterior margin of second and disk of third and fourth. Wings hyaline, longer and narrower than in the female, the last section of the fourth vein consequently longer than in that sex.

Length 9 mm.; wing 8.25 mm.

The male of *tristis* differs in having the face, the epistoma especially, more developed; the pile on the dorsum of the thorax mostly black; legs black, but the apices of femora, the bases and extreme apices of tibiae, as well as the first joint of the middle tarsi, yellowish; the third abdominal segment more extensively opaque black, only the anterior angles shining aeneous.

Chilosia similis new species.

Eyes bare; scutellum with marginal bristles; arista short pubescent; abdomen of male in part opaque, the rest shining metallic bronzy black.

Male: Ocellar and frontal triangles shining black and with black pile. Antennae small, the first two joints shining brownish black, the third ferruginous; arista about two and a half times as long as antenna, black and with rather dense pubescence, most abundant basally. Face shining black, eye margins with very fine, silvery pile; tubercle large, projecting a little beyond antennal prominence. Thorax shining black; mesonotum with short, rather stiff, black pile; post-alar calli with black bristles,

pleurae with yellowish brown pile, intermixed with black; posterior margin of scutellum with rather long black bristles and short white pile. Legs black, yellow on extreme apices of femora and bases and apices of tibiae; tarsi black, the first two joints ventrally with a cushion of very short golden pile; lower margins of hind femora with very short, black bristles which extend nearly the entire length. Abdomen shining bronzy black and opaque; second segment opaque black except at anterior angles, third segment opaque on posterior half, subshining in middle on anterior half; pile short, black on opaque parts and brownish on the shining parts. Wings smoky, stigma dark luteous. Squamae and halteres darkened. Length: 6.5–8.5 mm.; wing 5.5–7.5 mm.

Female: Frons about two-thirds the width of one eye, slightly narrower posteriorly, shining black, with short black pile posteriorly and longer and denser white pile anteriorly, along eye an incomplete margin of whitish pollen. First and second antennal joints black with very short black pubescence basally. Face broader than in the male, more deeply excavated beneath antennae. Mesonotum with very short white pile; pleurae with the pile a little longer; whitish. A few rather short, black bristles along side margins of mesonotum and posterior margin of scutellum; Legs as in the male, except that the first tarsal joint of hind leg is somewhat swollen. Abdomen shining black with a greyish reflection; third and fourth segments each with an inwardly arcuate stripe of whitish pile on their disks, behind these stripes the segments are a deeper black, the third with an indication of a posterior opaque band; pile along sides of abdomen whitish. Wings slightly smoky, sometimes hyaline. Squamae white; halteres yellowish white. Length: 6–7.5 mm.; wing 5.5–6.5 mm.

Described from twenty-two specimens.

Type Cat. No. 20315 U. S. N. M.

Male type; Cabin John, Maryland, October 30, 1915 (Shannon); allotype, female, Dead Run, Fairfax Co., Virginia, October 28, 1915 (Shannon); for other local records, see list of species, p. 180. All other specimens recorded there and the following are paratypes: Riverton, New Jersey, September 7 and 20, 1904 and 1908 (C. T. Greene); Manumuskin, New Jersey, October 8, 1901 (V. A. E. Daecke); Clementon, New Jersey, October 4, 1904 (collector unknown). Usually taken on *Solidago.*

This species belongs to the group which is characterized by bare eyes, short pubescence on the arista and marginal bristles on the scutellum. The other females of this group, *pallipes*, *tristis*, and *leucoparea*, are further characterized by having a yellow spot on each side of the face and the humeri and the scutellum partly yellow, but *similis* is black in both sexes. *C. similis* male is less distinct, but may be distinguished from *pallipes* male by its dark legs and shorter pubescence and from *tristis* by having the pile on the dorsum of the thorax entirely black; pile on abdomen rather short, the squamae darkened and the ciliae deep blackish brown. *C. tristis* has the pubescence on arista and body rather

long, the pile on the mesonotum in part luteous and the squamae whitish.

Specimens of this species were sent to the late Mr. Coquillett at the National Museum by Mr. C. T. Greene for determination. Coquillett gave it only the manuscript name *Chilosia similis* which was published in the last edition of the List of New Jersey Insects, 1909. This name is retained for the species.

Its late occurrence in the year, September and October, along with occasional specimens of *C. pallipes*, is a characteristic worth noting, as in the eastern United States most of the species occur in the spring.

Note on **Myiolepta.**

Xylota tuberans was described by Williston in his Synopsis of the Syrphidæ* from a single male specimen from Texas. He states that the species can not properly be placed in the genus *Xylota*, as it differs in the position of the discal cross vein, the profile of the face, etc. A careful comparison of this specimen with species of the genus *Myiolepta* shows that it belongs to this genus, and, moreover, is conspecific with *M. nigra* Loew. It is curious that Williston, after noting the essential characters, failed to recognize his *Xylota tuberans* as a true *Myiolepta*.

In *Myiolepta* the discal cross-vein is placed before the middle of the discal cell and is rectangular; the first posterior cell is closed at the margin of the wing and the second vein turns abruptly upwards near its tip. The male has a tuberculate face and short, rather thick pile on the frons. All the femora are somewhat swollen at least and spinose beneath. *M. bella* differs in having the frons bare in the male, the second vein turned upwards less abruptly and a sawtooth like projection on the hind femora below.

In *Xylota* the cross-vein joins the discal cell beyond the middle and is oblique, the first posterior cell is closed some distance before the wing margin and the second vein turns upwards less obliquely. The frons in the males is bare, except in some species (*chalybea*, for example) there is very fine pale pile along the eyes. The face has no trace of a tubercle in either sex and the femora of the front and middle legs are not swollen nor spinose beneath.

Xylota tuberans possesses the characteristics noted under the genus *Myiolepta*. Comparison of the type with Williston's description of *M. nigra* female, and Hine's description† of *M. nigra* male, and a male specimen collected in this vicinity by Mr. Knab, proves it to be this species. Other characters which may be noted for the species are as follows: The costa at the base is white with whitish vestiture, the origin of the second and third veins bears very small, black bristles which continue for a short distance along the third vein; middle and hind legs have the first three tarsal joints whitish.

The genus *Myiolepta* has a closer relationship with *Tropidia* than with

* Bull. 30, U. S. N. M., pp. 225-226. 1886.

† Ohio Nat. XIV, p. 207, 1913.

Xylota. In fact *Myiolepta bella* seems to be a connecting link between these two genera; in this species the hind femora below at the apex are produced into a saw-tooth process, which is as fully developed in the male as in some species of *Tropidia;* the frons is bare as in *Tropidia*. However, there can be no doubt as to the generic affinity of *M. bella* because of the position of the discal cross-vein and the tubercle on the face of the male. On the other hand *Myiolepta* seems to be more naturally placed near *Brachyopa*, as the position of the discal cross-vein would indicate, and some species of *Brachyopa* in common with *Myiolepta* have all the femora distinctly swollen and serrated beneath.

Genus **Syrphus.**

Verrall* in his treatment of the British species of *Syrphus* points out that three species—*ribesii*, *vitripennis*, and *torvus*—form a group by themselves, being the only ones "which have the disc of the thoracal squamae hairy." Besides *ribesii* and *torvus*, there are the following species in this country possessing this curious character: *rectus* O. S. (hitherto confused with *ribesii*), *knabi* n. sp., *opinator* O. S., and possibly also *protritus* O. S. (cf. Osten Sacken, West. Dipt., p. 327, 1877), of which the writer has seen no specimens.

Syrphus grossulariae and *xanthostomus* have been confused with the above species, all of which have bicolored antennae; *grossulariae* can be recognized by the entirely black antennae and the black fringes of hairs on the middle and hind coxae, while *xanthostomus* has the antennae entirely yellow, the pile on the scutellum yellow and all the coxae, trochanters and legs yellow.

Specimens of *grossulariae* in the National Collection are from localities extending from Maine to Pennsylvania, and Metcalf† records this species from Ohio, but we have also one specimen from Kaslo, B. C., and one from Laggan, Alberta. *Grossulariae* is therefore apparently a northerly ranging species. Of *S. xanthostomus*, which appears to be rare, the National Collection has besides the type and allotype from Pennsylvania, a specimen from Plummers Island, Md., May 23, 1911 (P. R. Myers), and Mr. Banks has shown me a specimen taken by him in the Black Mountains of North Carolina, in May.

The species of this group with the disk of the squamae hairy may be tabulated as follows:

1. Eyes hairy; hind femora of female dark to beyond middle; first abdominal segment entirely dark . . . . . *torvus* O. S.
   Eyes bare; bases of femora yellow in female; sides of first abdominal segment yellow . . . . . 2.
2. Sides of mesonotum bright yellow; legs of both sexes bright yellow except for a dark band on hind femora just beyond middle . . . . . *knabi* n. sp.
   Sides of mesonotum but little paler or concolorous with dorsum; bases of femora dark in males . . . . . 3.

* Brit. Flies, VIII, p. 368, 1901.

† Bull. No. 31, Ohio State Univ., p. 86, 1913.

3. Yellow bands on third and fourth abdominal segments extending over the sides . . . . . 4.
   Yellow bands not reaching the side margins . . . . . *opinator* O. S.
4. The pile on scutellum rather sparse; female with dark rings on hind femora just beyond middle; rather small species . *rectus* O. S.
   Pile on scutellum rather dense; female without infuscate rings on hind femora; larger species . . . . . 5.
5. No dark median vitta on face . . . . . *ribesii* Linne.
   With dark median vitta on face . . . . . *ribesii vittafrons* n. var.

Syrphus knabi new species.

Squamae with rather long, light yellow pile; ground color of the sides of thorax bright yellow, with yellow pile; bands on the third and fourth abdominal segments entire and extending over the margins almost in their full width.

Male: Frons yellow with bluish green reflection, a black spot above each antenna, and with fine rather long, black hairs which continue a short distance down between the antennae and eyes. First two antennal joints reddish brown, the third joint darker, reddish beneath and somewhat pointed apically; arista brownish, a little longer than antenna. Face and cheeks yellow and with light pile. Mesonotum greenish aeneous with two obvious median stripes and bright yellow sides clothed with light golden pile; pleurae a somewhat lighter yellow than the lateral stripes of dorsum, and with golden pile; scutellum yellow with a greenish sheen and with black pile, the sides with yellow pile. Band on the second abdominal segment interrupted and outwardly produced forward where it extends over the sides and up onto the sides of the first segment. The bands on the third and fourth segments run straight across, extending over the sides in almost their full width. Fore coxae and trochanters cinereous, the hind trochanters yellowish, front and middle legs entirely yellow; hind pair yellow, the femora with dark band beyond the middle, yellow posteriorly; hind tibiae darkened on outer side of apical half and clothed with black pile; last four tarsal joints darkened. Length about 11.5 mm.; wing about 11 mm.

Female: Width of frons at vertex about equal to length of third antennal joint, but widening quite rapidly down to the antennae. Frons yellow, brightly so for about one-fourth its extent above antennae, above this a region with a greenish-black reflection which has an ill-defined triangular mark; the last section, which includes the ocelli, is nearly as long as broad and is shining black; a black spot above each antenna.

Type locality: Plummers Id., Md. (Male type, July 19, R. C. Shannon); female allotype, Falls Church, Va., June 21 (F. Knab). Paratypes are from Plummers Id., Md.; Difficult Run, and Dead Run, Fairfax Co., Va.; and North Carolina. For the records of locally collected specimens all of which may be considered paratypes, see pp. 182–183.

Type: Cat. No. 20285, U. S. N. M.

This species, of which a series of 28 specimens is before me, has been

confused with *ribesii*, *grossulariae*, and *xanthostomus*. It differs from *ribesii* and *rectus* in its bright yellow mesonotal side margins; apically pointed third antennal joint; bases of femora in male yellow, and second and third yellow bands of abdomen but little narrowed laterally. It is the only species included in the table having the small bristles on the under side of the middle tarsi yellow instead of black. All the above mentioned specimens agree closely among themselves. Three specimens from Texas agree with this species except for having some black bristles intermixed with the yellow ones on the under side of the middle tarsi and the wings slightly yellowish.

I desire to express my sincere appreciation of the deep interest taken and helpful suggestions made by Mr. Frederick Knab in the work I have undertaken. Through his critical readings of all the papers I have prepared many important changes have been made and faults corrected. It is with great pleasure therefore that I name this species in his honor.

Syrphus rectus O. S.

Osten Sacken * in his work "The North American Species of the Genus *Syrphus*" described *Syrphus rectus* from the White Mts., N. H., and New York; afterwards he placed it as a synonym of *ribesii* L. In discussing *rectus* he stated that he had two forms, a small one in which the female has a brown ring on the hind femur, and a larger form the female of which has the hind femora entirely yellow. In studying local material of *ribesii* and allied species the writer was able to separate a form which agreed with the description Osten Sacken gives for the small variety and with small specimens from the White Mts., N. H.

Slide mounts of the male genitalia of one of these specimens, a European specimen of *ribesii*, and a local *ribesii*, show that the small form is a distict species from *ribesii*. Upon the advice of Messrs. Knab and Banks, Osten Sacken's name, *rectus*, is applied to this species.

But few characters appear to be available to separate *rectus* from *ribesii*. In *rectus* the pile on the thorax is paler and less dense than in *ribesii;* and on the scutellum noticeably sparser; the bands on the third and fourth abdominal segments in the female are quite straight and scarcely narrowed at their ends. In the male the yellow markings on this second abdominal segment in the part produced forward to the basal angles are much broader than in the male *ribesii*. The female of *rectus* has a dark ring on the hind femur just beyond the middle. *Rectus* is noticeably smaller than *ribesii*.

Length of *rectus*, male: 8–9 mm., wing 7–8.5 mm.; of female: 8.5–9 mm., wing 7.5–9.5 mm.

Length of *ribesii*, male: 12–13 mm., wing 10–11.; of female about 13 mm., wing 10–11 mm.

For records of this species in the vicinity of Washington, D. C., see p. 183. Other specimens of this species in the National Collection are from Beverly, Mass.; White Mts., New Hampshire; North Carolina;

* Proc. Boston Soc. Nat. Hist. XVIII, pp. 135–158, 1875.

Michigan; and Missouri. Two specimens from Washington, D. C., were bred from larvae preying on *Aphis euonymi*.

Syrphus ribesii vittafrons new variety.

When he described *S. rectus*, Osten Sacken mentioned four specimens, two males and two females, which had a distinct brown median stripe on the face. No locality was given, but in the vicinity of Washington specimens with this peculiarity appear to be much more numerous than typical *ribesii*, and it is therefore thought best to designate this form by a distinctive varietal name. Besides having the facial stripe the pile on the thorax is more deeply golden.

Type, male, Maryland near Plummers Id., Md., April 17, 1913 (W. V. Warner); allotype, Cabin John, Md., September 13 (F. Knab); paratypes, vicinity of Washington, D. C., for records of which see p. 183.

Type: Cat. No. 20286, U. S. N. M.

The National Collection contains specimens of typical *ribesii* from New Brunswick, Connecticut, Colorado, Washington (State), Alaska, California, and Mexico. Specimens from Alaska are inclined to have longer and much thicker pile on the body.

Brachyopa flavescens Shannon.

This species was described from males. (Insec. Insci. Mens. 3, 1915, p. 144.) The female may be recognized from those of other North American Brachyopa, except *notata*, by its reddish yellow frons and thorax and from *notata* by its nearly bare arista, narrower frons and less elongate scutellum.

KEY TO THE SPECIES OF **Brachypalpus** (SENSUS STRICTU).

1. Abdomen without crossbands . . . . . 2.
   Abdomen with crossbands . . . . . 3.
2. Posterior margin of fourth abdominal segment yellow, first two joints of fore tarsi and first three joints of middle and hind tarsi orange colored . . . . . *inarmatus* Hunter.
   Abdomen unicolorous; the first joint of the front and middle tarsi yellowish, the following joints and all of the hind tarsi dark . . . . . *frontosus* Lw.
3. Third antennal joint large and blackish; pile on frons. Legs entirely black . . . . . *rileyi* Will.
   Third antennal joint rather small, somewhat reddish; no pile on frons. Legs for the most part reddish brown . . *parvus* Will.

B. INARMATUS Hunter.

Eyes in male narrowly separated. Antennae reddish brown, arista lighter. Tips of tibiae and extreme tips of femora yellow; first two joints of fore tarsi yellow, the other black; first three joints of middle and hind tarsi yellow, the others black. Hind tibiae of male unarmed. Thorax brassy with a purplish reflection and with short yellow

pile. Abdomen shining black with a strong purplish reflection; second segment with an opaque spot in the middle; posterior margin of fourth segment orange with golden pile. Wings lightly infuscated anteriorly; anterior cross-vein joins discal cell a little beyond the middle. Length about 12 mm.; wing about 10 mm. Two males: Waldoboro, Me. (J. H. Lovell); Ottawa, Canada.

B. FRONTOSUS Loew.

Head in this species very distinctly triangular shaped, more so than in the others. Eyes in the male barely touching. Antennae dark, faintly reddish; arista yellow. Extreme tips of the femora and the bases of the tibiae yellow. Hind tibiae in male armed with a tooth on under side. Thorax dull aeneous, with whitish pile. Abdomen entirely shining black. Wings somewhat infuscated, the transverse veins clouded. Anterior cross-vein meets discal cell about its middle. Length about 13 mm., wing about 12 mm. Common throughout eastern United States.

B. RILEYI Williston.

Eyes of male scarcely separated; antennae blackish; arista reddish-brown. Dorsum of the thorax dull aeneous, with yellowish white and black pile intermixed. Wings hyaline except for small clouds at base of second vein, on anterior cross-vein and at angle of fifth vein; stigma luteous. Anterior cross-vein but little beyond the middle of discal cell. Abdomen with broad metallic bands on anterior margins of second, third, and fourth segments. Length about 9 mm., wing 8 mm. Males and females: North Carolina (Morrison); Cincinnati, Ohio; Dead Run, Fairfax Co., Va.; common in a small Sphagnum swamp resting on logs (R. C. Shannon).

B. PARVUS Williston.

Eyes distictly separated in male; antennae brownish; third joint much smaller than in *rileyi;* arista yellow. Frons and face brownish, with silvery pile. Dorsum of thorax brassy, with rather long light pile. Abdomen bluish metallic with opaque cross bands on posterior margins of second and third segments; fourth somewhat yellowish on posterior margin. Anterior cross-vein joins the discal cell distinctly beyond the middle. Length 8 mm.; wing 6.5 mm. One male, the type—Colorado.

Records of two rare species that have been obtained since the list was sent to press are: Microdon megalogaster, Piney Branch, D. C., June 17, 1916, G. E. Quinter, and Eristalis flavipes, Beltsville, Md., on flowers of Euthamia graminifolia, September 10, 1916, McAtee.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

THE GENOTYPES OF ECHIMYS AND LONCHERES.

In a recent article* Mr. Oldfield Thomas has assumed that *Rattus* G. Fischer (1814) is available as the generic name of 'le rat épineux' of Azara, being unaware that Hollister† had already traced the use of the name *Rattus* in a generic sense back to 1803, when it was used by G. Fischer himself in a way to make *Mus decumanus* the genotype of *Rattus*, which thus must displace *Epimys* Trouessart (1881), as maintained by Hollister. But Thomas's new "application of *Rattus* among the Octodontidæ" leads him "to the much-discussed question of what species is the type of *Echimys*, F. Cuv., 1809." He refers to my fixation of the type upon *Echimys spinosus*, "on the ground of elimination," in 1899,‡ but considers my fixation of the type overthrown by the fact that Fleming in 1822§ selected '*Hystrix chrysurus*' as the type of *Echimys*. "If then," he continues, "as we are compelled to do, we accept Fleming's selections the name *Echimys* will become the correct term for the animals known as *Loncheres*, with *Echimys chrysurus* as the type, while the genus typified by Azara's *Espinoso* will have to bear another title." I fail to see that this necessarily follows, for the following reasons:

Echimys F. Cuvier, 1809, contained only two species, 'le Lérot à queue dorée' of Allemand (*Myoxus chrysurus* Zimmermann, 1780), and 'le rat épineux' of Azara. Therefore one of these two, as they are not congeneric, must be taken as the type of *Echimys*. One of these species became, in 1811, the type of *Loncheres* Illiger. This left in *Echimys* only one of the two original species, namely, 'le rat épineux' (*Echimys spinosus* Desmarest, 1817), which automatically, under modern codes of nomenclature,‖ became irrevocably its type. (I said, writing seventeen years ago, before the expression became taboo, "by the process of elimination.") *Loncheres* Illiger also contained nominally two species, (1) *L. paleacea*, a species not described till nine years later, and therefore a nomen nudum,

* On *Rattus* as a Generic Name, with a Note on the Nomenclature of *Echimys* and *Loncheres*. Ann. and Mag. Nat. Hist. (8), XVIII, pp. 70-72, July, 1916.

† The Generic Names *Epimys* and *Rattus*, Proc. Biol. Soc. Washington, XXIX, p. 126, June 6, 1916. It is evident that Thomas could not have seen Hollister's paper, which preceded his in publication by only about three weeks.

‡ The Generic Names *Echimys* and *Loncheres*. Bull. Amer. Mus. Nat. Hist., XII, pp. 257-264, Dec. 26, 1899.

§ Philosophy of Zoology, II, 1822, p. 191.

‖ See Opinion 6, International Zoological Commission.

and (2) '*Hystrix chrysuros* Lin Gmel.'=*Myoxus chrysurus* Zimm. Therefore *Loncheres*, when founded, was virtually monotypic, with *Loncheres chrysurus* (Zimm.) type by monotypy.

In my paper published in 1899 (*l. c.*) all the details of the two cases of *Echimys* and *Loncheres* were fully presented, and interested readers are referred to that paper for their fuller history.

—*J. A. Allen.*

THE TYPE SPECIES OF RATTUS.

In a late paper,* Mr. Oldfield Thomas calls attention to my recent statement† that *Mus decumanus* (=*Rattus norvegicus*) is the type species of *Rattus* Fischer, 1803,‡ and decides that the type of that genus is *Mus rattus*. The question is just now one of more than usual importance. In view of the standard set for murine genera by Mr. Thomas in recent work on African mammals, it is highly desirable that the type species of *Rattus* be determined beyond doubt, for the Norway and black rats represent groups as much entitled to generic rank as many sections of murine genera recently given distinctive names. Whatever the final decision on the case, the proposal of Mr. Thomas seems to be far from satisfactory.

The most simple way out obviously would be to accept *Rattus* from its original publication alone, the type species to be *Mus decumanus* by monotypy. As Mr. Thomas, in another connection, has recently put it:§ "We have not to deal with what Cuvier [in this case Fischer] meant to do, but with what he did do," and he certainly published the Latin name *Rattus* as a new generic name and mentioned by name only one species, *Mus decumanus*. The case in that respect is very different from that of *Rattus* Donovan, 1827,‖ because Donovan actually mentioned *Mus rattus* in his description of the new species of the "rat tribe" *Rattus donovani*,¶ while Fischer lists the single species *decumanus* in exactly the way we nowadays mention a representative or type species.

Mr. Thomas argues that [although only a single species, *Mus decumanus*, is included by name in the genus by Fischer] the "genus is distinctly made for the 'Ratte,' French 'Rat,'=*Mus rattus*, the mention of *Mus decumanus* being merely as 'the most remarkable of the *other* species.'" This translation of Fischer is in itself misleading. What Fischer, who was describing the mammal gallery in the Paris museum, really says is: "Die merkwürdigste unter andern Gattungen dieses Geschlechts ist die Wanderratte (*rat surmulot; Mus decumanus*)" —that is, among the different species of this genus [on exhibition] the most remarkable is *Mus decumanus*. The case of *Troglodytes*, in ornithology, is in some respects similar to the case of *Rattus*. Vieillot, in describing some American wrens, proposed the new generic name *Trog-*

* Ann. and Mag. Nat. Hist., Ser. 8. Vol. 18, p. 240. August, 1916.

† Proc. Biol. Soc. Washington, Vol. 29, p. 126. June 6, 1916.

‡ Nationalmuseum der Naturgeschichte zu Paris, Vol. 2, p. 128. 1803.

§ Proc. Biol. Soc. Washington, Vol. 28, p. 181. November 29, 1915.

‖ See Hollister, Proc. Biol. Soc. Washington, Vol. 29, p. 126. 1916.

¶ Nat. Repos., Vol. 3, text to pl. 73, 1834 [1827].

lodytes.* It is plain that he intended to include within it the old world *Motacilla troglodytes*, but as he did not actually mention the technical specific name of that species anywhere in his text, the committees of both the American and the British Ornithologists' Unions agree that *T. aedon*, later selected from the mentioned American species, and not *Motacilla troglodytes*, stands as the type.

Fischer's chapter on the mammal collection in Paris is largely a translation of Lacepède's "Tableau," with the addition under each genus of the German name of the animals, and frequently with a complete sentence to introduce the name of the most remarkable, characteristic, or typical species on exhibition; rather than to list one such species in Lacepède's systematic, tabular manner. In case we can not accept *decumanus* as the type of Fischer's *Rattus* solely on the ground that it is the only species mentioned, we may consider the *Rattus* of Fischer simply a new name for the *Mus* of Lacepède. This is the sole instance where Fischer changed a generic name in his translation of Lacepède. He probably did it because he considered the Medieval Latin noun *Rattus* a much more appropriate generic name for the rats than the classical *Mus*, which was used by the ancients for almost any small mammal, including even the ermine and other carnivores. There is no reason to suppose that he was specially thinking of the German "Ratte" or French "rat" in this connection, as suggested by Thomas; if so there was abundant opportunity to change other generic names in the same manner, and he would have been much more likely to mention the "rat noir" as his example than the "rat surmulot."

Now in settling a technical case of this kind by rule, it seems to me that we must not arbitrarily assume that Lacepède's *Mus* is the *Mus* of Linnæus (type *M. musculus*) whatever we may honestly believe to be the actual truth. Lacepède listed only one species, and that in almost as formal a manner as did later authors like Gray and Fleming who actually "fixed" the types of so many genera. The species listed, *Mus decumanus*, was unknown to Linnæus; Lacepède does not cite Linnæus in any place; and his "system" is wholly different from the "Systema Naturæ." There is no actual evidence to prove that had he listed *Mus musculus* at all, it would not have been in some other of his genera which are divisions of the original *Mus* of Linnæus. The type species of the *Mus* of Lacepède, then, for this purpose, must be *Mus decumanus*, and this species must automatically become the type of Fischer's substitute generic name *Rattus*.

Had Fischer definitely indicated that his *Rattus* was a substitute name for the *Mus* of Lacepède, and if Lacepède had cited Linnæus or even Erxleben as the authority for his *Mus*, we would instantly dispose of *Rattus* as a synonym of the *Mus* of Linnæus. In the absence of the necessary references to treat the case in this manner, it seems to me that we must accept *Rattus* as the generic name of the rats, with *decumanus* (*norvegicus*) as the type species. The name *Epimys* (type *Mus rattus*)† is then available for those who care to separate the *alexandrinus-rattus* group from true *Rattus*. —*N. Hollister.*

* Ois. Amer. Sept., Vol. 2, p. 52. 1807.

† See Miller, Proc. Biol. Soc. Washington, Vol. 23, p. 58. April 19, 1910.

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PROCEEDINGS

OF THE

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TWO NEW MAMMALS FROM SUMATRA.

BY MARCUS W. LYON, JR.

In studying some of the collections made by Dr. W. L. Abbott and presented by him to the United States National Museum, I find two rats which represent forms not hitherto described. They may be known as:

Rattus vociferans tapanulius new subspecies.

1903. *Mus fremens* Miller, Proc. U. S. Nat. Mus., vol. 26, p. 463, February 3, 1903. Not *Mus fremens* from Sinkep Island.

Type specimen.—No. 114453, U. S. Nat. Mus., skin and skull of adult male, collected at Tapanuli Bay, west coast of Sumatra, February 16, 1902, by Dr. W. L. Abbott; original number 1538.

Geographic distribution.—Known only from vicinity of Tapanuli and Tarussan Bays, but probably having a considerable range along the west coast of Sumatra.

Diagnostic characters.—Differs from *Rattus vociferans vociferans* of the Malay Peninsula and also of Aru Bay, Sumatra,* in being decidedly duller in color, the dull zinc-orange colors of *vociferans* being replaced by cinnamon-buff; in other respects the two forms are essentially alike.

Color.—Upperparts and sides of head, neck and body and outerside of legs, a mixture of cinnamon-buff and blackish brown; along the back the two colors about equally mixed or blackish slightly in excess, along sides of head, neck and body cinnamon-buff predominating. Tail dull drab-brownish, slightly lighter on underside and toward tip. At center of tail 7 scales per centimeter, each scale subtended by three light colored hairs, about one and one-half, or one and three-quarters scales in length.

Skull and teeth.—These show no essential differences from those of *Rattus vociferans vociferans.*

Measurements.—Type: Head and body, 236; tail, 375; hindfoot, 47;

* The Aru Bay specimens were identified by me as *Mus fremens* in 1908 (Proc. U. S. Nat. Mus., vol. 34, p. 647). I now regard them as very close if not identical with *Epimys vociferans.* None of them are fully adult.

condylobasal length, 51.5; zygomatic width, 25.6; braincase, 21; maxillary toothrow, 10. Tail is always long, 350 mm. or over.

Remarks.—This subspecies is rather intermediate so far as its color is concerned between the typical form and *Rattus fremens*. In the possession of its long tail it is clearly related to *vociferans vociferans*.

Specimens examined.—Nine from Tapanuli Bay and one from Tarussan Bay.

Rattus virtus new species.

1903. *Mus firmus* Miller, Proc. U. S. Nat. Mus., vol. 26, p. 461, February 3, 1903. Not *Mus firmus* from Linga Island.

1908. *Mus firmus* Lyon, Proc. U. S. Nat. Mus., vol. 34, p. 645, September 14, 1908. Not *Mus firmus* Miller from Linga Island.

Type specimen.—No. 144223, U. S. Nat. Mus., skin and skull of adult male, collected in eastern Sumatra, along Siak River, near mouth of Gasip River, December 10, 1906, by Dr. W. L. Abbott; original number 4944.

Geographic distribution.—Sumatra.

Diagnostic characters.—A member of the *Rattus firmus* group of rats distinguished from *R. firmus* chiefly by its more slender skull, especially pronounced in the rostral and interorbital regions.

Color.—The color of *Rattus virtus* is indistinguishable from that of its allies, *R. firmus** and *R. validus*.† Upperparts and sides of head, neck and body, and outerside of legs a coarsely grizzled mixture of blackish brown and honey yellow (or color approximately that), the darker color somewhat in excess on the upper parts, and both colors about equally mixed on sides and legs; entire underparts including inner side of legs, ivory yellow, from base to apex of hairs.

Pelage, etc.—Without spines, but along the upperparts, especially lower back, rather thickly interspersed with rather long bristly hairs; tail with about nine scales per centimeter, each scale subtended by three hairs, scarcely longer than the scales.

Skull and teeth.—The skull is longer and relatively narrower, temporal beadings less lyrate, rostrum more slender than that of *R. firmus*. It is much smaller than that of *R. victor*.‡ In general characteristics it does not seem essentially different from that of *R. validus*. The teeth of *R. virtus* are not essentially different from those of *Rattus firmus* and *R. victor*, but are strikingly different from those of *R. validus* in being much narrowed and in lacking some small extra cusps on the outside of the upper toothrow.

Measurements.—Head and body, 250 mm.; tail, 278; hind foot, 50; condylobasal length, 51.6; zygomatic width, 26.4; width of braincase, 19.3; maxillary toothrow, 10.1.

Specimens examined.—One, the type.

* Proc. Acad. Nat. Sci. Phila., 1902, p. 155, June 11, 1902.

† Proc. Biol. Soc. Wash., vol. 13, p. 141, April 21, 1900.

‡ Miller, Smiths. Misc. Coll., vol. 61, no. 21, p. 16, December 29, 1913.

Remarks.—Rattus virtus should also be compared with *R. mülleri* (Jentink).* Mr. Miller's observations on this rat were published by me in 1908.† The hairs of the underparts in *R. mülleri* are described as gray. In *R. virtus* and its allies the hairs of the underparts are uniformly colored, whitish or ivory yellow. In *R. mülleri* the interpterygoid space is mentioned as extending distinctly further forward than the edge of the last molar, which is not the case in *R. virtus* and its allies.

* Notes Leyden Museum, vol. 2, p. 16, 1880.

† Proc. U. S. Nat. Mus., vol. 34, p. 646, September 14, 1908. *Mus bullatus* described in that paper is not a member of this group.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE CALIFORNIA LOWLAND MINK A DISTINCT RACE.

BY JOSEPH GRINNELL.

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

There are now eighty mink skulls in the Museum of Vertebrate Zoology taken within the State of California. Some of these are accompanied by skins and a lesser number by complete skeletons; but so far as the present study is concerned, the skulls only are of importance. Recent opportunity has been afforded the writer of comparing selected specimens from California with near-topotypes of *Mustela vison energumenos*, in the United States Biological Survey and National Museum collections, from Chilliwack, Port Moody and Sumas, British Columbia. It has become apparent that there are *two* races of the mink in California, *energumenos* (or something very nearly akin to that race), and a distinct one, which is herewith described. A large series of the latter gathered from one locality, Stockton, serves to accentuate the diagnostic characters by its uniformity in mass effect.

Mustela vison aestuarina new subspecies.

CALIFORNIA LOWLAND MINK.

Type.—Male adult comprising skin, skull and body skeleton; No. 23,660, Mus. Vert. Zool.; Grizzly Island, Solano County, California, November 30, 1915; trapped by A. H. Luscomb for Miss Annie M. Alexander and by her presented to the Museum of Vertebrate Zoology.

Diagnosis.—Similar to *Mustela vison energumenos*, but with cranium lighter in build, rostrum weaker, brain-case narrower and proportionately higher, zygomata less widely spreading posteriorly, and auditory bullae having steeper medial sides.

Material.—Forty-seven skulls from vicinity of Stockton, San Joaquin County; 4 skins with skulls and skeletons from Grizzly Island, Solano County; 1 skin with skull and skeleton from Joyce Island, Solano

County; 2 skins with skulls from Petaluma, Sonoma County; 1 skull from "Marin County."

Distribution.—The lowlands of west-central California, particularly the delta region at the confluence of the Sacramento and San Joaquin rivers; west to Petaluma and Marin County. No minks are known to occur on the south side of Golden Gate and San Francisco Bay.

Remarks.—The field has been clarified, nomenclaturally, by Hollister in his Synopsis of the American Minks (Proc. U. S. Nat. Mus., vol. 44, 1913, pp. 471–480); there appears to be no obstacle to bestowing a new name upon the race here pointed out. There are doubtless characters pertaining to general size of the animal and to color and quality of pelage, but lack of satisfactory material prevents definite statements regarding them. It is to be expected, from the cranial dimensions, that the California Lowland Mink is of smaller size than its relative, *energumenos*. The coloration, in corresponding season, is notably pale, as compared with that of the few northern and mountain minks at hand, and there is little or no white on chin and throat. Also the pelage is not so heavy, the overhair in particular seeming more scanty.

The localities in California, from which there are specimens in the Museum at this time referred to *energumenos*, are: Jackson Lake, Siskiyou County, 1; North Fork Coffee Creek, Trinity County, 1; Hay Fork, Trinity County, 3; Cuddeback, Humboldt County, 3; Carlotta, Humboldt County, 4; Independence Lake, Nevada County, 6; Cisco, Placer County, 1; Merced Lake, Mariposa County, 3; Fish Springs, Inyo County, 3.

Measurements, in Millimeters, of Skulls of Adult Males of *Mustela rison aestuarina*, All From West-central California.

Mus. No.	Locality.	Condylo-basal length.*	Zygomatic breadth.	Pre-mastoid breadth of brain-case.†	Mastoid width.	Width of rostrum.‡
10850	Petaluma .	67.7	39.0	29.1	33.5	14.6
23660§	Grizzly Island	68.6	38.8	28.6	34.0	14.9
23666	Joyce Island .	64.7	35.6	28.0	32.1	14.3
4979	Stockton . .	65.0	37.2	28.4	32.9	14.1
9077	Stockton . .	65.5	38.2	28.5	33.0	14.2
9086	Stockton . .	68.1	40.4	29.6	34.4	15.1
9087	Stockton . .	67.9	39.6	30.2	34.2	14.8
9088	Stockton . .	66.9	38.0	29.2	34.0	14.9
9090	Stockton . .	65.3	37.1	28.3	33.7	14.0
9103	Stockton	66.5	38.9	29.0	35.2	14.2

* Measured from anteriormost projection of premaxillaries to posteriormost vertical plane touching both occipital condyles.

† Measured by placing calipers at least width of brain-case in front of mastoid processes and behind posterior zygomatic roots.

‡ Measured at narrowest part of rostrum behind bulging bases of canines.

§ Type.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ADDITIONAL NOTES ON WEST INDIAN REPTILES AND AMPHIBIANS.

BY THOMAS BARBOUR.

Since I published in these proceedings a short paper entitled "Recent Notes on West Indian Reptiles and Amphibians," * material from this region has kept accumulating in the Museum of Comparative Zoology. As the appearance of my Herpetology of the West Indies is still more of a hope than an accomplishment I have decided to put these additional observations upon record now.

Anolis albipalpebralis sp. nov.

Type an adult male, M. C. Z. No. 11954, from Grand Turk, Turks Islands, B. W. I., collected by Louis A. Mowbray during the summer of 1916.

There has long been a question as to what was the identity of the common *Anolis* of Turks Island. Stejneger cited the record simply as "Anolis sp.?" in his Batrachians and Land Reptiles of the Bahamas (in Shattuck, Bahama Islands, 1905, p. 334). As a matter of fact it appears to be a recent derivative from *Anolis cristatellus* of Porto Rico and the Virgin Islands. It is more closely related to this species than it is to *A. monensis* Stejneger which is itself but slightly differentiated.

Similar to *A. cristatellus* but differing in having the ventrals weakly but perfectly distinctly keeled and the scales of the supraorbital discs almost perfectly smooth instead of keeled or tubercular. Compared with specimens from Porto Rico the head is distinctly narrower and flatter but in neither of these respects does it differ conspicuously from Stejneger's figure, Nos. 92 and 93 of the Herpetology of Porto Rico (Washington, 1904).

* Proc. Biol. Soc. Wash., 28, 1915, pp. 71-78.

Ameiva griswoldi sp. nov.

Type an adult, M. C. Z. No. 11945, from St. John, Antigua, B. W. I., collected in the summer of 1916 by Dr. Don. W. Griswold, Director of the Rockefeller West Indian Hookworm Commission.

This species belongs among those having the caudal scales of the adult straight dorsally, the nostril anterior to the nasal suture and having ten longitudinal rows of ventrals. This brings it into an assemblage rather remote geographically, viz. *dorsalis* of Jamaica, *thoracica* of the Northern Bahamas and *auberi* of Cuba. In color the new species recalls *A. cineracea* Barbour and Noble from Guadeloupe (Cf. Revision of *Ameiva*, Bull. M. C. Z., 49, 1915, p. 425).

Rostral forming approximately a right angle behind; nostril in the posterior part of the anterior nasal; anterior pair of nasals in contact; frontonasal almost as wide as long, widely in contact with posterior nasal and just touching the loreal; frontal in contact with the first, second and third supraoculars; a pair of frontoparietals in contact with the third supraocular for a very short distance and then separated by a single or double row of granules (in the other examples they are wholly separated); four (three in one other example) occipitals in a transverse row; seven supraciliaries; three supraoculars, the first separated from the loreal; two posterior supraoculars separated from the superciliaries by a single row of granules; last supraocular separated from the outer occipital by a double row of small scales; five large and one small supralabial to below the center of the eye; four infralabials, the second enormous, the third next largest; between the infralabials and chin shields a series of granules extends forward and just separates the extreme posterior portions of the third infralabial and the first paired chin shield; the throat granules extend forward and just separate the posterior portions of the first pair of chin shields; chin and throat covered with minute granules, a wide transverse zone of which are considerably enlarged; a single series of very conspicuously enlarged scales and two rows less enlarged across the throat between the two folds; under side of body with ten longitudinal and thirty-two complete transverse rows of plates; preanal plates in a roughly rectangular area, two at the vent margin, with a few small enlarged scales at each side, a single larger scale surmounting the two and a few other slightly enlarged scales surrounding the three very large ones; on the lower arm four rows of antebrachials, the two outer rows very small and of the two inner rows one is much larger and more strap-like than the other; on the upper arm a series of brachials which increases in size and becomes multiple toward the shoulder; no considerably enlarged postbrachials; under side of thigh with four rows and many scattered enlarged plates, the outer row largest, the others successively smaller; 29 femoral pores on each side; on the under side of the tibia about three rows of plates, the outer with the two upper plates enormous; upper side of foot with regular series of transverse enlarged plates; tail covered with approximately straight keeled scales; about 38 scales in the fifteenth ring from the base of tail.

Color, dirty brown above with irregular wavy cross bands of bluish green; throat yellowish, chest dark blue green, belly light blue green, limbs flecked or speckled above, thighs marked posteriorly with a conspicuous longitudinal light stripe on a dark, almost black field.

Doctor Griswold, for whom the species is properly named, sent three specimens of this *Ameiva*, the type and two smaller examples to the Museum of Comparative Zoology, as well as additional and most welcome specimens of *Anolis antiquae* Barbour and *Eleutherodactylus martinicensis* D. & B. We had frequently remarked upon how strange it was that no *Ameiva* was known from Antigua. Doctor Griswold finds it present but rare. He writes "The mongoose was introduced here about 20 years ago to combat 'cane rats.' These rats were very destructive and caused considerable damage. The local government paid £1000 for the importation of 1000 mongoose. The result is that the rats left the fields and are now in human habitations. If plague were ever introduced here, I dread to think of the results.

"The mongoose has driven the rats from the cane fields, exterminated the 'guanas' and snakes, and is now doing its best to do the same with the chickens.

"The local government now pays a bounty of 'tu'pence' for males and four pence for females."

So much for the history of the introduction of the mongoose to Antigua. With a little variation it would serve equally well as the story for a host of other islands.

Ameiva dorsalis Gray.

In spite of many searches we have never been able to learn anything in the field regarding the breeding habits of any of the Antillean species of *Ameiva*. It was, therefore, with great delight that I received a letter not long ago from my friend Dr. M. Grabham of Kingston, Jamaica, telling of the finding of the eggs of *A. dorsalis* and their transmission to me here. They have come to hand safely. Doctor Grabham writes: "The eggs (of *A. dorsalis*) are rarely met with. We have often followed the burrows for considerable distances without success. These were found among the roots of a tree about three feet below the surface. * * * I believe the specimens may be of interest; two young hatched out a few hours after we got the eggs. This fine lizard is very plentiful in my own garden because we have no cats or dogs to hunt it down and the mongoose does not come into Kingston. It is a most useful scavenger devouring many insect pests and snails and bugs. The males, like those of many other species we have here, are great fighters." The eggs measure 27 x 15 mm. The young measure from snout to vent 36 mm. and from vent to tip of tail, 78 mm.

Liocephalus arenarius sp. nov.

Type an adult M. C. Z. No. 11948 from Bastion Cay, Turks Islands, B. W. I., collected by Louis A. Mowbray in June, 1916.

Related closely to *L. melanochlorus* Cope with the types of which it has

been compared (they are M. C. Z. 3598). It differs conspicuously, however, in having much smaller and less heavily keeled dorsal scales. The pattern of the coloration is similar to that of *melanochlorus* but the quality is wholly different. The new species is light sandy gray with more or less irregular black cross bars and spots. In the Haitian species the ground color is deep olive so that the dark marks are much less conspicuous. In *arenarius* the belly is ashy white, the throat only with a few faint marblings; in *melanochlorus* the belly is dark drab, the throat with black markings, the thighs white spotted.

A fine series of paratypes show that, as is, I think always, the case in this genus, the color characters are perfectly diagnostic even were not this conspicuous difference in squamation so striking.

Cyclura carinata Harlan.

The type of this species was distinctly stated to have come from Turks Island, so also the specimen collected by Bickmore and now in the Museum of Comparative Zoology (Cf. Barbour and Noble, Bull. M. C. Z., 60, 1916, p. 157, Pl. 8, fig. 3–4, pl. 13, fig. 3–4). It has long been supposed that the Iguana probably was exterminated upon Turks Island and I had feared that the species might be in danger of extinction. It was a pleasant surprise to receive specimens and news of this species from two sources. Both the Commissioner of the Turks and Caicos Islands, The Honorable G. Whitfield Smith and Mr. Louis A. Mowbray, exploring for the New York Aquarium, have found that *C. carinata* was abundant upon Ambergris Cay, one of the Caicos group, and report its probable presence upon other islands. The Museum has two excellent specimens from each of these sources.

Epicrates chrysogaster (Cope).

When Cope described this species (Proc. Amer. Phil. Soc., 11, 1871, p. 557) he evidently had but a single example. No subsequent record of the capture of the boa upon Turk's Island has since appeared in the literature so far as I am aware. Mr. L. A. Mowbray caught four boas upon Ambergris Cay which are surely very closely related to *E. chrysogaster*, if not identical with it, which is probably the case. We do not know anything about variation within this species so that for the present I shall simply remark that in this series the scale rows vary from 39–43, the number of ventrals from 251–264, of subcaudals from 72–82 and of dorsal spots on body (only) 57–59. One specimen is longitudinally striped, not spotted. The type had 43 rows, 255 ventrals, 78 subcaudals and 54 dorsal spots. The number of dorsal spots serve to separate this species from *E. fordii*, which has from 69–78; while if the figure which Stejneger copies from Zenneck is accurate (Stej., Ann. Rep. U. S. Nat. Mus., 1902 (1904), p. 692, fig. 153–157) these snakes may be distinguished from *E. monensis* by the smaller and more numerous head scales. The figures also show lateral series of spots which are not present in the suite from Ambergris Cay.

The specimens arrived alive, except one small one well preserved. All were gravid females and they had become injured and diseased during their journey to Cambridge so that only the small individual and one of the adults make really satisfactory material for the study of details of squamation.

Mabuya sloanii (Daudin).

Cope recorded a scinc from Turks Island in Abell's collection first as *M. cepedei* (Proc. Amer. Phil. Soc. 11, 1871, p. 558) and later mentioned it again as *M. agilis* (Proc. U. S. Nat. Mus., 10, 1887, p. 438). Stejneger (Shattuck's Bahama Islands, 1905, p. 332) suspected that if there really were a Turks Island *Mabuya* it would prove to belong to the same species as is found in Porto Rico and Haiti, viz. *M. sloanii*. Mr. Mowbray secured two beautifully preserved adult scincs at Grand Turk in June, 1916. He says that they are very rare. They are not precisely typical of *sloanii*, in that in both examples the supranasals fail to meet behind the rostral. However, knowing West Indian scincs to be variable and with such scanty material it seems wisest simply to confirm Stejneger's surmise. In their color, which is exceptionally brilliant, these lizards agree well with *sloanii*.

Nothing has hitherto been known concerning the herpetological fauna of the Exuma group of the Bahama Islands. Mr. C. J. Maynard visited these cays during the spring of 1915. The collection which he made and which is now the property of the Museum of Comparative Zoology furnishes the following records. From the same series a new iguana (*Cyclura inornata* Barbour and Noble) has already been described (Bull. M. C. Z., 60, 1916, p. 151, pl. 14).

HYLA SEPTENTRIONALIS Boulenger.—Conch Cut Cay; Sampson's Cay.

SPHAERODACTYLUS NOTATUS Baird.—Cay opposite Roseville, Exuma. Stocky Island, Exuma.

SPHAERODACTYLUS CORTICOLUS Garman.—Nassau, 1 example, new to New Providence Island.

SPHAERODACTYLUS DECORATUS Garman.—Little Woman's Cay.

SPHAERODACTYLUS ALOPEX Cope.—Two examples from Stocky Island, near Exuma Island, and one from the Cay opposite Roseville, Exuma. These examples have been compared with Cope's types of alopex also in the Mus. Comp. Zool. and while these are not in perfect condition nevertheless there does not seem to be much doubt as to the identity of the specimens. It is not very surprising to add this Haitian *Sphaerodactylus* to the fauna of the Bahamas.

TARENTOLA CUBANA G. & P.—Many years ago when I was, as a youth, more or less constantly at the New York Zoological Park I remember

well the return of one Gustave Sabille from the Bahamas. I had met the man in Nassau and if I remember correctly returned with him once upon a Ward Liner from the islands. He was a professional gatherer of living birds and animals and went to the Bahamas to catch young flamingos. On this occasion he returned to the Zoological Park with many birds of various sorts and a few reptiles, among them one which I took at first to be an old world *Tarentola*. He assured me that he got it in the Southern Bahamas. I concluded finally that as he had been over, I think to Nipe Bay, in Cuba, that it really probably represented *T. cubana*, then very little known. The specimen finally came into my possession but now I can not find it, and I think I threw it away fearing confusion if I kept it with so much question regarding the locality. Naturally I have always been half expecting that perhaps I myself or some one else might after all find *Tarentola* in the Bahamas. I find one now in Mr. C. J. Maynard's 1915 collection from U Cay, in Allen's Harbor, near Highborn Cays in the Northern part of the Exuma chain. After a very careful comparison with a large series of Cuban specimens of the same size I have come to the conclusion that this specimen though slightly aberrant in a few characters is really true *Tarentola cubana*, which is by this note added to the Bahaman fauna.

AMEIVA THORACICA Cope.—Little Exuma; Great Exuma; Highborn Cay; Cay opposite Roseville, Exuma.

ANOLIS ORDINATUS Cope.—"Exuma Cays," East Hawk's bill Cay, Cay opposite Roseville, Exuma; Little Woman's Cay; Highborn Cay.

LEIOCEPHALUS CARINATUS Gray.—"Exuma Cays," Little Woman's Cay.

ALSOPHIS VUDII Cope.—Bird Cay and 3d Cay south of Highborn Cay.

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PROCEEDINGS

OF THE

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AMPHIBIANS AND REPTILES FROM TOBAGO.

BY T. BARBOUR.

Nothing approaching a complete list of the species of the lower land vertebrates from Tobago has appeared. There are a number of records from that island scattered through the pages of Boulenger's Catalogues of Snakes and Lizards in the British Museum. In August, 1879, Cope published a short list in his "Eleventh Contribution to the Herpetology of Tropical America" * and named the local *Ameiva*. This name *tobaganus* (sic) evidently escaped Boulenger when he was writing the Catalogue of Lizards, and small wonder—for it was not conspicuously published.

These notes are based upon a collection made by Dr. H. L. Clark of the Museum of Comparative Zoology while a member of the Carnegie Institution Expedition to Tobago and his series is supplemented by a fine lot obtained from Mr. Broadway, in charge of the Botanical Gardens at Scarborough, Tobago.

A glance at the list will show that the fauna is more extensive than one might expect from the small size of the island and the close relationship to that of Trinidad, so well known, is emphasized.

Cope recorded two species not in either the Clark or Broadway collection. They are the Fer-de-Lance (*Lachesis lanceolatus*) and the Piping Tree frog (*Eleutherodactylus martinicensis*). Specimens of the latter would be very interesting as they would probably not be referable to *martinicensis*.

* Proc. Amer. Phil. Soc., 1879, p. 276–277.

Eupemphix trinitatis Boulenger.

I have identified with this peculiar species a single frog which Doctor Clark brought from Milford Bay. It agrees fairly well with Boulenger's description (Ann. Mag. N. H. [6], 3, 1889, p. 307), but I confess I would like to compare it with topotypes from Trinidad. Unfortunately the creature has so far failed to turn up in any of the collections which have been made in Trinidad by Thaxter, Rorer and others. J. H. Hart, who discovered it in the Botanical Gardens at Port of Spain, wrote Boulenger that it was only found when half drowned in a fountain or similar receptacle of water to which it had repaired to spawn but from which it could not escape.

It is, of course, new to the fauna of Tobago, and is one of the most interesting finds which Clark made.

Bufo marinis (Linne).

Abundant throughout the island as would be expected. Several preserved from Milford Bay.

Hyla crepitans Wied.

A single very large adult from Milford Bay, April, 1916. The species is common in Trinidad but has not appeared in previous collections from Tobago so far as I am aware.

Iguana iguana (Linne).

Under the more recent name of *I. tuberculata* Laur., this species has been reported from Tobago by Boulenger, Ludlam coll. There are two adults in the collection made by Clark at Milford Bay.

Anolis trossulus Garman.

A single specimen of this species was sent to the Museum from Tobago by Mr. J. B. Rorer of Trinidad several years ago. He wrote that it was not uncommon. Clark's collection contains a number of additional examples. A comparison with the types of *trossulus* fails to reveal any difference between the series from the two islands. It is really surprising to find this *Anolis*, hitherto thought to be confined to Grenada, abundant upon Tobago. Its presence only serves to emphasize the really transitional character of the fauna of these lower islands between St. Vincent and Venezuela. St. Vincent typically Antillean, Grenada less markedly so, while Tobago and Trinidad are far more continental in character than Antillean.

This is doubtless the species which Cope recorded from Tobago as *Anolis alligator* D. & B.

Polychrus marmoratus (Linne).

A single specimen brought alive to Doctor Clark by a negro boy at Milford Bay. Clark tells me that this example, which is excellently pre-

served, is the only one of the species which he saw upon the island. It has not been previously recorded from Tobago.

Tupinambis nigropunctatus Spix.

A single adult example from Milford Bay collected by Dr. H. L. Clark. This lizard is a real surprise. It is noteworthy to find that this large, voracious terrestrial lizard has apparently never before been taken upon Tobago.

Ameiva tobagana (Cope).

When discussing this species in our Revision of the Genus *Ameiva* (Bull. M. C. Z., 59, 1915, p. 458), Mr. Noble and I had no specimens before us for examination. Doctor Clark's material secured at Milford Bay, southwestern Tobago, however, provides a really fine series of this distinct form. Young, half grown and adults are represented.

Cnemidophorus lemniscatus (Daudin).

A finely preserved large series from Milford Bay. It is not strange that this species is to be found upon Tobago as it occurs upon Trinidad and the Venezuelan Leeward Islands as well as widely spread upon the mainland. The males and females of the suite in hand show the remarkable dichromatism which is so conspicuous and so stable.

Mabuya aenea Gray.

Two scincs which may be referred to this species provisionally, came here with the Broadway suite. Garman has considered the slippery-backs from St. Vincent, Grenada and Trinidad distinct from *M. aurata* (Schneider) of the mainland. The Tobago examples may well rest thus also until accumulated material makes possible a final working-out of their status. This scinc appears also to be new to Tobago.

Constrictor constrictor (Linne).

The dried skin of a large adult was among the material secured from Mr. Broadway of Scarborough. Specimens from Tobago are reported by Boulenger to be in the British Museum.

Epicrates cenchria (Linne).

Two boas which evidently belong to some race of this species are not provided with a subspecific name as material is not at hand for a satisfactory study of the species. Both of the examples before me came from Milford Bay. I can not find that this boa has been previously noted upon Tobago.

Spilotes pullatus (Linne).

A large serpent to which this name may well be applied provisionally was among those sent by Mr. Broadway. It had been known from Trinidad but apparently not from Tobago.

Drymarchon corais (Boie).

Doctor Clark secured a somewhat mangled but perfectly identifiable adult of this huge snake. It is fully adult. Like the preceding it had been reported from Trinidad but not Tobago.

Drymobius boddaerti (Sentzen).

Two specimens in Broadway's collection showing the bilineata (Jan) type of coloration. It was recorded from Tobago by Cope from F. A. Ober's collection.

Lemiadophis melanotus (Shaw).

A single adult from Scarborough, Broadway collector. Previously recorded from Tobago as having been in the Ludlam collection in the British Museum.

Leptophis liocercus (Wied).

Three adults in the Broadway collection and three from Milford Bay taken by Clark. Boulenger has already recorded this snake from Tobago in the British Museum Catalogue (Sn. 2, 1894, p. 114) from the collection of A. Ludlam, Esq.

Atractus trilineatus Wagler.

Two examples collected by Mr. Broadway. This little snake is very abundant in Trinidad, appearing in almost every collection. Mole and Urich (Jour. Trin. Field Nat. Club., 2, 3, 1894, p. 84) say "This is the common little snake found under stones and rubbish in gardens in Port of Spain." Apparently, however, it has not been found hitherto in Tobago.

Clelia cloelia (Daudin).

This snake, which was certainly to have been expected to occur upon Tobago, is represented by a large adult from Milford Bay and five others in the Broadway collection made at Scarborough.

Petalognathus nebulatus (Linne).

Two well preserved adults in the Broadway collection from Scarborough. Already recorded from Tobago by Boulenger, collection of L. Ludlam, Esq. (Cat. Sn. B. M. 2, 1894, p. 293).

Leptodeira annulata (Linne).

One specimen, W. E. Broadway, collector. Apparently new to Tobago but well known from Trinidad and northern and central South America.

Oxybelis acuminatus Wied.

A single example in the collection made by W. E. Broadway, and another from Milford Bay in Clark's series. While very widely distributed and common throughout a large part of Tropical America, this seems to be the first notice of its appearance in Tobago.

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PROCEEDINGS

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A NEW BRITTLE-STAR OF THE GENUS OPHIOMITRA FROM SOUTHERN JAPAN.

BY AUSTIN H. CLARK.*

During the cruise of the "*Albatross*" in Japanese waters in 1906 the following ophiuran, which appears to represent an undescribed species, was collected.

I take great pleasure in naming it in honor of Professor H. Matsumoto, of Sendai University.

Ophiomitra matsumotoi sp. nov.

The disk is 8.5 mm. in diameter, rounded pentagonal to nearly circular in shape.

Excepting for the radial shields, the disk is covered with rather large scales, each of which carries a large nearly spherical granule covered with small needle-like points. These granules, which are well spaced, are largest in the center of the disk, where there are about three in 1 mm., becoming much smaller at the interbrachial borders.

The visible portions of the radial shields resemble those of *O. granulosa* Lyman, but the borders are less well defined.

The general appearance of the dorsal surface of the disk is much the same as in *O. granifera* Lütkin and Mortensen, except that the granules are larger and are absent from the outer borders of the radial shields and from the first two arm plates.

In the interbrachial areas on the lower surface of the disk the granules are confined to the central portion, and are few, coarse, and widely separated.

The oral shields are similar to those of *O. granifera*, but are slightly smaller.

The side mouth shields are similar to those of *O. granifera*, but narrower, with more nearly parallel sides.

The mouth papillæ are three (rarely four), stout and swollen, only those of the innermost pair sharp pointed.

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

The upper arm plates are small, fan-shaped, broader than long, in shape and proportions resembling those of *O. granulosa*, but entirely, and rather widely, separated from each other.

The spiniferous ridges on the side arm plates are not continuous dorsally, and are not especially prominent. The arm spines are five in number, rather stout, thickly studded with exceedingly fine short spinules, though appearing smooth to the naked eye. The longest arm spines, the uppermost on the proximal segments, are 2 mm. long.

The earlier under arm plates are very narrow, longer than broad, with strongly concave sides and a slightly concave distal border; the distal under arm plates are similar, with a notch in the center of the distal border.

The tentacle scales are single, rather short, broadly rounded distally.

Type.—Cat. No. 38,667, U. S. N. M., from "Albatross" Station 5087, off southern Japan, in 612 fathoms.

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A NEW LIZARD OF THE GENUS SCELOPORUS FROM TEXAS.

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When Mr. Vernon Bailey wrote his "Biological Survey of Texas" (N. Amer. Fauna, No. 25, 1905), I identified five specimens collected by Mr. Wm. Lloyd at Lomita Ranch, six miles north of Hidalgo, in the extreme southern corner of Texas, as *Sceloporus dispar* Baird and Girard. This name Dr. Boulenger (Cat. Liz. Brit. Mus., vol. 2, 1885, p. 232) had placed, and as I now believe correctly so, in the synonymy of *Sceloporus microlepidotus*. The Texas specimens differed, however, in some respects from the latter species, and under the misapprehension that the type of *S. dispar* was of northern origin, while in reality it came from Vera Cruz, Mexico, I applied the latter name to the Texas form (N. Amer. Fauna, No. 25, 1905, p. 42).

A critical review of this and additional material of *S. microlepidotus* from northern Mexico has led to different and rather interesting results.

In the first place it turns out that the two specimens in British Museum from Duval Co., Texas, and Nuevo Leon, both collected by Mr. Wm. Tayler and identified by Boulenger (Proc. Zool. Soc. London, 1897, p. 485) as *Sceloporus ornatus* Baird, do not belong to this species at all, but are identical with the Hidalgo specimens. *Sceloporus ornatus*, the type of which (U. S. N. M. No. 2845) is before me, belongs to a totally different group of the genus, viz., the *S. torquatus* group. It is a much larger species (snout to vent 80 mm.) and has much shorter toes (fourth toe from base of fifth considerably shorter than distance from snout to ear). It differs from the other species of the *S. torquatus* group by having much smaller scales (12 dorsal scales corresponding to the length of the shielded part of the

head, and 60 scales between the interparietal shield and the base of the tail).

A comparison with specimens of *S. microlepidotus* from southern and central Mexico shows, moreover, that the Hidalgo specimens, although being closely related to this species, are sufficiently distinct to deserve recognition nomenclatorially, as is also evident from the fact that Boulenger considered the two forms so distinct that he placed them in different sections of the genus. I may add that I fail to realize the distinction in the dorsal lepidosis implied in the description of the two forms by Boulenger, *S. ornatus* being described as having "dorsal scales forming parallel longitudinal series," while *S. microlepidotus* is said to have them "forming oblique longitudinal series converging toward the median line." As far as I can see, the scutellation is essentially alike and of the latter type.

Sceloporus disparilis sp. nov.

Diagnosis.—Lateral scales directed obliquely upwards and backwards, and passing gradually into the dorsals; series of femoral pores widely separated, not meeting on the preanal region; tail cylindrical; head shields smooth; distance between base of fifth toe and extremity of the fourth slightly exceeding distance between the end of snout and posterior border of ear; 52–65 scales between the interparietal shield and the base of the tail, 15–17 corresponding to the length of the shielded part of the head.

Range.—Extreme southern corner of Texas and northeastern Mexico.

Type.—United States National Museum, No. [illegible]3,041; Lomita Ranch, six miles north of Hidalgo, [illegible]ne 17, 1897. Wm. Lloyd, collector, U. S. Biological [illegible].

Description.—Type [illegible]. Head-shields smooth; two canthal scales between the [illegible] much three larger prefrontal shields across the snout; frontal shield divided transversely; posterior frontal broadly in contact with interparietal; interparietal very large, much broader than long and fused with the parietals; five large transverse supraorbitals separated from the frontals and interparietal by a single series of scales and from the superciliaries by a double row of scales; six supralabials separated from the nasals and from the long subocular by a single row of scales, fifth supralabial under the center of the eye; anterior border of the ear-opening protected by about five small slightly projecting scales; dorsal scales about the same size as ventrals, rounded behind, distinctly keeled, forming slightly oblique longitudinal series converging towards the median line back of the shoulders; about 65 scales along the middle line of the back from the shielded part of the head to the base of the tail; 17 scales in the middle of the back corresponding to the shielded part of the head; lateral scales directed upwards and backwards scarcely

different in size from the dorsals; ventral scales smooth rounded behind, entire; scales on throat distinctly smaller than ventrals; adpressed hind limb reaches the anterior border of the ear; tibia slightly shorter than the shielded part of the head; the distance between the base of the fifth toe and extremity of the fourth exceeds by a half millimeter the distance between the end of the snout and the ear; 16–17 femoral pores; caudal scales much larger than dorsals, the keels ending in a point beyond the posterior border of the scales; two enlarged postanal scales.

Color (in alcohol) above olive gray with faint indications of two narrow disconnected longitudinal black lines on the back and a few similar zigzaggy cross lines, the anterior of which extends downwards in front of the insertion of the forelegs so as to form a narrow interrupted black collar; on the side of the neck from the ear to the shoulder joint a rather broad blackish spot crossing this line; underside whitish, the throat with a number of longitudinal narrow dusky lines; sides of belly blue with a well-defined inner edge of bluish-black leaving only a narrow space of white in the middle.

Dimensions.—Total length 103 mm.; tip of snout to vent 45 mm.; tip of snout to ear 10.5 mm.

Variation.—The greatest variation in the series before me is in the parietal shields. In the type and in specimen No. 33,042 there are no parietals or fronto-parietals as distinct from the interparietal, while in the other three specimens these shields are all separate. The parietals and fronto-parietals in these are smaller than the frontals and prefrontals; in all the posterior frontal and the interparietal are broadly in contact. The variation of proportion and size of scales, femoral pores, etc., will be seen from the subjoined table. The variation in color is, in the males, chiefly confined to the arrangement of the dusky lines on the throat which in the other specimens assumes the aspect of an irregular marbling rather than longitudinal lines. The two females are distinguished, besides the absence of postanal shields, by a much more distinct color pattern on the upper parts of the body and by the absence of the blue black-edged patches on the side of the belly; the black lines on the back in these appear more like narrow transverse zigzaggy lines, one between the shoulders, one between the hind legs and two in the space between; head and limbs with similar narrow blackish cross lines.

Remarks.—There can be but little doubt that the form here described is closely related to *Sceloporus microlepidotus*, but there is as yet no indication of any intergradation with the latter species. A number of specimens in the National Museum from Colonia Garcia, Chihuahua, No. 26,598 and Nos. 26,910–11, as well as a specimen from Buena Vista, Coahuila, records which materially extend northwards the known range of *S. microlepidotus*, show indications of slightly larger scales than specimens from southern Mexico, but the difference is plainly within the individual variation exhibited by the series recorded by Boulenger (Proc. Zool. Soc. London, 1897, p. 510). The Chihuahua specimens, moreover, examined by me having only 12–14 femoral pores against 14–18 in the southern series, but inasmuch as the number of femoral

pores in *S. disparilis* varies between 12 and 17, this discrepancy does not seem to be of any importance.

For the sake of comparison with *Sceloporus microlepidotus*, I submit the following averages taken from the 32 specimens of the latter recorded by Boulenger (P. Z. S., 1897, p. 510): Snout to ear-opening, 12.4 mm.; fourth toe from base of fifth, 15; scales, occiput to tail, 73.7; scales in head length, 17.1; scales round middle, 69.8; femoral pores, 16.2. These should be compared with the averages of *Sceloporus dispar* given in the following table:

Record of Specimens of Sceloporus disparilis.

Museum No.	Sex and age.	Locality.	When collected.	By whom collected.	Snout to vent.	Shield part of head.	Snout to ear-opening.	Tibia.	Fourth toe from base of fifth.	Scales, occip. to tail.	Scales in head-length.	Scales, round middle.	Femoral pores.
U.S.N.M.					mm.	mm.	mm.	mm.	mm.				
33041 *	♂ ad.	Lomita Ranch, Tex.	June 17, 1891	Wm. Lloyd	45	10	10.5	9	11	65	17	63?	16–17
33042	♂ ad.	" " "	June 17, 1891	"	48	11	11	9	11	52	15	63	14–15
33043	♀ ad.	" " "	June 14, 1891	"	43	10	10	9	10	55	16	58	12–14
33044	♀ ad.	" " "	June 13, 1891	"	42	10	10.5	8	10.5	60	17	50	13–
33045	♂ ad.	" " "	June 17, 1891	"	51	11	11	9	11.5	57	16	64	. .
Brit. M.†	♂	Nuevo Leon	. . . . .	Wm. Taylor	55	12	14	12	14	60	16	60	16–17
"	♀	Duval Co., Tex.	. . . . .	"	46	11	12	10	12	63	15	64	16–17
				Average			11.3		11.4	59	16	60.3	15.2

* Type. † P. Z. S., 1897, p. 485.

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