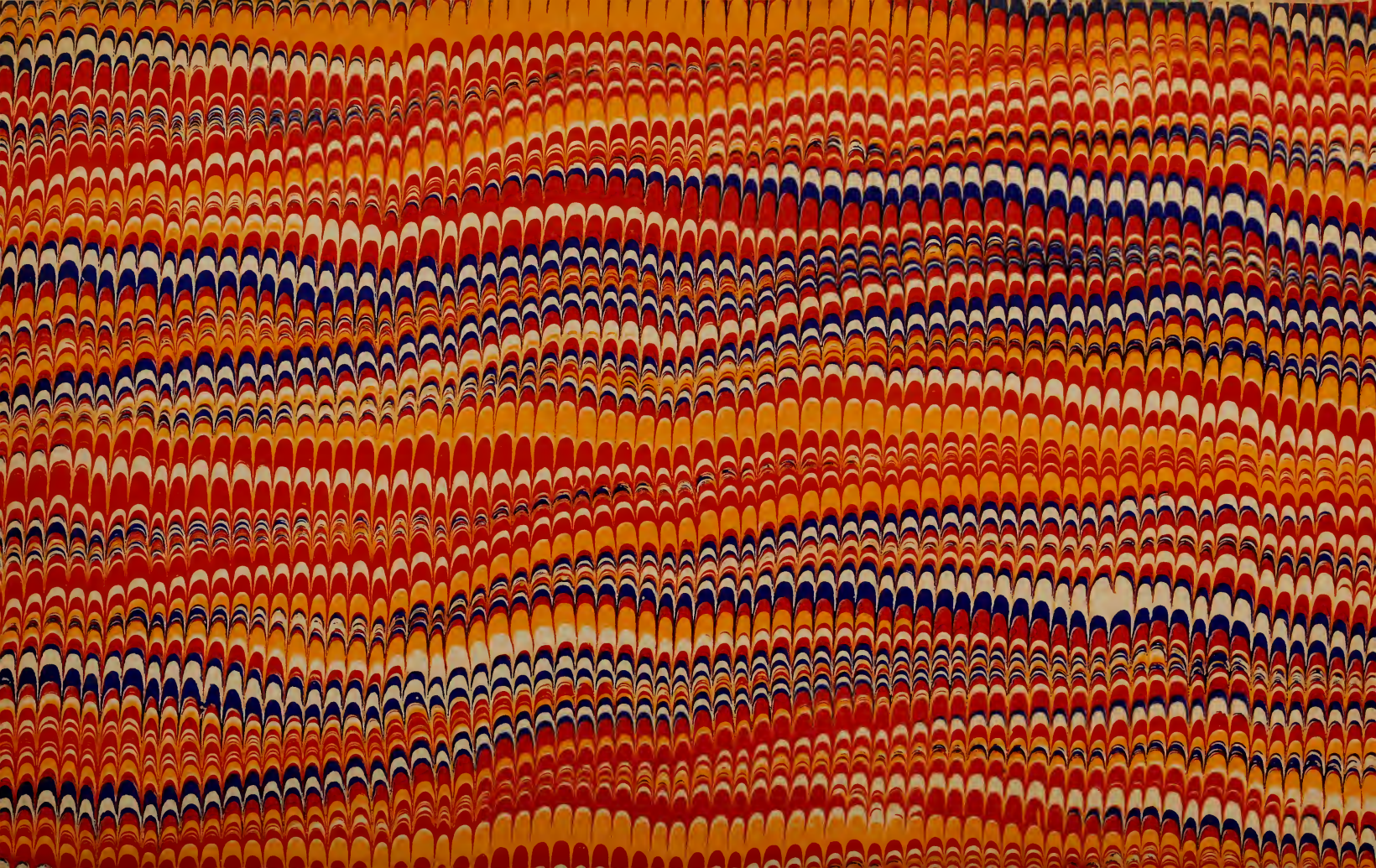

PROCEEDINGS

OF THE

Biological Society of Washington

VOLUME 36
1923

WASHINGTON
PRINTED FOR THE SOCIETY

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FOR 1923

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*Theodore N. Gill, 1881, 1882
*Charles A. White, 1883, 1884
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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
F. A. Lucas, 1901, 1902
B. W. Evermann, 1903, 1904
F. H. Knowlton, 1905, 1906
L. Stejneger, 1907, 1908
T. S. Palmer, 1909, 1910
David White, 1911
E. W. Nelson, 1912, 1913
Paul Bartsch, 1914, 1915
W. P. Hay, 1916, 1917
J. N. Rose, 1918
Hugh M. Smith, 1919
A. D. Hopkins, 1920
N. Hollister, 1921
Vernon Bailey, 1922

* Deceased.

TABLE OF CONTENTS

The Committee on Publications declares that each paper of this volume was distributed on the date indicated on its initial page. The Index, title page, and minutes of meetings for 1923 (pp. i–xi; 203–208) were issued on February 21, 1924.

ERRATA

Page 68, lines 13, 21 and 23, for Edmonston read Edmondson.
Page 187, for *Pseudopareas vagrans* read *Pseudopareas* **vagrans.**

Vol, 36, pp. vii-xi

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets from October to May, on alternate Saturdays, at 8 P. M. All meetings during 1923 were held in the new lecture hall of the Cosmos Club, except No. 647, held in the auditorium of the National Museum, and a special meeting, No. 650, held in the auditorium of the Interior Department.

January 6, 1923—645th Meeting.[1]

President A. S. Hitchcock in the chair; 75 persons present.

The President announced the membership of the Committee on Communications as follows: E. A. Goldman, Chairman; C. E. Chambliss, H. E. Ewing, W. R. Maxon, H. C. Oberholser, S. A. Rohwer. He also announced the membership of the Committee on Zoological Nomenclature as follows: G. S. Miller, Jr., Chairman; P. Bartsch, S. A. Rohwer.

Informal communication: E. A. Goldman, Symposium on geographical distribution at the Cambridge meeting of the A. A. A. S.

Formal communications: E. J. Reinhard, Notes on the life history and habits of the solitary wasp, *Philanthus gibbosus;* V. Bailey, Beaver habits and beaver farming.

January 20, 1923—646th Meeting.[2]

President Hitchcock in the chair; 83 persons present.

New member elected: Afranio do Amaral.

Informal communications: L. O. Howard, A new case of *phoresie* between a proctotrypid parasite and a coreid bug;

[1]Abstract in Journ. Washington Acad. Sci., vol. 13, p. 234, June 4, 1923.
[2]Abstract in Journ. Washington Acad. Sci., vol. 13, p. 234–235, June 4, 1923.

Pearl L. Boone, Early flowering of plants near Hyattsville, Md.

Formal communications: H. M. Albright, Protecting native wild life in Yellowstone National Park; F. R. Lillie, The problem of the sex hormones.

February 3, 1923—647th Meeting.[1]

Joint meeting with the Washington Academy of Sciences and affiliated societies, in commemoration of the centenary of S. F. Baird, with the following speakers: W. H. Dall, D. S. Jordan, Edwin Linton, C. H. Merriam, C. D. Walcott.

February 17, 1923—648th Meeting.[2]

President Hitchcock in the chair; 91 persons present.

The President announced the appointment of E. A. Chapin and H. C. Oberholser as additional members of the Committee on Zoological Nomenclature.

New member: R. C. Shannon.

Informal communications: M. B. Waite, An article in the Geographical Journal on the ascent of Mt. Kilimanjaro; L. O. Howard, A new biological society, The Japanese Beetle Club of Riverton, N. J.; T. S. Palmer, Death of B. E. Fernow.

Formal communications: H. L. Shantz, Plant and animal life in Africa; H. S. Bernton, Biological aspects of hay fever.

March 3, 1923—649th Meeting.[3]

President Hitchcock in the chair; 54 persons present.

New member: Anna E. Jenkins.

Informal communications: R. W. Shufeldt, Work of the British Royal Society for the Protection of Birds, and exhibition of J. A. Leach's "Australian Nature Studies"; H. M. Smith, Flowering of *Cercis.*

Formal communications: F. V. Coville, The effect of aluminum sulphate on rhododendron seedlings; Perley Spaulding, The biology of *Pinus strobus;* J. M. Aldrich, The Canadian life zone as indicated by insect distribution; H. C. Oberholser, Notes on birds of the District of Columbia.

1 Abstract in Journ. Washington Acad. Sci., vol. 13, p. 235, June 4, 1923.
2 Abstract in Journ. Washington Acad. Sci., vol. 13, p. 235–236, June 4, 1923.
3 Abstract in Journ. Washington Acad. Sci., vol. 13, p. 236–237, June 4, 1923.

March 14, 1923—650th Meeting.[1]

A special joint meeting with the Washington Academy of Sciences, the Geological Society, and the Botanical Society, devoted to a symposium on the fossil swamp deposits at the Hotel Walker site.[2]

Formal communications: C. K. Wentworth, The geologic relations; Edgar Brown, Seeds and other plant remains; E. W. Berry, The plant remains and their significance; Albert Mann, The remarkable fresh water diatom flora from the swamp deposit, and its significance; Lawrence La Forge, The physiographic relations of the swamp deposit.

March 17, 1923—651st Meeting.[3]

President Hitchcock in the chair; 88 persons present.

New members: W. H. Cheesman, C. P. Hartley.

Informal communications: R. W. Shufeldt, Note on "Nature Magazine"; V. Bailey, Travels of Prince Maximilian in North America.

Formal communications: J. C. Merriam, The cats of Rancho La Brea; F. A. McClure, Observations of a plant collector on the island of Hainan.

March 31, 1923—652d Meeting.[4]

President Hitchcock in the chair; 112 persons present.

New member: H. C. Skeels.

Informal communications: R. W. Shufeldt, Exhibition of a squalling bullfrog; Pearl L. Boone, A new fossil deposit near Weems, Va.; S. F. Blake, Observation of a belled turkey buzzard.

Formal communications: C. A. Reed, Biological observations in China; C. W. Stiles, Brother Bryan's revolution against evolution.

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[1] Abstract in Journ. Washington Acad. Sci., vol. 13, p. 237, June 4, 1923.

[2] These remarks, in detail, are published in the Journal of the Washington Academy of Sciences, vol. 14, No. 1, Jan. 4, 1924, pp. 1–41.

[3] Abstract in Journ. Washington Acad. Sci., vol. 13, p. 237–238, June 4, 1923.

[4] Abstract in Journ. Washington Acad. Sci., vol. 13, p. 372, October 4, 1923.

April 14, 1923—653d Meeting.[1]

President Hitchcock in the chair; 69 persons present.

Formal communications: Mrs. C. D. Walcott, Wild Flowers of the Canadian Rockies; Albert Mann, The Usefulness of diatoms.

April 28, 1923—654th Meeting.[2]

President Hitchcock in the chair; 38 persons present.

New members: Carlyle Carr, K. McL. Smoot, Percy Viosca, Jr.

Informal communications: A. D. Hopkins, Note on belled turkey buzzards.

Formal communications: Agnes Chase, Hunting types of plants in European herbaria; S. P. Baldwin, Bird banding—a new method of bird study.

May 12, 1923—655th Meeting.[3]

President Hitchcock in the chair; 52 persons present.

Informal communications: R. W. Shufeldt, Exhibition of lantern slides of a gorilla in the National Museum

Formal communications: E. T. Wherry, Studies of plant distribution in relation to soil acidity; E. A. Goldman, The deer of the Grand Canyon National Game Preserve.

November 10, 1923—656th Meeting.[4]

Vice-President J. W. Gidley in the chair; 103 persons present.

Formal communications: W. B. Greeley, The relation of National Forest management to wild life; L. O. Howard, A recent visit to certain European centers.

November 24, 1923—657th Meeting.[5]

Vice-President H. C. Oberholser in the chair; 44 persons present.

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[1] Abstract in Journ. Washington Acad. Sci., vol. 13, p. 372–373, October 4, 1923.
[2] Abstract in Journ. Washington Acad. Sci., vol. 13, p. 373–374, October 4, 1923.
[3] Abstract in Journ. Washington Acad. Sci., vol. 13, p. 374, October 4, 1923.
[4] Abstract in Journ. Washington Acad. Sci., vol. 14, p. 59–60, January 19, 1924.
[5] Abstract in Journ. Washington Acad. Sci., vol. 14, p. 60–62, January 19, 1924.

New members: Harry Harris, Edward Elliott, Mrs. Edward Elliott, A. G. Johnson.

Informal communications: E. A. Goldman, Observation of a California condor; L. O. Howard, Note on a lecture on metallic colors by Prof. Wilder Bancroft; F. C. Lincoln, Notes on returns from banded birds.

Formal communications: C. W. Stiles, Underground movements of bacteria; Frank Bond, Reproduction in paintings of the metallic feathers of birds, with exhibition of paintings of hummingbirds.

December 8, 1923—658th Meeting.[1]

FORTY-FOURTH ANNUAL MEETING.

Vice-President E. A. Goldman in the chair; 16 persons present.

Reports were received from the Recording and Corresponding Secretaries, the Treasurer, and the Committee on Publications.

The following officers and members of the Council were elected:

President, J. W. Gidley.

Vice-Presidents, S. A. Rohwer, H. C. Oberholser, E. A. Goldman, A. Wetmore.

Recording Secretary, S. F. Blake.

Corresponding Secretary, T. E. Snyder.

Treasurer, F. C. Lincoln.

Members of the Council, C. E. Chambliss, H. C. Fuller, H. H. T. Jackson, W. R. Maxon, C. W. Stiles.

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[1]Abstract in Journ. Washington Acad. Sci., vol. 14, p. 62, January 19, 1924.

Vol. 36, pp. 1–6 February 3, 1923

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PUBLICATION STANDARDS IN VERTEBRATE PALÆONTOLOGY.

BY HENRY FAIRFIELD OSBORN.

American Standards of Publication.

The founders of Vertebrate Palæontology in America, Leidy, Marsh, and Cope, fortunately set a high and uniform standard in publishing the taxonomic divisions of species, genera, and the higher grades. Leidy published uniformly in the Proceedings and Journals of the Academy of Natural Sciences of Philadelphia, chiefly in the form of written reports of his verbal communications to the regular meetings of the Academy.[1] Marsh published uniformly in the American Journal of Science and Arts, which, since its foundation by Benjamin Silliman, has enjoyed a world-wide reputation and distribution. He published some of his higher taxonomic divisions in the Memoirs Odontornithes and Dinocerata of King's Survey of the Fortieth Parallel. Cope's systematic lists and contributions were much more widely scattered[2] but chiefly appeared in the Proceedings and Transactions of the American Philosophical Society and in the Reports of Hayden's Survey of the Territories and of Wheeler's Survey; also subsequently in the publications of the Geological Survey of Canada for the period during which he was Palæontologist. During his editorial period of the American Naturalist, from 1877 to 1897, he used this Journal widely; and during the very active period of his exploration of

[1]Osborn, H. F. "Biographical Memoir of Joseph Leidy 1823-1891," Nat. Acad. Sci. Biog. Mems., Vol. VII, pp. 339-370, with Bibliography, pp. 370-396, 1913.

[2]Osborn, H. F. "Biographical Memoir of Edward Drinker Cope 1840-1897." With Bibliography revised by Miss Jannette M. Lucas from manuscript of Miss M. A. Brown, with scientific annotations by Dr. William D. Matthew (vertebrate palæontology) and by Mr. Walter B. Veazie (herpetology). In preparation.

the Eocene of the Bridger, Washakie, and Wasatch basins, he used the Proceedings of the American Philosophical Society, issuing forty Bulletins, which were brought together, printed, and dated in advance of the regular Proceedings—dates which formed the subject of a dispute between Marsh and himself. Bulletin No. 12, entitled "On Some Eocene Mammals, Obtained by Hayden's Geological Survey of 1872 . . . (*Read before the American Philosophical Society*, ..., 1873.)" was issued in the same way but was not included in a subsequent printing of the Proceedings. Cope, to the despair of editors, of proof-readers, and of the succeeding generation of systematists, on two occasions published specific names in the explanation of plates, where certainly no one would look for them. These, however, seem to be the glaring exceptions to an otherwise regular practice.

Scott and Osborn, of the next generation, began publishing in the Bulletins of the E. M. Museum of Geology and Archæology of Princeton College, in the Proceedings of the American Philosophical Society, and in the Bulletins of the Museum of Comparative Zoology at Cambridge. Scott has continued to publish in the Proceedings of the American Philosophical Society, and Osborn since 1892 has been publishing uniformly in the Bulletins and Memoirs of the American Museum of Natural History.

All the media of publication above named have had a large circulation and a world-wide distribution, so that it may be said that the uniform and high standard originally set by vertebrate palæontologists has been maintained to the present day. With the multiplication of publications by museums as well as by universities in various parts of our country, it is desirable to agree as to future standards of world-wide distribution and accessibility, also of printing on permanent paper in permanent form, with illustrations printed on permanent paper rather than on the temporary coated paper so often used nowadays.

European Standards of Publication.

In connection with a complete revision of the Proboscidea, on which the present writer has been especially engaged during the past three years, in pursuance of researches begun in the

year 1907,[1] it has been necessary to consult upwards of 500 titles, certain of which could not be found in any American library. It appears that in the order Proboscidea all systematic genera and species since 1735 have been published either in the regular or special publications of learned societies, or in serial journals, or in standard memoirs, or in volumes regularly placed on sale, such, for example, as the successive editions of Blumenbach's "Handbuch der Naturgeschichte." In this manner a total of 276 species and 53 genera of the Proboscidea alone have been described, and there is thus the precedent of nearly two centuries in the Old World and of nearly three-quarters of a century in the New World for the publication of systematic lists in a manner which will be permanent.

Standards of Publication in Books and Brochures.

While the International Commission on Zoological Nomenclature is very positive in the matter of publication and priority, it does not declare itself expressly as to standard media of publication, except in repeated reference to "serials." As to the standards which must be observed in publications other than serials, we may quote from a letter recently received from C. Davies Sherborn, author of the *Index Animalium*, since 1896 a member of the British Association Committee on Zoological Bibliography and Publication, and acknowledged to be the highest authority in the world to-day in a field to which he has devoted the best part of a lifetime. He writes (letter December 2, 1922):

"*Privately printed and privately issued books are not valid.* [Italics our own.] To be valid must have publishers name upon them (& should have a price). Public sale is the essential test. Exception should be made to those works issued by Public Institutions for Exchange or wide distribution, e. g. Smithsonian and similar Inst. In old days the case was different. Pallas' Zoogr. Rosso-Asiat. 1811 was issued (owing to internal troubles) by the author to a score of the first naturalists of Europe, & as this was the only then means of making it known, the work should be accepted. Personally it is my business to record & tell you where a G. or sp. is to be found, but if and when I quote from a privately printed book I mark the entry (Auct. Typ.) In this connection, I would bar all newspapers, even 'Nature' and 'Science' for new Generic or specific names. But here you are at once confronted with the question What is a newspaper?"

[1] Osborn, H. F. "A Mounted Skeleton of the Columbian Mammoth (Elephas columbi)." *Bull. Amer. Mus. Nat. Hist.*, Vol. XXIII, Art. XII, Mar. 30, 1907, pp. 255-257.

A letter dated August 21, 1922, from Dr. F. A. Bather of the British Museum and Secretary of the British Association Committee on Zoological Bibliography and Publication declares the same standard:

. . . "I think I may venture to write as Secretary of the British Association Committee on Zoological Bibliography and Publication, since my committee discussed this question some 25 years ago and has always been in emphatic agreement on the subject. Also as a member of the International Commission of Zoological Nomenclature, I am able to say that the Commission fully agrees with the attitude and proposals of the British Association Committee. I fully agree with you in rejecting . . . [referring to a privately printed and issued paper] because it is to all appearances issued privately and bears no place of publication, no publishers name, and no price; in other words the presumption is that *the pamphlet (and consequently the names within it) is not published.* [Italics our own.] The rules of the International Commission on Zoological Publication say (Article 25): 'the valid name of the genus or species can only be that name under which it was first designated on the condition; (a) that this name was published etc.' The question arises, what is meant by publication? This has often been discussed, and the general conclusion is well summarised by Sherborn 'Index Animalium,' vol. I, p. vi, where he defines it as 'Offered for public sale or public distribution.' The words 'public distribution' are necessary, because if it were limited to 'public sale' many valuable works issued by the Smithsonian Institution and the United States Government would, I am informed, be excluded, since they are not sold at a price."

Professor C. W. Stiles, Secretary of the International Commission on Zoological Nomenclature, Washington, D. C., adopts the same standard (letter September 12, 1922):

"It is difficult for me to judge the case without having the paper and without knowing whether it is on sale. My idea would be that a paper must be generally accessible to the public; if privately distributed, and not on sale, it would not be publication, so far as I see. If actually on sale, it would appear to have the same status as a book. New names in books are accepted. For instance, the standard works of 1808, 1809, 1810, 1819, 1845, 1850 and 1851, on parasites are books and their published status has never been questioned. Linné, 1758, Systema naturae is a book, not a periodical. *A book or paper, privately distributed, hence not on sale, I would ignore entirely, in respect to nomenclature.*" [Italics our own.]

Also Dr. Theo. D. A. Cockerell of the University of Colorado (letter August 27, 1922) maintains the same standard:

"On the other hand the rules require,—and I think very properly—that a work shall be *placed on sale.* It is obvious that if any one is at liberty

to print a few copies of a work, and send them only to his friends, there is no publication in the genuine sense of the word. A scientific work, to be published, must be available to *any one* who is willing to purchase it at the published price. We may some day have to require that that price shall not be exorbitant."

The standard form of publication in vertebrate palæontology in America is in serials. Privately issued brochures and books are without precedent; they do not constitute publication, unless placed on sale. They are not a standard. The serial form of publication is the only one which meets modern conditions and the present world-wide expansion of vertebrate palæontology.

Standards of the British Association for the Advancement of Science.

The Committee of the British Association on Zoological Bibliography and Publication, Dr. F. A. Bather, Secretary, issued (London, 1896) the following seven rules:

"(1) That each part of a serial publication should have the date of actual publication, as near as may be, printed on the wrapper, and when possible, on the last sheet sent to press. (2) That authors' separate copies should be issued with the original pagination and plate-numbers clearly indicated on each page and plate, and with a reference to the original place of publication. (3) That authors' separate copies should not be distributed privately before the paper has been published in the regular manner. . . 4. That it is desirable to express the subject of one's paper in its title, while keeping the title as concise as possible. 5. That new species should be properly diagnosed and figured when possible. 6. That new names should not be proposed in irrelevant footnotes, or anonymous paragraphs. 7. That references to previous publications should be made fully and correctly, if possible in accordance with one of the recognized sets of rules for quotation, such as that recently adopted by the French Zoological Society."

These rules were distributed for comment and discussion and elicited the following supplementary rule (Toronto, 1897) regarding *sale* and distribution:

"In cases where a volume or part can only appear at long intervals, each author that requires separate copies of his paper for private distribution before its publication in the volume or part should be permitted them only on this condition—that, for every month before the probable issue of the volume, a certain number of copies—say five—should be placed by him in the hands of the society or its accredited publisher, in order that they may be offered for sale to the public at a fixed price. Further, that the society,

for its part, should announce the publication, with price and agent, of their papers to some recognized office, or to some such paper as the 'Zoologischer Anzeiger.' The details of expense must be settled between the author and the society."

Subsequent reports of the same Committee have been issued, namely, Newcastle, 1916, London, 1920, Edinburgh, 1921, full of valuable matter to zoologists, bibliographers, and publishers, copies of which have been kindly furnished the present writer by Dr. F. A. Bather of the British Museum.

PUBLICATION IN JOURNALS AND NEWSPAPERS NOT STANDARD.

The British authorities tacitly or openly strictly advise against such publication even in standard journals like "Nature" or "Science." New lists of systematic description should be issued where scientific workers the world over may expect to find them and not in a casual way. This is a natural right. It is also a natural right that new names should be accompanied by figures. It is also essential that names, descriptions, and figures should be printed on *permanent* paper which will last for centuries. It is finally essential that prompt or immediate distribution of not less than four hundred copies should be made of the serial or of the reprints. This is the standard circulation of scientific publications at the present time.

Permanence both of the text paper and of the plate paper on which text figures appear is a new standard of the utmost importance affecting publication under modern conditions of wood pulp and glazed papers which have replaced the permanent rag papers of early writers. The beauty and clearness of both the plates and text in such ancient works as those of Blumenbach ("Handbuch der Naturgeschichte") and of Cuvier ("Recherches sur les Ossemens Fossiles," editions of 1812, 1821-1824, 1834-1836) show the great advantage of using permanent plate and printing materials. Imagine the condition of zoology one hundred years hence if the printing of new species in an afternoon edition of a newspaper, which crumbles to dust in a few months, were permitted.

American Museum Natural History,
New York City,
December 21, 1922.

Vol. 36, pp. 7–34 March 28, 1923

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

RECORDS OF FISHES FOR THE SOUTHERN STATES.

BY HENRY W. FOWLER.[1]

In studying the fishes in the Academy contained in the general series from our Southern States I had occasion to examine all the materials available. Among the older collections are a number of smaller lots of material, most of which had never been reported. Several recent collections are also included. The source of each lot of material, or collection, is mentioned under the different captions pertaining to the respective State.

In the case of North Carolina, Florida and Tennessee, as bibliographies have been given by more recent contributors, I have only noted the subsequent papers dealing more particularly with distribution. The same limit has been used for the other States, in which no lists of papers have ever been given. It is therefore hoped that the data, thus presented in this condensed manner, will be of future service in work on the southern ichthy fauna.

Virginia.

These collections are contributions chiefly from Cope and represent his records published in 1868. A re-examination of this material is desirable, besides giving a complete list of such of his types as are still in the Academy.

With Messrs. J. B. Stetson, Jr., and W. T. Innes, during April, 1922, I visited Roanoke and vicinity. Collections of fishes were made at the following stations:

1. Clear, spring-fed, stony stream near Hollins, in the Roanoke basin, Botetourt County, April 22.

2. Tributary of the Roanoke north of Cloverdale, in Botetourt County, April 22. This is a clear open brook, and most of the fish taken from it were parasitized with tremetodes.

3. Brook in the Roanoke basin, near Daleville, Botetourt County, April 22. A clear rapid stream, with fish exceedingly abundant.

4. Catawba Creek, tributary of the James River near Kyle, Botetourt

[1] Published by permission of the Academy of Natural Sciences of Philadelphia.

County, April 22. A rather large open stream, with shallows and many riffs. It flows through a rather gradual valley, just below [north of and toward northeast] of Fincastle.

5. Sinking Creek at Maywood, tributary of New River in the Kanawha basin, Craig County, April 23. An open clear, cold, rocky stream, rapid and rather deep.

6. Brush Creek, tributary of Little River, in the Kanawha basin, at Brush Creek Bridge, Floyd County, April 24. A fine shallow, sandy stream near its mouth, though rocky above and with numerous pools.

7. Little River at the island below Sowers, Floyd County, April 24.

8. Laurel Creek, tributary of Little River in Floyd County, April 24. A stream much like Brush Creek. Its banks are lined with rhododendrons and hemlocks. The stream flows over gravel and sandy reaches in its lower course.

9. South Fork of the Roanoke two miles east of Elliston, Montgomery County, April 24. Resembles Catawba Creek, with gravel and sandy bottoms, many pools and rapids.

The principal papers relative to the distribution of Virginia fishes are as follows:

Edward D. Cope.

1868. On the distribution of fresh-water fishes in the Allegheny region of southwestern Virginia. <Journ. Acad. Nat. Sci. Phila., (2) 6, 1868, pp. 207-247, 3 pls.

David S. Jordan.

1890. Report of explorations made during the summer and autumn of 1888, in the Alleghany region of Virginia, North Carolina and Tennessee, and in western Indiana, with an account of the fishes found in each of the river-basins of those regions. <Bull. U. S. Fish Comm. 8, 1888 (1890), pp. 97-192, 15 pls. (Virginia fishes, pp. 101-124, 139-149.)

Barton A. Bean.

1891. Fishes collected by Wm. P. Seale in Chesapeake Bay, at Cape Charles City, Virginia. <Proc. U. S. Nat. Mus., 14, 1891, pp. 83-94.

Henry W. Fowler.

1912. Records of fishes for the Middle Atlantic States and Virginia. <Proc. Acad. Nat. Sci. Phila., 64, 1912, pp. 34-59. (Virginia fishes, pp. 56-59.)

1913. Notes on the fishes of the Chincoteague Region of Virginia. <L. c., 65, 1913 (1914), pp. 61-65.

1918. Fishes from the Middle Atlantic States and Virginia. <Occas. Pap. Mus. Zool. Univ. Michigan No. 56, May 6, 1918, pp. 1-19, pls. 1-2. (Virginia fishes, pp. 14-19, pl. 2.)

1920. Notes on New Jersey, Pennsylvania and Virginia fishes. <Proc. Acad. Nat. Sci. Phila., 1919 (March 11, 1920), pp. 292-300. (Virginia fishes, p. 300.)

1922. Records of fishes for the Eastern and Southern United States. <L. c., 74, 1922, pp. 1-27, 2 pls. (Virginia fishes, pp. 9-13.)

William C. Kendall.

1914. A new record for the lumpfish in Chesapeake Bay. <Copeia, December 5, 1914, No. 13. (*Cyclopterus lumpus* reported above Old Point Comfort.)

Lepisosteus osseus (Linnæus).

Holston River.

Salvelinus fontinalis (Mitchill).

Head of James River; Little Stony Creek, Walker's Creek.

Ictalurus punctatus (Rafinesque).

Sinking Creek.

Ameiurus catus (Linnæus).

Lower James River.

Ameiurus nebulosus (Le Sueur).

Lower James River.

Leptops olivaris (Rafinesque).

Sinking Creek.

Schilbeodes insignis (Richardson).

Sinking Creek.

Campostoma anomalum (Rafinesque).

Roanoke River; Cloverdale; Daleville; Elliston. Walker's and Sinking Creeks; Brush Creek; Little River; Laurel Creek. Holston River.

At Daleville we found a male 105 mm. long in full color. Upper surface of head and all of back tuberculate, tubercles larger on head though none below eye. Three tubercles above each nostril. Fine tubercles on dorsal rays terminally and along its front edge, also on inner surfaces of larger or upper pectoral rays. The usual color-pattern present, with black blotch on dorsal, anal and caudal base.

Chrosomus erythrogaster (Rafinesque).

South Fork of Holston River.

Chrosomus oreas Cope.

Types, from head of Roanoke River. My examples from Cloverdale, Daleville, Kyle and Elliston. At Daleville very abundant and many brilliant. The color is quite fleeting and the bright crimson shades were seldom noticed in examples freshly captured. When the fish were in the aquarium a time the red would gradually appear. All had bright yellow fins. The median black lateral band is not always completely broken, though often with that appearance. Great numbers were found in the little brook at this place, especially in rock or gravel pools. Often a hundred or more were captured at a single sweep of a minnow seine.

Hybognathus nuchalis argyritis (Girard).

Kanawha Creek.

Pimephales notatus (Rafinesque).

Sinking, Walker's and Kanawha Creeks; Brush and Laurel Creeks, Little River; Elliston.

Semotilus bullaris (Rafinesque).

Lower James River.

Semotilus atromaculatus (Mitchill).

Lower James River, Richmond, Stroubles Creek, Daleville, Kyle, Elliston and Kanawha River.

Leuciscus vandoisulus Valenciennes.

Daleville, head of Roanoke River, James River.

Notropis deliciosus (Girard).

Brush Creek.

Notropis procne longiceps (Cope).

Types of *Hybopsis longiceps* Cope from head of James and Roanoke Rivers. Frequent in the Catawba at Kyle.

Notropis spectrunculus (Cope).

Types of *Hybopsis spectrunculus* Cope from Bear Creek in the Holston basin.

Notropis hudsonius (Clinton).

Holston River.

Notropis whipplii (Girard).

Creek in Kanawha basin, Walker's and Sinking Creeks. Also found in Brush Creek.

Notropis whipplii analostanus (Girard).

James River and head of Roanoke River. In the latter basin I have it from Hollins, Daleville and Elliston. Also in the Catawba Creek at Kyle.

Notropis galacturus (Cope).

Types of *Hybopsis galacturus* Cope from the Holston.

Notropis cornutus (Mitchill).

Head of James and Holston Rivers. Little River and Laurel Creek.

Notropis cornutus cerasinus (Cope).

Types of *Hypsilepis cornutus cerasinus* Cope, from head of Roanoke. My examples from Hollins, Cloverdale, Elliston and Daleville in the Roanoke and Kyle in the James. Among the Daleville examples many spawning males, quite variable, largest 83 mm. Vermilion on fins variable, sometimes only as broad submarginal band, again nearly covering fin, which always has a narrower paler edge. The lips and often the cheeks are rosy or vermilion. Sides of body blushed rosy. The tubercles extend only on the top of the head, muzzle and predorsal, though much smaller and less conspicuous on the latter.

Notropis lacertosus (Cope).

Types of *Hybopsis lacertosus* Cope, from Bear Creek and other examples from the Holston.

Notropis coccogenis (Cope).

Types of *Hypsilepis coccogenis* Cope, from the Holston, also South Fork.

Notropis rubricroceus (Cope).

Types of *Hybopsis rubricroceus* Cope, from Tumbling Creek, North Fork of the Holston.

Notropis scabriceps (Cope).

Types of *Photogenis scabriceps* Cope, from Sinking Creek and Walker's Creek near Austinville.

Notropis luciodus (Cope).

Types of *Photogenis luciodus* Cope, from the Holston.

Notropis telescopus (Cope).

Types of *Photogenis telescopus* Cope, and many others, all from the Holston.

Notropis atherinoides Rafinesque.

Sinking and Walker's Creeks; headwaters of James and Roanoke Rivers.

Notropis rubrifrons (Cope).

Kanawha River.

Notropis photogenis (Cope).

Types of *Photogenis leucops* Cope from Sinking Creek and near Austinville, and *P. l. engraulinus* Cope from the Kanawha at Austinville. I obtained it in Little River, Laurel and Brush Creeks. At the last this species very abundant and many in color. Muzzle, top of head, shoulder-girdle to pectoral axil and dorsal base blushed rosy. Two very small rosy spots at base of each tube in lateral line. Fine tubercles scattered on upper surface and sides of head and median predorsal region.

Notropis photogenis amœnus (Abbott).

Kyle and Daleville. At latter locality two taken, smaller 55 mm. long, in color. Muzzle blushed rosy-red and paler shade at pectoral base and on shoulder-girdle above same, though no tubercles. Plumbeous lateral band becomes much more leaden-dusky behind.

Notropis micropteryx (Cope).

Types of *Alburnellus micropteryx* Cope, from the Holston.

Notropis umbratilis ardens (Cope).

Types of *Hypsilepis ardens* Cope at head of Roanoke River. Two from Daleville, larger 75 mm. long. Very pronounced or striking dusky median band down back. Plumbeous lateral band dusky behind and small black spot at caudal base medially, also slightly reflected out on median caudal rays. No red. Base of dorsal narrowly dusky forward at black blotch. Muzzle, top of head and front predorsal tuberculate.

Another fully ornate male, 77 mm. long from Little River, had its side blushed rosy-coppery to lilac. Suborbitals, snout edge and upper lip vermilion, muzzle and side of head largely blushed orange. Back olive-green. Dorsal base blackish, with black spot forward, then white, and

greater terminal portion deep vermilion. Anal white basally, with large vermilion terminal blotch forward. Caudal gray, other fins whitish. No tubercles.

Phenacobius teretulus Cope.

Types, from the Kanawha at Eggleston Springs. One also from Brush Creek, 70 mm. Back dull olive-brown, each scale with narrow dusky edge. From each side of snout rather broad dusky lateral band to caudal base, forming rather ill-defined small blackish spot at latter. Fins all pale or whitish, like lower surface below dark lateral band. Iris grayish. Upper surface of head, predorsal and inner surfaces of pectoral rays, finely tuberculate. None of tubercles extend on trunk beyond dorsal fin.

Phenacobius uranops Cope.

Types, from the Holston at Saltville.

Rhinichthys cataractæ (Valenciennes).

Sinking and Walker's Creeks, Austinville in the Kanawha River, Brush Creek, Little River; Kyle; Daleville.

Rhinichthys atronasus (Mitchill).

Sinking and Walker's Creeks, Kanawha, Holston and Roanoke Rivers; Brush and Laurel Creeks, Maywood; Daleville, Elliston.

Hybopsis monachus (Cope).

Types of *Ceratichthys monachus* Cope, from the Holston.

Hybopsis amblops (Rafinesque).

Types of *Ceratichthys hyalinus* Cope, from the Holston.

Hybopsis kentuckiensis (Rafinesque).

Walker's Creek, Holston, Roanoke and James Rivers; Cloverdale, Daleville, Elliston; Brush and Laurel Creeks, Little River.

Exoglossum maxillingua (Le Sueur).

Walker's and Sinking Creeks, Kanawha and Roanoke Rivers. I obtained it at Kyle and in Brush Creek.

Catostomus commersonnii (Lacépède).

Stroubles Creek in the Kanawha basin, Roanoke and Holston Rivers. I found it in Brush and Laurel Creeks, Hollins, Daleville, Kyle.

Catostomus nigricans Le Sueur.

Sinking Creek, Roanoke and Holston Rivers; Brush and Laurel Creeks, Little River, Daleville and Kyle.

Catostomus rhothœcus Jordan and Evermann.

Three seined in the rapids of the Catawba at Kyle. After death, the black blotches, so conspicuous in the Midway Mills examples, faded out.

Erimyzon sucetta oblongus (Mitchill).

Richmond.

Moxostoma aureolum (Le Sueur).

Holston River.

Moxostoma cervinum (Cope).

Types of *Ptychostomus cervinus* Cope, from headwaters of the Roanoke and James.

Anguilla rostrata (Le Sueur).

Lower James River.

Umbra pygmæa (De Kay).

Lower James River.

Fundulus catenatus (Storer).

Holston River.

Pomoxis sparoides (Lacépède).

James River.

Ambloplites rupestris (Rafinesque).

Holston and lower James Rivers.

Ambloplites rupestris cavifrons (Cope).

Type of *Ambloplites cavifrons* Cope from headwaters of the Roanoke in Montgomery County.

Chænobryttus gulosus (Cuvier).

Type of *Lepomis gillii* Cope, from branch of Tuckahoe Creek, in the bottoms of James River, twelve miles above Richmond.

Enneacanthus gloriosus (Holbrook).

Type of *Hemioplites simulans* Cope, from slow waters of Tuckahoe Creek, which enters the James above Richmond. Also material from the lower James.

Lepomis auritus (Linnæus).

Roanoke River; Hollins, Cloverdale, Daleville; Kyle.

Pomotis gibbosus (Linnæus).

Lower James River.

Micropterus salmoides (Lacépède).

Norfolk and lower James River.

Percina caprodes (Rafinesque).

Holston River.

Hadropterus aspro (Jordan).

Giles County and Walker's Creek. I obtained one in Brush Creek.

Hypohomus aurantiacus (Cope).

Types of *Cottogaster aurantiacus* Cope, from the Holston.

Etheostoma blennioides Rafinesque.

Types of *Hyostoma blennioperca* Cope, from the Kanawha and Holston.

Boleosoma nigrum (Rafinesque).

Sinking Creek and Holston River. I found it in Laurel Creek.

Boleosoma nigrum vexillare (Jordan).

Cloverdale.

Pœcilichthys zonalis Cope.

Types, from the Holston.

Pœcilichthys flabellaris (Rafinesque).

Sinking and Walker's Creeks, Kanawha, Holston and Roanoke Rivers. I found it abundant at Hollins, Cloverdale, Daleville, Kyle, Maywood, Brush and Laurel Creeks.

Orthopristis chrysopterus (Linnæus).

Norfolk.

Leiostomus xanthurus Lacépède.

Norfolk.

Prionotus evolans strigatus (Cuvier).

Hampton Roads.

Cottus bairdii Girard.

Walker's and Sinking Creeks, Holston River, and Kanawha Creek in Wythe County. My examples from Maywood.

Achirus fasciatus Lacépède.

Norfolk.

NORTH CAROLINA.

The material from this State is mostly Cope's old collection. There are also a few of Yarrow's specimens from Fort Macon, and others from Conrad and Leidy.

The following papers are subsequent to Smith's work, which contains a bibliography until 1907.

HUGH M. SMITH.

1907. The fishes of North Carolina. 1907, xi, 453 pp., 21 pls. and 187 figs. (Published as vol. 2 N. C. Geol. and Economic Survey.)

BARTGIS MCGLONE.

1908. A note on the occurrence of two West Indian fishes at Beaufort, N. C. <Science, n. s. 28, 1908, p. 572. (*Abudefduf saxatilis* and *Ulaema lefroyi* recorded.)

E. W. GUDGER.

1910. Notes on some Beaufort fishes. <Amer. Nat. 44, 1910, pp. 395-403.

1912. Natural history notes on some Beaufort, N. C. fishes. <Proc. Biol. Soc. Wash., 25, 1912, pp. 141-156, 165-176.

1913. Natural history notes on some Beaufort, N. C. fishes, 1910-11. <Journ. Elisha Mitchell Sci. Soc., 28, 1913, pp. 157-172.

—— Natural history notes on some Beaufort, N. C. fishes 1912. <Proc. Biol. Soc. Wash., 26, 1913, pp. 97-109.

JOHN T. NICHOLS.

1911. Notes on teleostean fishes from the Eastern United States. <Bull. Amer. Mus. Nat. Hist. N. Y., 30, pp. 275-278. (*Moxistoma alleghaniensis* described as new.)

1914. A new Scorpaena and a rare ray from North Carolina. <L. c. 33, 1914, pp. 537-538, f. (*Scorpaena colesi* described as new.)

1916. A new Gymnachirus from North Carolina. <L. c., 35, 1916, 69-72, f.

Lewis Radcliffe.

1914. The work of the United States Fisheries Marine Biological Station at Beaufort, N. C., during 1913. <Science, n. s. 40, 1914, pp. 413-417.

1916. The sharks and rays of Beaufort, N. C. <Bull. Bur. Fisher., 34, doc. no. 822, pp. 241-284, 17 pls.

1917. Description of a new goby Garmannia spongicola from North Carolina. <Proc. U. S. Nat. Mus., 52, 1917, pp. 423-425, fig.

R. J. Coles.

1915. A cannibalistic Pterophryne. <Copeia, 24, November 19, 1915, p. 49. (P. histrio at Cape Lookout.)

1916. Is Cynoscion nothus an abnormal regalis. <L. c., 30, April 24, 1916, pp. 30-31. (At Cape Lookout.)

—— Note on Radcliffe's sharks and rays of Beaufort. <L. c., 32, June 24, 1916, pp. 45-47.

1919. The large sharks of Cape Lookout, North Carolina. The great White Shark or Maneater, Tiger Shark and Hammerhead. <L. c., 67, May 7, 1919, pp. 17-43, pls. 2-3.

W. W. Welsh.

1916. Notes on the fishes of the Peedee River Basin, North and South Carolina. <Copeia, 33, July 24, 1916, pp. 54-56.

Barton W. Evermann.

1916. Notes on the fishes of the Lumbee River. <Copeia, 36, October 24, 1916, p. 77-80.

S. F. Hildebrand.

1919. Two species of menhaden occurring on the coast of North Carolina. <Rep. U. S. Fish Comm. 1918 (1919) Appendix VIII, 38 pp., 1 pl., 1 chart.

J. C. Bell and John T. Nichols.

1921. Notes on the food of Carolina sharks. <Copeia, 92, March 15, 1921, pp. 17-20.

Henry W. Fowler.

1922. Records of fishes for the Eastern and Southern United States <Proc. Acad. Nat. Sci. Phila., 74, 1922, pp. 1-27, 2 pls. (North Carolina fishes, pp. 13-14.)

Rhinoptera bonasus (Mitchill).

Beaufort.

Brevoortia tyrannus (Latrobe).

Ft. Macon.

Synodus fœtens (Linnæus).

Ft. Macon.

Ameiurus catus (Linnæus).

Types of *Amiurus niveiventris* Cope, from the Neuse River.

Ameiurus nebulosus (Le Sueur).

Catawba River.

Ameiurus platycephalus (Girard).

Catawba River.

Schilbeodes insignis (Richardson).

Yadkin and Catawba Rivers.

Campostoma anomalum (Rafinesque).

Catawba and French Broad Rivers.

Hybognathus nuchalis argyritus (Girard).

Catawba River.

Semotilus atromaculatus (Mitchill).

Yadkin River.

Leuciscus vandoisulus Valenciennes.

Catawba and Yadkin Rivers.

Abramis crysoleucas (Mitchill).

Neuse and Catawba Rivers.

Notropis procne longiceps (Cope).

Yadkin River.

Notropis spectrunculus (Cope).

French Broad River and Henderson County.

Notropis hudsonius saludanus (Jordan and Brayton).

Catawba River.

Notropis niveus (Cope).

Types of *Hybopsis niveus* Cope, from the upper Catawba River. Other examples from the Catawba, Neuse and Yadkin Rivers.

Notropis galacturus (Cope).

Catawba and French Broad Rivers.

Notropis pyrrhomelas (Cope).

Types of *Photogenis pyrrhomelas* Cope, from the upper Catawba.

Notropis cornutus (Mitchill).

Neuces River.

Notropis coccogenis (Cope).

French Broad and Neuces Rivers.

Notropis chlorocephalus (Cope).

Types of *Hybopsis chlorocephalus* Cope, from tributaries of the Catawba.

Notropis chiliticus (Cope).

Types of *Hybopsis chiliticus* Cope, from the Yadkin.

Notropis altipinnis (Cope).

Type of *Alburnellus altipinnis* Cope, from the Yadkin in Roane County.

Notropis luciodus (Cope).

French Broad River.

Notropis telescopus (Cope).

French Broad River and Henderson County.

Rhinichthys atronasus (Mitchill).

Holston and French Broad Rivers, Linville, Roan Mountain.

Hybopsis labrosus (Cope).

Types of *Ceratichthys labrosus* Cope, from the Catawba in McDowell County.

Hybopsis hypsinotus (Cope).

Types of *Ceratichthys hypsinotus* Cope, from the Catawba and Yadkin.

Hybopsis amblops (Rafinesque).

French Broad River and Henderson County.

Hybopsis kentuckiensis (Rafinesque).

Catawba and Yadkin Rivers.

Catostomus commersonnii (Lacépède).

Catawba and French Broad Rivers.

Catostomus nigricans Le Sueur.

Coal Creek.

Minyterema melanops (Rafinesque).

Types of *Ptychostomus pidiensis* Cope, from the Yadkin River.

Moxostoma collapsum (Cope).

Types of *Ptychostomus collapsus* Cope, from the Neuse River.

Moxostoma robustum (Cope).

Types? of *Ptychostomus robustus* Cope, from the Yadkin River.

Moxostoma aureolum (Le Sueur).

French Broad, Catawba and Neuse Rivers.

Moxostoma lachrymale (Cope).

Type? of *Ptychostomus lacrymalis* Cope, from the Neuse River.

Moxostoma crassilabre (Cope).

Type of *Ptychostomus crassilabris* Cope, from the Neuse near Raleigh.

Moxostoma breviceps (Cope).

Neuse River.

Moxostoma cervinum (Cope).

Types of *Ptychostomus cervinus* Cope, from the Catawba.

Esox americanus (Gmelin).

Catawba and Yadkin Rivers.

Esox tridecemlineatus Mitchill.

Neuse River.

Fundulus heteroclitus (Linnæus).

Ft. Macon.

Cyprinodon variegatus Lacépède.

Ft. Macon.

Gambusia affinis (Baird and Girard).

Types of *Haplochilus melanops* Cope, from the Neuse River.

Menidia menidia (Linnæus).

Ft. Macon.

Mugil cephalus Linnæus.

Ft. Macon.

Mugil curema Valenciennes.

Ft. Macon.

Oligoplites saurus (Schneider).

Ft. Macon.

Selene vomer (Linnæus).

Ft. Macon.

Trachinotus carolinus (Linnæus).

Ft. Macon.

Eucentrarchus macropterus (Lacépède).

North Carolina.

Ambloplites rupestris (Rafinesque).

French Broad and Yadkin Rivers.

Chænobryttus gulosus (Cuvier).

Neuse and Roanoke Rivers.

Enneacanthus gloriosus (Holbrook).

Neuse River.

Lepomis auritus (Linnæus)

Catawba and Yadkin Rivers.

Lepomis incisor Valenciennes.

Types of *Lepomis purpurescens* Cope, from a tributary of the Yadkin in Roane County. Also material from the French Broad River.

Pomotis gibbosus (Linnæus).

Catawba, French Broad and Yadkin Rivers.

Micropterus dolomieu Lacépède.

French Broad River.

Micropterus salmoides (Lacépède).

Yadkin, Catawba and French Broad Rivers.

Stizostedion vitreum (Mitchill).

French Broad River.

Hadropterus peltatus (Cope).

Buck Creek.

Etheostoma blennioides (Rafinesque).

French Broad River.

Boleosoma nigrum maculaticeps (Cope).

Types of *Boleosoma maculaticeps* Cope, from the upper Catawba. Also an example from the Yadkin.

Pœcilichthys zonalis Cope.

French Broad River.

Pœcilichthys rufilineatus Cope.

Types, from Warm Springs Creek, in the French Broad basin, Madison County.

Pœcilichthys flabellaris (Rafinesque).

Catawba River.

Lagodon rhomboides (Linnæus).

Ft. Macon.

Chætodipterus faber (Broussonet).

Ft. Macon.

Chilomycterus schœpfi (Walbaum).

Ft. Macon.

Cottus bairdii Girard.

French Broad River.

Paralichthys dentatus (Linnæus).

Ft. Macon.

Achirus fasciatus Lacépède.

Flat Lake.

Symphurus plagiusa (Linnæus).

North Carolina, from T. A. Conrad.

Opsanus tau (Linnæus).

Ft. Macon.

SOUTH CAROLINA.

The older collections contain a number of specimens from Holbrook, though with but few of his types. Small lots of specimens were also received from Craven, Case, Corse, Bache, Norcom, Blanding and others. The chief faunal papers are as follows:

JOHN E. HOLBROOK.

1847. Southern ichthyology; or a description of the fishes inhabiting the waters of South Carolina, Georgia and Florida. <New York and London. 32 pp., 4 pls.

1855. Ichthyology of South Carolina. 182 pp., 27 pls.

1860. Ichthyology of South Carolina. 205 pp., pls.

DAVID S. JORDAN and A. W. BRAYTON.

1877. On the distribution of the fishes in the Alleghany region of South Carolina, Georgia and Tennessee, with descriptions of new or little-known species. <Bull. U. S. Nat. Mus., 12 (pt. 3), pp. 1-95. (South Carolina fishes, pp. 11-29.)

Tarleton H. Bean.

1878. Description of a new sparoid fish *Sargus holbrookii*, from Savannah Banks. <Proc. U. S. Nat. Mus., I, 1878, pp. 178-200.

David S. Jordan and Charles H. Gilbert.

1883. Notes on a collection of fishes from Charleston, S. C., with descriptions of three new species. <Proc. U. S. Nat. Mus., 5, 1882 (1883). Pp. 580-620. (*Querimana* described as a new genus and 126 species recorded.)

David S. Jordan and Carl H. Eigenmann.

1888. Notes on a collection of fishes sent by Mr. Charles C. Leslie, from Charleston, S. C. <Proc. U. S. Nat. Mus., 10, 1887 (1888), pp. 269-270.

David S. Jordan.

1890. Report of explorations made during the summer and autumn of 1888, in the Alleghany region of Virginia, North Carolina and Tennessee, and in western Indiana, with an account of the fishes found in each of the river-basins of those regions. <Bull. U. S. F. Com., 8, 1888 (1890), pp. 97-192, 15 pls. (South Carolina fishes, pp. 136-139.)

Barton A. Bean and Alfred C. Weed.

1909. Description of a new skate (*Dactylobatus armatus*) from deep water off the southern Atlantic Coast of the United States. <Proc. U. S. Nat. Mus., 36, 1909, pp. 459-461, pl. 38.

Paul M. Rea.

1909. Sailfish [*Istiophorus nigricans* taken off Charleston]. <Bull. Charleston Mus., 5, 1909, pp. 61-62, 66.

Witmer Stone.

1914. Fishes from Pocotaligo River, South Carolina. <Copeia, No. 10, 1914, pp. 1-2.

W. W. Welsh.

1916. Notes on the fishes of the Peedee River basin, North and South Carolina. <Copeia, 33, July 24, 1916, pp. 54-56.

Henry W. Fowler.

1921. Description of a new cyprinoid fish (*Notropis stonei*) with notes on other fishes obtained in the United States. <Proc. Acad. Nat. Sci. Phila., 1920 (March 4, 1921), pp. 385-402. (South Carolina fishes, pp. 391-393: *N. stonei* described from the Pocotaligo.)

1922. Records of Fishes for the Eastern and Southern United States. <L. c., 74, 1922, pp. 1-27, 2 pls. (South Carolina fishes, pp. 14-15.)

Elops saurus Linnæus.

South Carolina (Holbrook).

Brevoortia tyrannus (Latrobe).

South Carolina (Norcom).

Synodus fœtens (Linnæus).

South Carolina (Holbrook).

Ameiurus platycephalus (Girard).

Paratype of *Pimelodus platycephalus* Girard, from Anderson.

Fundulus majalis (Walbaum).

Hilton Head and Charleston.

Fundulus heteroclitus (Linnæus).

Charleston.

Mollienisia latipinna Le Sueur.

South Carolina (Holbrook).

Mugil cephalus Linnæus.

South Carolina (Corse).

Scomberomorus maculatus (Mitchill).

South Carolina (Holbrook).

Trichiurus lepturus Linnæus.

Hilton Head.

Vomer setapinnis (Mitchill).

South Carolina. Hilton Head.

Selene vomer (Linnæus).

South Carolina (Blanding).

Trachinotus carolinus (Linnæus).

South Carolina (Holbrook).

Chloroscombrus chrysurus (Linnæus).

South Carolina (Holbrook).

Pomoxis sparoides (Lacépède).

South Carolina (Holbrook).

Eucentrarchus macropterus (Lacépède).

South Carolina (Blanding).

Lepomis auritus (Linnæus).

South Carolina (Holbrook).

Lepomis incisor Valenciennes.

South Carolina.

Micropterus salmoides (Lacépède).

South Carolina (Wilson and Blanding).

Garrupa nigrita (Holbrook).

Type of *Serranus nigritus* Holbrook, from Charleston.

Centropristis striatus (Linnæus).

South Carolina (Holbrook).

Centropristis philadelphicus (Linnæus).

South Carolina (Holbrook).

Rypticus bistrispinis (Mitchill).

Type? of *Rhypticus maculatus* Holbrook, from South Carolina.

Hæmulon sciurus (Shaw).

South Carolina (Holbrook).

Hæmulon plumieri (Lacépède).

South Carolina (Holbrook).

Orthopristis chrysopterus (Linnæus).

South Carolina (Holbrook).

Stenotomus chrysops (Linnæus).

South Carolina (Holbrook).

Lagodon rhomboides (Linnæus).

South Carolina (Holbrook).

Cynoscion regalis (Schneider).

South Carolina (Holbrook).

Sciænops ocellatus (Linnæus).

South Carolina (Holbrook).

Leiostomus xanthurus Lacépède.

South Carolina (Holbrook).

Menticirrhus americanus (Linnæus).

South Carolina (Holbrook).

Menticirrhus littoralis (Holbrook).

South Carolina (Holbrook).

Chætodipterus faber (Broussonet).

Hilton Head.

Chilomycterus schœpfi (Walbaum).

Hilton Head.

Astroscopus y-græcum (Cuvier).

Hilton Head.

Gobiesox strumosus Cope.

Types, from Hilton Head.

Hypleurochilus geminatus (Wood).

Type of *Blennius geminatus* Wood, from Charleston.

Hypsoblennius hentz (Le Sueur).

Types of *Blennius punctatus* Wood, from Charleston.

Chasmodes novemlineatus (Wood).

Type of *Pholis novemlineatus* Wood, from Charleston harbor.

Chasmodes bosquianus (Lacépède).

Charleston (Bache).

Rissola marginata (De Kay).

Hilton Head.

TENNESSEE.

A list of Cope's material, still in the Academy, is given below.

A bibliography in detail is given in Evermann's 1918 paper, so that its title is sufficient.

BARTON W. EVERMANN.

1918. The fishes of Kentucky and Tennessee: a distributional catalogue of the known species. <Bull. Bur. Fishes., 35, 1915-1916, January 10, 1918, pp. 295-368. (List of 171 species, largely from Tennessee.)

Ichthyomyzon concolor (Kirtland).

Clinch River.

Campostoma anomalum (Rafinesque).

Coal Creek and South Fork of the Cumberland.

Semotilus atromaculatus (Mitchill).

South Fork of the Cumberland.

Leuciscus vandoisulus Valenciennes.

Coal Creek.

Notropis procne longiceps (Cope).

Coal Creek and South Fork of the Cumberland.

Notropis galacturus (Cope).

Coal Creek and South Fork of the Cumberland.

Notropis cornutus (Mitchill).

Coal Creek.

Notropis coccogenis (Cope).

Coal Creek.

Notropis luciodus (Cope).

Cumberland River.

Notropis telescopus (Cope).

Coal Creek and Cumberland River.

Notropis micropterix (Cope).

Coal Creek.

Notropis umbratilis ardens (Cope).

South Fork of the Cumberland.

Hybopsis amblops (Rafinesque).

Coal Creek.

Hybopsis kentuckiensis (Rafinesque).

Coal Creek.

Catostomus nigricans Le Sueur.

Cumberland River.

Moxostoma aureolum (Le Sueur).

Tennessee.

Fundulus catenatus (Storer).

Coal Creek and Clinch River.

Ambloplites rupestris (Rafinesque).

Clinch River.

Lepomis megalotis (Rafinesque).

Coal Creek.

Lepomis incisor Valenciennes.

Coal Creek.

Micropterus dolomieu Lacépède.

Coal Creek.

Micropterus salmoides (Lacépède).

Coal Creek and Clinch River.

Percina caprodes (Rafinesque).

South Fork of Cumberland River.

Etheostoma blennioides Rafinesque.

South Fork of Cumberland River and Clinch River.

Crystallaria asprella (Jordan).

South Fork of Cumberland River.

Pœcilichthys maculatus (Kirtland).

South Fork of Cumberland River.

Pœcilichthys cœruleus (Storer).

South Fork of Cumberland River.

GEORGIA.

A small collection presented by Cope, who obtained it from Jordan. The specimens were labeled from the Etowah River near Rome, and the species listed below without locality are intended to convey this.

The following is a bibliography of the fishes of Georgia:

JOHN E. HOLBROOK.

1847. Southern ichthyology; or a description of the fishes inhabiting the waters of South Carolina, Georgia and Florida. <New York and London, 32 pp., 4 pls.

1855. An account of several species of fish observed in Florida, Georgia, etc. <Journ. Acad. Nat. Sci. Phila., (3) 2, pt. 1, 1855, pp. 47-58.

DAVID S. JORDAN.

1874. A partial synopsis of the fishes of upper Georgia. <Ann. Lyc. Nat. Hist. N. Y., 11, 1874-7, pp. 307-377.

DAVID S. JORDAN and A. W. BRAYTON.

1877. On the distribution of the fishes in the Alleghany region of South Carolina, Georgia and Tennessee, with descriptions of new or

little-known species. <Bull. U. S. Nat. Mus., 12 (pt. 3), pp. 1-95. (Georgia fishes, pp. 29-55, scattered records, pp. 56-70.)

Tarleton H. Bean.

1879. Notes on a collection of fishes from eastern Georgia. <Proc. U. S. Nat. Mus., 2, 1879, pp. 284-286.

David S. Jordan and Seth E. Meek.

1885. Description of *Zygonectes zonifer*, a new species of *Zygonectes* from Nashville, Ga. <Proc. U. S. Nat. Mus., 7, 1884 (1885), p. 482. (A synonym of *Z. nottii* Agassiz.)

Charles H. Gilbert.

1890. Notes on fishes from the lowlands of Georgia, with a description of a new species (*Opsopœodus bollmani*). <Bull. U. S. F. Com., 8, 1888 (1890), pp. 225-229.

Henry W. Fowler.

1921. Description of a new cyprinoid fish (*Notropis stonei*), with notes on other fishes obtained in the United States. <Proc. Acad. Nat. Sci. Phila., 1920 (March 4, 1921), pp. 385-402. (Georgia fishes, pp. 393-394.)

1922. Records of fishes for the Eastern and Southern United States. <L. c., 74, 1922, pp. 17-21. (Georgia fishes, pp. 17-21.)

Lepisosteus osseus (Linnæus).

Liberty County.

Notropis stigmaturus (Jordan).

Paratypes of *Photogenis stigmaturus* Jordan.

Notropis callistius (Jordan).

Paratypes of *Photogenis callistius* Jordan.

Notropis cæruleus (Jordan).

Paratypes of *Photogenis cæruleus* Jordan.

Notropis chrosomus (Jordan).

Paratypes of *Hybopsis chrosomus* Jordan.

Notropis xænocephalus (Jordan).

Paratypes of *Hybopsis xænocephalus* Jordan.

Notropis stibbius (Jordan).

Paratypes of *Nototropis stilbius* Jordan.

Notropis lirus (Jordan).

Paratype of *Nototropis lirus* Jordan.

Phenacobius catostomus Jordan.

Paratype.

Rhinichthys atronasus (Mitchill).

Hybopsis amblops (Rafinesque).

Esox vermiculatus Valenciennes.

Fundulus stellifer (Jordan).

Paratypes of *Xenisma stellifer* Jordan.

Ulocentra stigmæa (Jordan).

Paratypes of *Boleosoma stigmæum* Jordan.

Pœcilichthys jessiæ Jordan.

Chilomycterus schœpfi (Walbaum).

Savannah.

Cottus bairdii Girard.

Paratypes of *Potamocottus zopherus* Jordan.

FLORIDA.

The most extensive collections are from this State. The older specimens were received chiefly from Cope. Other contributors who have given various small lots are F. B. Kirkbride, W. G. Ardis, J. Roosevelt, G. Davidson, J. Wilcox, R. Harlan, F. B. Stevenson, S. Ashmead, William Blanding, Angelo Heilprin, H. A. Pilsbry, S. N. Rhoads, Harrison Allen, C. W. Johnson, Philip Laurent, J. A. G. Rehn, etc. During 1921-1922 Mr. L. L. Mowbray, of the Miami Aquarium, kindly sent a collection of interesting Miami fishes.

Subsequent to the publication of Evermann and Kendall's list in 1900, containing a general bibliography to that time, the following faunal works have appeared:

BARTON W. EVERMANN and WILLIAM C. KENDALL.

1900. Check-list of the fishes of Florida. <Rep. U. S. F. Com., 25, 1899 (1900), pp. 35-103.

HENRY W. FOWLER.

1900. Description of *Ameiurus lacustris okeechobeensis* (Heilprin). <Proc. Acad. Nat. Sci. Phila., 1899 (1900), pp. 480-481.

1903. Description of a new gurnard from Florida, with notes on the colors of some other Florida fishes. <L. c., 55, 1903, pp. 326-336.

1906. Some cold-blooded vertebrates of the Florida Keys. <L. c., 58, 1906, pp. 77-113, pls., 3-4. (Fishes, pp. 77-109, pl. 3 and 13 figs.)

1915. Cold-blooded vertebrates from Florida, the West Indies, Costa Rica and Eastern Brazil. <L. c., 1915, pp. 244-269. (Florida fishes pp. 244-251.)

1917. Cold-blooded vertebrates from Florida. <Copeia, 43, April 24, 1917, pp. "26-27" [38-39].

1921. Description of a new cyprinoid fish (*Notropis stonei*), with notes on other fishes obtained in the United States. <Proc. Acad. Nat. Sci. Phila., 1920 (March 4, 1921), pp. 385-402. (Florida fishes, pp. 394-397.)

BARTON A. BEAN.

1902. A rare Whale Shark [Rhinodon]. <Science (n. s.) 15, 1902, p. 353.

HUGH M. SMITH.

1904. A fish new to Florida waters. *Macrorhamphosus scolopax* (Linnæus). <Science (n. s.) 19, 1904, 314.

David S. Jordan.
1904. Notes on fishes collected in the Tortugas Archipelago. <Bull. U. S. F. Com., 22, 1902 (1904) pp. 539-544, 2 pls.

David S. Jordan and Joseph C. Thompson.
1905. The fish-fauna of the Tortugas Archipelago. <Bull. Bur. Fishes., 24, 1905, pp. 231- 256, f.

John T. Nichols.
1910. On two new blennys from Florida. <Bull. Amer. Mus. Nat. Hist. N. Y., 28, 1910, pp. 155-161, fs.
1912. Fish life of a Florida swamp. <Aquarium, 1912, pp. 30-31.
1914. A new swell fish from Florida. <Bull. Amer. Mus. Nat. Hist. N. Y., 33, 1914, pp. 81-83. (*Spheroides harperi* described as new,)
1917. Ichthyological notes from a cruise off southwest Florida, with a description of *Gobiesox yuma*, sp. n. <L. c., 37, 1917, pp. 873-877, pl. 111.

Barton A. Bean and Alfred C. Weed.
1911. An electric ray and its young from the west coast of Florida. <Proc. U. S. Nat. Mus., 40, 1911, pp. 231-232, pls. 10-11.

E. W. Gudger.
1913. Fishing for sharks in Key West harbor. <Journ. Elisha Mitchell Sci. Soc., 29, 1913, p. 9.
—— A second capture of the whale shark (*Rhineodon typus*) in Florida waters. <Science, (n. s.) 38, 1913, p. 270.
—— Summary of work done on the fishes of Tortugas. <Twelfth Year-book Carnegie Inst. Wash., 1913, pp. 176-177.
1914. The nurse sharks of Boca Grande Bay, Florida. <Science (n. s.) 40, 1914, p. 386.
1921. Notes on the morphology and habits of the nurse shark (*Ginglymostoma cirratum*). <Copeia, 98, Sept. 1, 1921, pp. 57-59.

Louis L. Mowbray.
1915. A new species of fish from Florida. <N. Y. Zool. Soc. Bull., 18, No. 6, Nov. 1915, p. 1298. (*Hæmulon chrysopterum* described from Key West.)
1920. Description of a Thunnus believed to be new. <Copeia, 78, Feb. 11, 1920, pp. 9-10, f. (*Thunnus allisoni* described from Miami.)

W. W. Welsh.
1920. Recent records of ribbon-fishes from Florida. <Copeia, 86, Sep. 16, 1920, pp. 79-81.

Ginglymostoma cirratum (Gmelin).

Tortugas.

Eulamia commersoni (Blainville).

West Palm Beach and Gulf of Florida.

Scoliodon terræ-novæ (Richardson).

Bayport.

Sphyrna tiburo (Linnæus).

St. Augustine.

Narcine brasiliensis (Ölfers).

Key West.

Urobatis sloani (Blainville).

Florida. Two fine examples from Miami.

Dasyatis sabina (Le Sueur).

Bayport.

Acipenser brevirostrum Le Sueur.

Bayport.

Lepisosteus osseus (Linnæus).

Bayport.

Lepisosteus platostomus Rafinesque.

West Coast of Florida. Type of *Cylindrosteus megalops* Fowler, from Bayport.

Megalops atlanticus Valenciennes.

Florida.

Elops saurus Linnæus.

West Palm Beach.

Harengula pensacolæ Goode and Bean.

West Palm Beach.

Dorosoma cepedianum (Le Sueur).

Bayport.

Signalosa mexicana (Gunther).

Volusia.

Anchovia brownii (Gmelin).

Tortugas.

Synodus fœtens (Linnæus).

Bayport.

Galeichthys felis (Linnæus).

Bayport.

Ameiurus catus (Linnæus).

Bayport. Types of *Ictalurus okeechobeensis* Heilprin, from the Kissimee.

Schilbeodes gyrinus (Mitchill).

Five from Miami, secured by Rhoads in 1899.

Abramis crysoleucas (Mitchill).

Bayport, Volusia and St. John's River.

Notropis roseus (Jordan).

Northeast tributary of Lake Okeechobee.

Anguilla rostrata (Le Sueur).

Miami and Bayport.

Verma kendalli (Gilbert).

One 170 mm. long from Osprey, secured by Rhoads in 1921.

Mystriophis intertinctus (Richardson).

One 346 mm., same data as last.

Esox americanus (Gmelin).

Volusia.

Esox tridecemlineatus Mitchill.

Florida.

Fundulus similis (Baird and Girard).

Miami River.

Fundulus majalis (Walbaum).

Bayport.

Fundulus grandis (Baird and Girard).

Bayport.

Fundulus chrysotus Holbrook.

Tick Island and Miami.

Fundulus nottii (Agassiz).

Leon County and Walaka.

Fundulus goodei (Jordan).

Miami River and Tick Island.

Lucania venusta (Girard).

Juniper Creek on southwest Lake George.

Cyprinodon variegatus Lacépède.

Miami.

Gambusia affinis (Baird and Girard).

Cotypes of *Gambusia holbrooki* Girard, from Palatka.

Heterandria formosa Agassiz.

Tick Island.

Mollienisia latipinna Le Sueur.

Hernando County, Bayport, Blue Creek in Lake County and Tick Island.

Strongylura notata (Poey).

Bayport.

Strongylura marina (Walbaum).

Bayport.

Hyporhamphus roberti (Valenciennes).

Volusia, St. Augustine, Key West and Point Puellas, West Florida.

Mugil cephalus Linnæus.

Florida and Bayport.

Mugil curema Valenciennes.

Mouth of St. Lucie River.

Oligoplites saurus (Schneider).

Key West.

Caranx crysos (Mitchill).

Two from Miami.

Selene vomer (Linnæus).

Bayport.

Trachinotus glaucus (Bloch).

Miami.

Trachinotus falcatus (Linnæus).

Miami.

Chloroscombrus chrysurus (Linnæus).

Fernandina, from P. Laurent. Also from Miami.

Eucentrarchus macropterus (Lacépède).

Bayport.

Chænobryttus gulosus (Cuvier).

Taylor's Creek in Lake Okeechobee basin, and Volusia.

Lepomis punctatus (Valenciennes).

Cotype of *Lepomis apiatus* Cope, from Volusia. Also material from the Caloosahatchie River.

Lepomis incisor Valenciennes.

Cotype of *Lepomis mystacalis* Cope, from Volusia. Lake Okeechobee and mouth of St. Lucie River.

Eupomotis holbrookii (Valenciennes).

Cotypes of *Xystroplites longimanus* Cope, from Volusia.

Micropterus salmoides (Lacépède).

Bayport, Lake Okeechobee and Caloosahatchie River.

Morone americana (Gmelin).

Bayport.

Duleichthys subligarius (Cope).

Type of *Centropristis subligarius* Cope, from near Pensacola.

Lobotes surinamensis (Bloch).

Miami.

Priacanthus arenatus Cuvier.

Miami.

Lutjanus griseus (Linnæus).

Bayport and Tortugas.

Lutjanus synagris (Linnæus).

Miami.

Hæmulon sciurus (Shaw).

Tortugas.

Hæmulon flavolineatum (Desmarest).

Miami.

Anisotremus virginicus (Linnæus).

Miami.

Lagodon rhomboides (Linnæus).

St. John's River.

Archosargus probatocephalus (Walbaum).

Florida.

Eucinostomus harengulus Goode and Bean.

Bayport.

Gerres olisthostomus Goode and Bean.

Opposite mouth of St. Lucie River.

Cynoscion nebulosus (Cuvier).

Miami.

Micropogon undulatus (Linnæus).

Bayport.

Pomacentrus fuscus Cuvier.

Three from Miami. All dull brown in alcohol, scarcely or little paler below.

Microspathodon chrysurus (Cuvier).

One from Miami, 128 mm.

Abudefduf marginatus (Bloch).

Adult from Miami.

Lachnolaimus maximus (Walbaum).

Miami.

Halichœres garnoti (Valenciennes).

One from Miami 163 mm.

Halichœres bivittatus (Bloch).

Nine from Miami.

Halichœres caudalis (Poey).

One from Miami, 127 mm. long.

Chlorichthys bifasciatus (Bloch).

One from Miami, 102 mm.

Callyodon cœruleus (Bloch).

Miami.

Pseudoscarus guacamaia (Cuvier).

Miami.

Chætodon ocellatus Bloch.

Miami.

Chætodon striatus Linnæus.

Miami.

Pomacanthus paru (Bloch).

Miami.

Holacanthus tricolor (Bloch).

Miami.

Angelichthys ciliaris (Linnæus).

Miami.

Hepatus cœruleus (Schneider).

Miami.

Balistes carolinensis Gmelin.

Stuart.

Monacanthus ciliatus (Mitchill).

Type of *Monacanthus davidsoni* Cope, from Florida.

Monacanthus hispidus (Linnæus).

Florida.

Pseudomonacanthus amphioxys (Cope).

Miami. One 153 mm. long.

Alutera schœpfii (Walbaum).

Miami.

Alutera scripta (Osbeck).

Two from Miami. Spots and lines variable.

Lactophrys triqueter (Linnæus).

Miami.

Lactophrys trigonus (Linnæus).

Tortugas.

Lactophrys tricornis (Linnæus).

Miami.

Chilomycterus atinga (Linnæus).

Tortugas.

Chilomycterus schœpfi (Walbaum).

Bayport, Anclote Bay and Tortugas.

Prionotus punctatus (Bloch).

Tampa Bay.

Prionotus tribulus (Cuvier).

Boca Noga at Little Gasparilla.

Eleotris amblyopsis (Cope).

Five from Miami, obtained by Rhoads in 1899.

Mapo soporator (Valenciennes).

Tortugas.

Leptecheneis naucrates (Linnæus).

Key West and Pensacola.

Malacanthus plumieri (Bloch).

Palm Beach. Adult obtained by Wm. Clark in 1904.

Astroscopus y-græcum (Cuvier).

Pensacola.

Opsanus tau (Linnæus).

Anclote Bay and Point Puellas in Tampa Bay. Adult from Miami.

Auchenopterus fasciatus (Steindachner).

Biscayne Bay.

Phycis floridianus Bean and Dresel.

Young from Manatee River, Tampa Bay.

Platophrys ocellatus (Agassiz).

Miami.

Achirus fasciatus Lacépède.

Lake George.

Symphurus plagiusa (Linnæus).

Manatee River, Tampa Bay.

Histrio histrio (Linnæus).

Tortugas.

Oncocephalus vespertilio (Linnæus).

Key West and Miami.

ALABAMA.

Several specimens in the older collections. The few titles are as follows:

Charles H. Bollman.

1887. Notes on a collection of fishes from the Escambia River, with description of a new species of *Zygonectes*. <Proc. U. S. Nat. Mus., 9, 1887, pp. 462-465. (*Z. escambiae* described.)

Charles H. Gilbert.

1891. Report of explorations made in Alabama during 1889, with notes on the fishes of the Tennessee, Alabama and Escambia Rivers. <Bull. U. S. F. Com., 9, 1889 (1891), pp. 143-159, Pl. 42.

Henry W. Fowler.

1922. Records of fishes for the Eastern and Southern United States. <Proc. Acad. Nat. Sci. Phila., 74, 1922, pp. 1-27, 2 pls. (Alabama fishes, pp. 22-27.)

Cyprinodon variegatus Lacépède.

Alabama.

Chænobryttus gulosus (Cuvier).

Mobile.

Mississippi.

Several specimens are in the old collections and a few subsequent from the U. S. Fish Commission.

The following titles pertain to Mississippi fishes:

Oliver P. Hay.

1881. On a collection of fishes from eastern Mississippi. <Proc. U. S. Nat. Mus., 3, 1881, pp. 488-515. (List of 56 species with 15 described as new.)

David S. Jordan.

1884. Description of a new species of *Hybognathus* (*H. hayi*) from Mississippi. <Proc. U. S. Nat. Mus., 7, 1884 (1885), pp. 545-550.

Barton W. Evermann.

1899. On investigations in Mississippi, Louisiana and Texas. <Rep. U. S. F. Com., 24, 1898 (1899), pp. 287-310, pls. 8-36. (Of the total list of 74 species a number from Mississippi.)

Louis Hussakof.

1914. Fishes swallowed by gar pike. <Copeia, Oct. 15, 1914, No. 11. (*Lepisosteus platostomus* and *Pomoxis sparoides* swallowed by *L. tristœchus*.)

Lepisosteus tristœchus (Schneider).

Mississippi.

Brevoortia tyrannus patronus Goode.

Grand Plains Bayou.

Fundulus pulvereus (Evermann).

Baldwin Lodge.

Lucania venusta Girard.

Grand Plains Bayou.

Cyprinodon variegatus Lacépède.

Baldwin Lodge.

Leiostomus xanthurus Lacépède.

Grand Plains Bayou.

Microgobius gulosus (Girard).

Grand Plains Bayou.

LOUISIANA.

A few old specimens, not previously examined, were received from J. S. Walker.

Three faunal papers have appeared:

DAVID S. JORDAN.

1885. List of fishes collected in the vicinity of New Orleans by Dr. R. W. Shufeldt, U. S. A. <Proc. U. S. Nat. Mus., 7, 1884 (1885), pp. 318-322.

BARTON W. EVERMANN.

1899. On investigations in Mississippi, Louisiana and Texas. <Rep. U. S. F. Com., 24, 1898 (1899), pp. 287-310, pls. 8-36.

FRANK W. WEYMOUTH.

1910. Notes on a collection of fishes from Cameron, Louisiana.

Polyodon spathula (Walbaum).

New Orleans.

Lepisosteus tristœchus (Schneider).

Mississippi River, Louisiana.

Brevoortia tyrannus patronus Goode.

Mississippi Sound at New Orleans.

Seserinus paru (Linnæus).

Mississippi Sound at New Orleans.

Pomoxis sparoides (Lacépède).

New Orleans.

Bairdiella chrysura (Lacépède).

New Orleans.

Leiostomus xanthurus Lacépède.

New Orleans.

Micropogon undulatus (Linnæus).

New Orleans and Morgan City.

Chilomycterus schœpfi (Walbaum).

New Orleans.

Paralichthys lethostigmus Jordan and Gilbert.

New Orleans.

Achirus lineatus (Linnæus).

New Orleans.

Achirus fasciatus Lacépède.

New Orleans.

Symphurus plagiusa (Linnæus).

New Orleans.

Gobiosoma bosc (Lacépède).

Louisiana.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A SYNOPSIS OF THE GENUS ARREMONOPS.

BY W. E. CLYDE TODD.

The genus *Arremonops* was instituted by Mr. Ridgway some years ago (Man. N. Am. Birds, ed. 2, 1896, 385, 434, 605) for the so-called Texas Sparrow, *Embernagra rufivirgata* of Lawrence, and its conspecies. The name was chosen because of the evident relationship between the forms in question and the members of the genus *Arremon*—a relationship so close, indeed, that Mr. Ridgway was obliged to admit that he "found it difficult to discover reasons for separating them generically from the latter" group, although the propriety of removing them from *Embernagra* was obvious enough. In his "Birds of North and Middle America" (Vol. I, p. 37) he was still unable to assign any structural characters whereby to distinguish the group from *Arremon*, and quite frankly based it on pattern of coloration. Taking this as a criterion, *Arremonops* is a natural and sufficiently compact group, its members agreeing in having the upper parts plain olive green, the pileum striped with black or brown, and the under parts whitish, with the sides and flanks shaded with olivaceous, grayish, or buffy. The discrimination of the several forms, on the other hand, is a matter of no small difficulty, not only because of their general resemblance in form and in details of coloration, but also by reason of the subtle nature of their differential characters, which are brought out plainly enough, however, when series of specimens are compared. In the present paper we recognize seven species and eight additional subspecies, one of which is described as new. The genus divides up into two groups, according to the color of the pileum and crown-stripes. The first group, composed

of *A. conirostris*, *A. striaticeps*, and *A. chloronotus*, ranges from the Guiana frontier of Venezuela westward to Colombia and Ecuador, and thence northward through Central America to the Isthmus of Tehuantepec. The second group comprises *A. tocuyensis*, *A. verticalis*, *A. superciliosus*, and *A. rufivirgatus;* this group, while not known to go beyond the arid coast region of Venezuela, extends considerably farther north, one form passing the Mexican boundary and entering Texas. This one form belongs to the Lower Austral Zone, but all the others are strictly birds of the Tropical Zone wherever found, and most of them are more or less characteristic of certain faunal areas commonly recognized. With the exception of the single form occurring in Texas, little appears to be known of their habits; they would seem, however, to be birds of the more open country, where there are bushes and shrubbery, rather than of the deep forest. *A. conirostris*, described by Bonaparte in 1850, is the oldest known form of the genus, and was referred at the time to *Embernagra*, as were also all the other related forms discovered up to the founding of the genus *Arremonops*. Several of the forms have been very imperfectly understood, and some involved in considerable confusion, mainly owing to lack of sufficient material. We have been fortunate in having had access to good series of specimens, the Carnegie Museum series alone numbering 190 skins, while the authorities of the American Museum of Natural History, the Museum of Comparative Zoology, the U. S. National Museum, and the Bureau of Biological Survey have very generously placed additional material in this group at our disposal, for which courtesy we wish to express our thanks. As in other recent papers by the writer, Mr. Ridgway's "Color Standards and Color Nomenclature" has been adopted as a reference work in dealing with this phase of the study. Measurements, where given, are in millimeters, and the length of the bill is that of the exposed culmen. A full synonymy is omitted, but the first reference under each name is given in every case.

The key which follows is the result of an attempt to arrange the various forms in what appears to be their natural order, but it must be understood that the characters are in large measure comparative rather than absolute, and depend for their value on what is shown by a series of specimens.

Key to the Species and Subspecies of Arremonops.

A. Pileum purer gray (neutral gray to pale neutral gray); lateral crown-stripes purer black.
  a. Above duller green; flanks washed with grayish or buffy.....(*Arremonops conirostris*).
    b. Tail below dull brownish olive; outermost primary margined with grayish or whitish.
      c. Above darker, more yellowish olive, washed with grayish; wings externally dark citrine; gray of head deeper (neutral gray).....*Arremonops conirostris umbrinus*.
      c′. Above brighter, more citrine, washed with grayish; wings externally pyrite yellow; gray of head lighter (light neutral gray).....*Arremonops conirostris conirostris*.
    b′. Tail below dark citrine; outermost primary margined with yellowish green.....*Arremonops conirostris inexpectatus*.
  a′. Above purer green; flanks washed with olive green.
    b. Larger; wing of male over 70 mm.....(*Arremonops striaticeps*).
      c. Gray median crown-stripe wider than black lateral crown-stripes.....*Arremonops striaticeps chrysoma*.
      c′. Gray median crown-stripe not wider than black lateral crown-stripes.
        d. Above duller, more brownish olive green; head paler gray.....*Arremonops striaticeps striaticeps*.
        d′. Above brighter, purer olive green; head darker gray.
          e. Below darker and more distinctly bicolor; flanks with more greenish wash.....*Arremonops striaticeps richmondi*.
          e′. Below paler and more uniform; flanks with less greenish wash.....*Arremonops striaticeps centratus*.
    b′. Smaller; wing of male under 70 mm.....*Arremonops chloronotus*.
A′. Pileum duller gray, buffy gray, or olivaceous; lateral crown-stripes more or less brown, at least posteriorly.
  a. Lateral crown-stripes black, becoming brownish on the nape, or black and brown streaked.
    b. Above more grayish; superciliaries and median crown-stripe pale mouse gray.....*Arremonops tocuyensis*.
    b′. Above more greenish; superciliaries and median crown-stripe light grayish olive.....*Arremonops verticalis*.
  a′. Lateral crown-stripes wholly brown.
    b. Lateral crown-stripes rich brown, in strong contrast with the buffy grayish median stripe.....(*Arremonops superciliosus*).
      c. Above more olivaceous green; below more shaded with buffy.
        d. Lateral crown-stripes darker (deep carob brown); buffy of under parts darker.....*Arremonops superciliosus superciliosus*.

d′. Lateral crown-stripes lighter (carob brown); buffy of under parts purer.....
Arremonops superciliosus sumichrasti.

c′. Above more grayish green; below less shaded with buffy
Arremonops superciliosus sinaloæ.

b′. Lateral crown-stripes dull brown, in slight contrast with the olivaceous median stripe.....(*Arremonops rufivirgatus*).

c. Above darker olive green; breast and sides paler buffy grayish; bill stouter....*Arremonops rufivirgatus crassirostris.*

c′. Above paler olive green; breast and sides deeper buffy grayish; bill weaker....*Arremonops rufivirgatus rufivirgatus.*

Arremonops conirostris umbrinus, subsp. nov.

Type, No. 90,509, Collection Carnegie Museum, adult male; Santa Elena, Merida, Venezuela, August 11, 1922; M. A. Carriker, Jr.

Subspecific characters.—Similar to *Arremonops conirostris conirostris,* but decidedly darker throughout, the top and sides of the head neutral gray, and the upper parts in general, wings, and tail dark yellowish olive.

Range.—Humid Tropical Zone of the Lake Maracaibo region, western Venezuela.

Remarks.—The characters applying to this form hold good in a series of twenty-one specimens from several localities in the region south of Lake Maracaibo. Probably it extends all around the lake, except to the northward, its range thus coinciding with that of several other forms which have been described from this region, and which have similarly undergone modification upon entering the Humid Tropical Zone.

Arremonops conirostris conirostris (Bonaparte).

A[rremon] conirostris Bonaparte, Consp. Avium, I, 1850, 488 ("Brazil" [=?"Bogotá," Colombia, fide Hellmayr and von Seilern]).

Arremonops venezuelensis Ridgway, Auk, XV, (May 13), 1898, 228 (Puerto Cabello, Venezuela).

Arremonops conirostris canens Bangs, Proc. Biol. Soc. Washington, XII, (June 3), 1898, 140 ("Santa Marta," Colombia).

Range.—Venezuela (except region around Lake Maracaibo) westward to the Magdalena and Sinu Valleys in Colombia, in the Tropical Zone, and southward along the eastern base of the Andes to about 4° north latitude.

Remarks.—After extended comparison of an ample series we are unable to appreciate any decided or constant differences between specimens from various parts of the range of this, the typical form, such variations as there are being mainly attributable to season and individual. Specimens from the Guiana frontier and the Caura Valley in Venezuela are not certainly distinguishable from others coming from the Santa Marta region and Magdalena Valley in Colombia, and these in their turn are not to be told from birds from the base of the Eastern Andes at Buena Vista and Villavicencio, which may be considered topotypical, if we accept Messrs. Hellmayr and von Seilern's designation of a type-locality. A series from farther north

along the east base of the range, in the State of Boyaca, however, have the under parts in general more grayish, and the flanks and crissum less buffy; they thus tend in the direction of *umbrinus*, although cut off therefrom by the Andes of Venezuela.

Bonaparte attributed his *Arremon conirostris* to Brazil, which was of course a mistake. Sclater recorded it from Colombia, and its range was presently extended to include Venezuela also. Mr. Ridgway, misled by the treatment of other authors, unfortunately applied Bonaparte's name to the Panama bird subsequently called *Embernagra striaticeps* by Lafresnaye, and re-described the present species as *Arremonops venezuelensis*. A few weeks later Mr. Bangs made a similar mistake, comparing his new form *canens* from the Santa Marta region of Colombia with what he supposed was typical *conirostris*. His type-specimen, which we examined at one time, is an unusually large and richly colored individual, but is approached by others from within the range of *conirostris*. Although the writer called attention to the status of these names some ten years ago (Annals Carnegie Museum, VIII, 1912, 199), he was uncertain as to the proper application of the name *conirostris*, mainly because of its assigned type-locality, but with this point cleared up there can be no reasonable doubt but that *venezuelensis* and *canens* will both fall as synonyms of *conirostris*.

Arremonops conirostris inexpectatus Chapman.

Arremonops conirostris inexpectata Chapman, Bull. Am. Mus. Nat. Hist., XXXIII, 1914, 181 (below Andalucia, Eastern Andes, Colombia, altitude 3,000 feet).

Range.—Known only from the type-locality, near the headwaters of the Magdalena River, Colombia.

Remarks.—This form differs from typical *conirostris* chiefly in the brighter coloration of its wings and tail, the other characters ascribed to it failing to hold good in a series. The tail is fully as yellowish green (nearest dark citrine) as in *A. striaticeps chrysoma*, while the wings, at least in fully adult birds, are as brightly yellow. The upper parts in general, however, are yellowish olive, almost as in *umbrinus*, with much grayish wash. The bill is dark colored throughout. The form thus stands midway in its characters between *conirostris* and *chrysoma*, but not in its geographical range. So far as known it is confined to the region at the headwaters of the Magdalena River in Colombia, while typical *conirostris* occupies the valley of that stream lower down. Dr. Chapman remarks that this is the only known case in which a species common to both these respective regions has developed a geographic variant in the former section. *A. striaticeps chrysoma*, on the other hand, occupies the Pacific slope of Ecuador and Colombia, and does not even enter the Cauca Valley. Intergradation between *chrysoma* and *inexpectatus* is thus virtually out of the question, at least in this particular part, and we are left to conjecture why a form with such characters should have been developed in a region having no other peculiar forms.

Arremonops striaticeps chrysoma (Sclater).

Embernagra chrysoma Sclater, Proc. Zool. Soc. London, 1860, 275 (Babahoyo, Ecuador).

Range.—Pacific slope of Ecuador and Colombia, in the Tropical Zone.

Remarks.—For a long time it was supposed that this bird was confined to western Ecuador, whence it was first made known by Sclater over sixty years ago. Dr. Chapman's researches in Colombia led to its discovery in the extreme southwestern part of that country, and still more recently Mr. Carriker has found it at Sautata, in the valley of the lower Atrato River, indicating that it probably occurs in the intervening region as well. Specimens from this part are absolutely identical with a series from Ecuador, and show no approach whatever to the characters of *conirostris*. This Atrato record tends to close the gap between *chrysoma* and *striaticeps*, while at the same time suggesting that these two forms are specifically distinct from *conirostris*, which has been traced as far west as the Rio Sinu. The color-pattern is the same in both groups, but the colors themselves are different, being much more intense in *chrysoma*, especially on the back, wings, and tail; the size is larger in the latter also. The back in *chrysoma* is a uniform clear green (between warbler green and dark citrine), while the edge of the wing and the under coverts are lemon chrome; there is always more or less greenish wash on the flanks, and the tail below is decidedly greenish.

Arremonops striaticeps striaticeps (Lafresnaye).

Embernagra striaticeps Lafresnaye, Rev. et Mag. Zool., 1853, 61 (Panama).

Range.—Panama (exact limits of range unknown).

Remarks.—When Mr. Ridgway described his *Arremonops richmondi* from Nicaragua in 1898 he compared it with Panama specimens, which he inadvertently referred to *conirostris*, at the same time describing the latter under a new name, *venezuelensis*. This latter error we discovered and corrected some years ago, but the full implication of the error, so far as the Panama form was concerned, seems to have escaped notice. Panama specimens differ from Costa Rican just as Mr. Ridgway says, *i. e.*, in being duller, more brownish olive green above, with paler grayish head, and paler, more whitish, less grayish under parts. The black stripes of the pileum average narrower also. Compared with *chrysoma* of western Ecuador and Colombia, they have the crissum paler, more buffy, less yellowish, and the flanks and tibiæ with less yellowish green wash; the dark stripes on the pileum are wider, leaving the median gray crown-stripes narrower. These three forms are evidently conspecific, and will take for their specific name *striaticeps* of Lafresnaye, based on the bird of Panama.

Arremonops striaticeps richmondi Ridgway.

Arremonops richmondi Ridgway, Auk, XV, (May 13), 1898, 228 (Greytown, Nicaragua).

Range.—Southern Honduras (Segovia River) to Chiriqui.

Remarks.—In this form the gray of the head and under parts is deeper,

and the black crown-stripes are decidedly wider than in *striaticeps* or *chrysoma*; the green of the upper parts is purer, less brownish in tone than in the former, and rather deeper than in the latter. Specimens from the Caribbean slope of Costa Rica are perhaps a trifle darker than those from the Pacific slope of that country, with the crown-stripes a little broader; they thus verge toward the Panama race. The name was based on Nicaragua specimens, and the form ranges north to the Segovia River, Honduras. Chiriqui specimens have not been examined in this connection, but are referred here on geographical grounds. Nearly all the published references pertaining to this form appear under the specific name *striaticeps*, with which it was confused until discriminated by Mr. Ridgway in 1898.

Arremonops striaticeps centratus Bangs.

Arremonops conirostris centratus Bangs, Bull. Mus. Comp. Zool., XXXIX, July, 1903, 156 (Ceiba, Honduras).

Range.—Known only from the type-locality, on the north coast of Honduras.

Remarks.—This proves on examination of the type-series (three specimens) to be a rather poor form, scarcely worthy of formal recognition, additional specimens being needed to confirm its validity. In describing it Mr. Bangs must have compared it with true *striaticeps* from Panama, instead of with *richmondi* from Nicaragua and Costa Rica, to which form it is certainly very close. There is practically no difference in the color of the upper parts between *centratus* and *richmondi*, except that the slight brownish wash on the inner remiges, evident in most specimens of the latter, appears to be wanting. The under parts are a little paler and more uniform (not darker, as intimated in the description), while the flanks have less greenish wash and the crissum rather less buffy. The size averages a little smaller too, the bill tending to be shorter in proportion, but in some specimens of *richmondi* it is fully as small.

Arremonops chloronotus (Salvin).

Embernagra chloronota Salvin, Proc. Zool. Soc. London, 1861, 202 (Choctum, Vera Paz, Guatemala).

Range.—Northern Honduras, north and west to the Isthmus of Tehuantepec, in the Tropical Zone.

Remarks.—The relationships of this form are clearly with the *striaticeps* group, the range of which it approximates on the south. It is in fact merely a smaller and little darker edition of *A. striaticeps richmondi*, and might indeed be considered as conspecific with that bird. The bill is relatively as well as absolutely shorter than in *richmondi*, however, and the black stripes on the pileum are narrower, and in some specimens indistinctly streaked with brownish. It was discovered by Salvin during his ornithological explorations in Guatemala, and has subsequently been traced into Honduras, British Honduras, and the southeastern States of

Mexico, not entering the Pacific drainage, however, nor going much if any above 2000 feet elevation.

Arremonops tocuyensis Todd.

Arremonops tocuyensis Todd, Ann. Carnegie Mus., VIII, 1912, 198 (Tocuyo, Lara, Venezuela).

Range.—Arid coast region of Venezuela and Colombia, from the State of Lara to the Goajira Peninsula.

Remarks.—*Arremonops tocuyensis* is a very distinct species, belonging to that section of the genus in which the pileum is paler gray, and the stripes tend to be brown or brownish. It has nothing to do with *A. conirostris*, although their respective ranges certainly approximate each other very closely, if indeed they do not actually overlap. It is apparently most closely related to *A. verticalis* of Yucatan, from which it differs in rather smaller size, relatively stouter bill, grayer, less greenish coloration, and blacker head-stripes. These latter are black in front, but more or less mixed with brown posteriorly. The species was described by the present writer from a single specimen taken by Mr. M. A. Carriker, Jr., at Tocuyo, a point located west of Barquisimeto, in the State of Lara, Venezuela. The same party subsequently secured a series at Riohacha, in the Goajira district of Colombia, while Mr. George K. Cherrie has found it in the Paraguana Peninsula of Venezuela. These records enable us to predicate its range as the Arid Tropical Zone in the region around the Gulf of Maracaibo.

Arremonops verticalis (Ridgway).

[*Embernagra rufivirgata*] γ. *verticalis* Ridgway, Proc. U. S. Nat. Mus., I, 1878, 248, 249 (Merida, Yucatan).

Range.—Northern Yucatan and Campeche, Mexico.

Remarks.—Originally described by Mr. Ridgway as a race of *A. rufivirgatus*, this form is now considered to be specifically distinct, differing in its darker crown-stripes, grayer head, and whiter under parts. From *A. chloronotus*, with which it was at one time confused, it is still more different. Its relationships appear to lie with *A. tocuyensis*, despite the gap existing between their respective ranges. It occupies a comparatively restricted area in northern Yucatan, and has been traced southward into Campeche by Messrs. Nelson and Goldman.

Arremonops superciliosus superciliosus (Salvin).

Embernagra superciliosa Salvin, Proc. Zool. Soc. London, 1864, 582 (Bebedero, Costa Rica).

Range.—Northwestern Costa Rica, in the region around the Gulf of Nicoya.

Remarks.—In its broad and rich dark brown crown-stripes this form possesses a good distinctive character. It was originally compared with *A. chloronotus*, but is obviously much more closely related to *A. rufivirgatus*, which may be considered its Gulf coast representative, the two agree-

ing well in size and proportions, although sufficiently different in details of coloration. True *superciliosus* is confined to the Pacific slope of Costa Rica, in the region around the Gulf of Nicoya.

Arremonops superciliosus sumichrasti (Sharpe).

E[mbernagra] sumichrasti Sharpe, Cat. Birds Brit. Mus., XII, 1888, 762, in text ("Huamela," *i. e.*, Huamelula, Oaxaca, Mexico).

Range.—Pacific coast region of southern Mexico, from Chiapas to Colima.

Remarks.—This race differs from the typical one in the slightly more greenish, less grayish color of its upper parts, in the more decidedly buffy suffusion of the under surface, and in particular by the lighter color of the crown-stripes, which are nearer chestnut brown than carob brown. Some individual specimens, it is true, are scarcely to be told apart, but in series the differences between the two are sufficiently obvious. No form of this species is known to occur between western Costa Rica and the western border of Chiapas, and if this gap in the range is actual and not merely apparent it is not surprising to find that racial differences are involved. The present form was provisionally described by Sharpe in 1888, on the basis of a single specimen collected by Sumichrast, and the separation was later confirmed by Mr. Nelson (Auk, XV, 1898, 157), after examining a series.

Arremonops superciliosus sinaloæ Nelson.

Arremonops superciliosa sinaloæ Nelson, Proc. Biol. Soc. Washington, XIII, 1899, 28 (near Mazatlan, Sinaloa, Mexico).

Range.—Coast region of western Mexico, in southern Sinaloa and Tepic.

Remarks.—*Arremonops superciliosus sinaloæ* is the northern representative of *A. s. sumichrasti*, inhabiting the Arid Tropical Zone in Sinaloa and Tepic. It differs from that form in its paler, duller coloration, the upper parts in general, and the median crown-stripe in particular, being more tinged with gray, while the lateral crown-stripes are paler (Mars brown) and narrower. There is less buffy suffusion on the lower parts also, but this may be seasonal, in part at least, in so far as the specimens at hand are concerned, which were all collected in the months from April to July. There is a specimen of this form in the collection of the Academy of Natural Sciences of Philadelphia, recorded by Baird under "*Embernagra*" *rufivirgata*, three (the type-series) in the collection of the Biological Survey, and two in the collection of the American Museum of Natural History, received from J. H. Batty. So far as we are aware these are the only known specimens.

Arremonops rufivirgatus crassirostris (Ridgway).

[*Embernagra rufivirgata*] *β. crassirostris* Ridgway, Proc. U. S. Nat. Mus., I, 1878, 248, 249 (Mexico; exact locality not stated).

Range.—Coast region of eastern Mexico, in the States of Vera Cruz, Puebla, and Oaxaca.

Remarks.—This is a dark, richly colored form, readily separable from true *rufivirgatus* by its pronounced greenish upper parts (between dark citrine and medal bronze) and strongly buffy brown shaded under parts. The bill, too, is obviously stouter, which character led Baird to apply the specific name as a manuscript designation to Mexican specimens in the National Museum collection, which name was adopted and formally published by Mr. Ridgway in 1878. According to Sumichrast it ranges up to 1200 meters in the State of Vera Cruz, but nothing is on record concerning its habits.

Arremonops rufivirgatus rufivirgatus (Lawrence).

Embernagra rufivirgata Lawrence, Ann. Lyc. Nat. Hist. N. Y., V, 1851, 112, pl. 5, fig. 2 ("Rio Grande" [=Brownsville], Texas).

Range.—Northeastern Mexico, in States of Tamaulipas, San Luis Potosi, and Nuevo Leon, north to San Patricio County, Texas, in the Lower Austral Zone.

Remarks.—The original description of this bird was based on specimens collected by Capt. J. P. McCown, U. S. A., while stationed on the Texan frontier. Baird recorded it from Nuevo Leon, Mexico, some years later, and in more recent years it has been determined to be a common and characteristic bird in what has been called by Allen the Tamaulipan Fauna, extending north to Corpus Christi, Texas. Merrill was the first author to give an account of its nesting, and his account has been confirmed by Sennett and others. Intergradation between the present race and *crassirostris* takes place in southern Tamaulipas, also in Nuevo Leon and San Luis Potosi, but Texan specimens are very distinct from that form, being much paler and grayer, and with a smaller and slenderer bill.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW SPECIES OF OTIOCERUS (HOMOPTERA; FULGORIDAE).

BY W. L. McATEE.

The species made known herein is distinct not only in color from all of the eleven previously described nearctic species of the genus but differs also in at least one important structural detail (from 8 species seen), the head viewed from the side being very obtuse and evenly rounded in front,[1] instead of having the frontal process more or less angulate above. The species belongs to the section of the genus in which the antenna has a single palpiform appendage. The venation is almost precisely as in *O. stollii* Kirby.

Following the custom of dedicating species in this genus to prominent hemipterists, I take pleasure in naming the present form for Dr. E. D. Ball, who has introduced to science numerous interesting Fulgoridae including some of the subfamily (Derbinae) to which Otiocerus belongs. It is the hope of hemipterists in general that Dr. Ball may be enabled from time to time to interrupt his administrative duties sufficiently to give us further results of his mature experience in the Homoptera, exemplified by his recent lucid synopsis of the genus *Gypona*.

Otiocerus ballii, new species.

Structural characters as noted above and as consonant with the generic assignment. Male genital segment with a median triangular process rounded apically, claspers widely separated at base, the general trend of their inner margins toward each other, overlapping at apices which are pointed and recurved, each clasper bearing on inner margin at about a third of its length from base a short, broad process, the posterior angle of

[1] Fowler describes in the Biologia Centrali-Americana some species having this character.

which is produced as an upwardly and anteriorly curved hook; oedeagus narrowed opposite these processes, its apex with two anteriorly directed tapering, curved and acutely pointed processes. Female genital segment broadly triangularly produced.

General color pale yellowish; antennae and a broad vitta along entire side of head, continued over side of thorax onto corium where it narrows and terminates at end of basal third, scarlet; beginning near base of corium, irregular dusky spots nearly fill the cells of remainder of tegmen except clavus, costal cell, the extreme apex, and a few large hyaline areas in disk of the posterior expanded portion; in the clear cells at the apex of tegmen are 3 or 4 more distinct dark spots; veins of the yellowish parts of tegmen concolorous, of the spotted part, red; outer apical angle with several irregular scarlet and one round black spot; hind-wings whitish hyaline, veins red.

Length: 8–9 mm.

Holotype ♂ (Coll. E. D. Ball) and 2 other ♂'s. Glen Echo, Md., August 22, 1922; Allotype, Glen Echo, Md., July 23, 1921, all collected by J. R. Malloch; 2 ♂'s from Uhler collection labelled September 19, and 27, also probably from Maryland (U. S. Nat. Mus.).

The opportunity is taken of presenting a key based chiefly on descriptions of the species of *Otiocerus*. This may prove an aid in identifying these forms, but it is in no sense intended as a contribution to knowledge of the group. This genus like many in the Fulgoridae could well be revised on the basis of genitalic and other structural characters.

Tegminal Coloration of Otiocerus.

A. Without distinct red or dark markings other than veins.
  B. Almost entirely dusky (hind-wings also), veins red *stollii* Kirby.
  BB. Lutescent, veins red . . . . . *schellenbergii* Kirby.
AA. With distinct red or dark markings other than veins.
  C. With red markings only, these chiefly in the form of a vitta along claval suture forking at end of clavus, sending one branch along radial margin and another to outer apical angle . . . . . *coquebertii* Kirby.
  CC. With dark markings, sometimes red ones also.
    D. Dark markings chiefly in the form of vittae or bands.
      E. A faint band from apex of clavus obliquely across to costal margin, and faint clouds at inner apical angle . . . . . *kirbyii* Fitch.
      EE. Dark markings more extensive.
        F. In addition to a vitta, 5 definite dark spots are present in basal half of tegmen.
          G. Vitta broader, percurrent *reaumurii* Kirby.
          GG. Vitta narrower, broken at apex of clavus . . . . . *wolfii* Kirby.

GGG. Vitta forked at apex of clavus (as in *coquebertii*) . . . . *signoretii* Fitch.
(These three may be one species.)
FF. Only one dark spot (that in clavus); a dark vitta above claval suture to its apex, thence to outer apical angle; numerous dark spots on inner apical angle *amyotii* Fitch.
DD. Dark markings chiefly in the form of spots.
H. Base of corium without spots.
I. Spots irregular in shape, aggregated, covering most of tegmen except clavus . . . . *ballii* n. sp.
II. Spots chiefly round, widely spaced, one in clavus *abbotii* Kirby.
HH. Spots distributed over the entire tegmen.
J. Spots forming series in the cells; abdomen without black spots *degeerii* Kirby.
JJ. Spots not in series in the cells, some of them grouped in an oblique vitta; abdomen spotted *francilloni* Kirby.

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PROCEEDINGS

OF THE

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A NEW DRYOPTERIS FROM DOMINICA.[1]

BY WILLIAM R. MAXON.

The following new species is one of a small lot of ferns recently collected by Prof. L. H. Bailey in the island of Dominica and submitted to the writer for identification.

Dryopteris mollicella Maxon, sp. nov.

Rhizome suberect, curved, 4 cm. long, nearly 1 cm. thick, with copious coarse roots, closely paleaceous at the included apex, the scales 2.5 to 4 mm. long, narrowly ovate-oblong, acuminate, bright brown, thin, minutely grayish-strigose, entire. Fronds 7 or 8, 20 to 30 cm. long, ascending, borne in a close crown; stipes very short (2 to 3 cm. long), dull olivaceous, densely grayish-puberulous, the hairs very short, stiff, pointed, mostly retrorse; blades pinnate-pinnatifid, lance-elliptic, 18 to 28 cm. long, 6 to 8 cm. broad near the middle, long-acuminate at apex (the tip subcaudate), rather abruptly narrowed at base, with 4 or 5 pairs of reduced pinnae, the lowermost ones vestigial; rachis paler than the stipe, similarly puberulous; larger (medial) pinnae alternate, spreading, 1.5 cm. apart, narrowly oblong, 3 to 4 cm. long, 8 to 10 mm. broad, sessile, slightly falcate toward the long-acuminate subentire apex, symmetrical, pinnatifid to within 1 or 1.5 mm. of the costa; costa elevated above, sulcate, densely hispidulous-strigose, elevated beneath only toward the base, freely and minutely puberulous; upper leaf surface copiously yellowish-strigose throughout, the hairs pointed, glistening, extending to the ciliolate margins; lower leaf surface evenly short-puberulous throughout (the hairs whitish, spreading) and sparingly glandulose, the glands small, globose, yellowish-hyaline, subpersistent; segments 10 or 12 pairs, subequal, slightly oblique, close, oblong, 2 to 2.5 mm. broad, rounded-obtuse (or slightly pointed distally), membranous, plane, dull green; veins simple, 4 or 5 pairs, very oblique (less than 45°), extending to the margin, slightly elevated, whitish in the outer part; sori small, 3 or 4 pairs, medial; sporangia few, non-setose; indusium very small but persistent, consisting mainly of a tuft of white setiform hairs.

Type in the U. S. National Herbarium, No. 1,049,536, collected in the island of Dominica, British West Indies, April, 1922, by L. H. Bailey (No. 771). A second, less fertile specimen is in Professor Bailey's herbarium.

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

In Christensen's monograph of *Dryopteris* this species runs directly to a small group (in the subgenus Lastrea) in which the blade is short-attenuate at the base (Type I), with a few pairs of reduced pinnae, the sporangia non-setose, the leaf tissue membrano-herbaceous, and the rachis densely puberulous with very short hairs; that is, the subgroup of *D. nockiana* (Jenman) C. Chr., containing five Andine and West Indian species. Of these it is related closely only to *D. muzensis* Hieron., of Colombia, which it resembles especially in its copiously short-strigose upper surfaces and vestigial pilose indusia. It differs from *D. muzensis* strongly in its lesser size, small, close segments, fewer and more oblique veins (half as many per segment as in *D. muzensis*), and uniform short whitish puberulous covering beneath, the hairs of the costae and costules not strongly oblique or appressed as in *D. muzensis*.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THREE NEW COMPOSITES FROM BOLIVIA.

BY S. F. BLAKE.

Recent study of the material of the family Asteraceae (except that belonging to the tribes Vernonieae and Eupatorieae) collected by the members of the Mulford Biological Exploration of the Amazon Basin has led to the recognition of three new species. All of these are from the pampas along the Rio Beni or its tributaries, to the east of the Andean chain, and all are of interest from the fact that they are most closely allied to species known only from central and southern Brazil or the regions southward. Another composite, *Chaenocephalus heterophyllus* Griseb., collected by the same expedition at Huachi, Bolivia, altitude 915 meters, has been previously known only from Argentina.

Erigeron seneciiformis Blake, sp. nov.

Erect herbaceous perennial, simple below the inflorescence, 0.7 to 1 meter high, the root not seen; stem rather stout, striate-angulate, green, below the inflorescence glabrous or with a few short spreading hairs; leaves alternate, about 8, the lower obovate, 8 to 14 cm. long, 3 to 4.5 cm. wide, obtuse or acutish, narrowed to a sessile base, finely and subremotely callous-denticulate, pergamentaceous, light green, glabrous on both sides or sparsely hirsutulous on costa beneath, hispidulous-ciliolate, featherveined, the whitish costa prominulous beneath, the chief lateral veins 6 to 8 pairs, prominulous or obscure; middle leaves elliptic, clasping, 4.5 to 8.5 cm. long, 0.8 to 1.8 cm. wide; upper leaves remote, bracteiform, 1.5 to 2.5 cm. long, hirsute-ciliate; heads 1.8 cm. wide, radiate, 5 to 22 in a usually close, cymose, terminal panicle, on sparsely spreading-hirsute pedicels 1 to 3.8 cm. long, these subtended by subulate to lance-ovate bracts 1.5 cm. long or less; disk hemispheric, 7 to 8 mm. high, 1.5 cm. thick; involucre 4-seriate, graduate, 7 mm. high, appressed, the phyllaries lanceolate or narrowly oblong-lanceolate, acute or acutish, ciliolate, otherwise glabrous or the outer sparsely hirsutulous, the outer with subherbaceous center and subscarious yellowish margin, the others subscarious and yellowish, marked

with about 3 rows of reddish vittae; receptacle flat, fimbrillate, the fimbriae 0.5 mm. long; flowers "deep dandelion yellow"; rays biseriate, about 67, scarcely surpassing disk, erectish, the tube subglabrous, 2.8 mm. long, the lamina narrowly elliptic, emarginulate, 4 mm. long, 1.1 mm. wide, marked with 3 reddish vittae; disk flowers very numerous, their corollas essentially glabrous, marked with 5 reddish vittae, 5.5 mm. long (tube 1.5 mm., throat cylindric-funnelform, 3.2 mm., teeth ovate, acutish, 0.8 mm.); ray achenes oblong, 1.6 mm. long, hirsute above, elliptic in cross-section, 2- or 3-nerved, the nerves reddish, the pappus bristles 1-seriate, unequal, brownish-tinged, 4.5 mm. long; disk achenes similar, compressed, 2-nerved, their pappus 5 mm. long; style-branches oblong, with deltoid, obtusish, dorsally hispidulous appendages.

Type in the U. S. National Herbarium, No. 1,120,942, collected in open wet grassy pampa, Hacienda Rosario, near Reyes, Bolivia, altitude 305 meters, April 11, 1921, by O. E. White (Mulford Biological Exploration of the Amazon Basin, No. 1206).

A species remarkable for its very short yellow rays, its graduate involucre of subscarious yellowish phyllaries, and its aspect, which is very similar to that of the groundsels of the *Senecio integerrimus* group. It is evidently a member of the Section *Leptostelma* of *Erigeron*, agreeing in structural characters and in habit with the Brazilian *Erigeron maximus* (D. Don) Otto, but differing greatly in its very short yellow rays (those of *E. maximus* being elongate and white, tinged with bluish or purplish) and in numerous details.

Aspilia lucidula Blake, sp. nov.

Suffrutescent, 2 meters high, oppositely branched; stem slender, somewhat compressed, sparsely strigillose, glabrescent below; internodes 7 to 11 cm. long; leaves opposite; petioles slender, usually narrowly marginate above, sparsely strigillose, 8 to 15 mm. long; leaf blades ovate or oblong-ovate, 7.5 to 11 cm. long, 2 to 3.5 cm. wide, falcate-attenuate, cuneate or rounded-cuneate at base, serrate (teeth about 9 to 17 pairs, small, depressed, mostly acute, 2 to 8 mm. apart), thin-papery, somewhat shining above or on both sides, above deep green, evenly and rather sparsely strigillose, smooth to the touch, obscurely bullate in age, beneath green, evenly strigillose, triplinerved slightly above the base, loosely prominulous-reticulate beneath, impressed-veined above; heads solitary in the forks and in terminal cymes of 2 or 3, 1.6 to 2 cm. wide, on strigillose monocephalous peduncles 2.5 to 5 cm. long; disk subglobose, about 7 mm. high, 9 mm. thick; involucre 3-seriate, somewhat graduate, 7.5 mm. high, the phyllaries comparatively few, those of the outermost series lanceolate or lance-oblong, about 2 mm. wide, acute, strigillose, with 3 black nerves below, the indurate base equaled or exceeded by the spreading herbaceous tip; those of the two inner series subequal, oval or obovate-oval, 4 to 5 mm. wide, minutely ciliolate, otherwise glabrous, black-lined and black-dotted, with indurate base and subequal, subscarious, rounded, rather loose apex; rays about 8, neutral, yellow, the lamina oval, bidentate, 8 mm. long, 4 mm. wide; disk corollas yellow, glabrous except for the hispidulous teeth, 5 mm. long (throat 1.5

mm., tube 2.8 mm., teeth 0.7 mm.); pales obtuse or acute, narrowly keeled, hispidulous on keel and on margin above, 5 mm. long; disk achenes narrowly obovoid, 3 mm. long, 1 mm. wide, slightly compressed, hispidulous, without margin or ears; pappus a narrow crown of lacerate squamellae without awns, about 0.5 mm. high and wide.

Type in the U. S. National Herbarium, No. 1,120,940, collected at Rurrenabaque, on the Rio Beni, District of Caupolicán, Province of Beni, Bolivia, altitude 305 meters, October 1, 1921, by H. H. Rusby (Mulford Biological Exploration of the Amazon Basin, No. 758).

Apparently nearest the Brazilian *Aspilia podophylla* Baker, which, according to the description, has smaller, glabrous leaves, longer involucre, and glabrous achenes.

Calea rhombifolia Blake, sp. nov.

Erect herbaceous perennial, 45 to 58 cm. high, the root not seen; stem simple, slender, striatulate, rather densely hirsute with several-celled wide-spreading hairs, sparsely sessile-glandular, and also toward apex densely hirsutulous; nodes 3 to 6, the internodes 3 to 10 cm. long; lowest leaves or rarely all opposite, the 1 to 3 upper nodes usually bearing a whorl of 3 or 4 leaves; leaves sessile, the upper larger, rhombic, broadest at the middle, 6.5 to 11.5 cm. long, 1 to 2.5 cm. wide, acuminate, narrowly cuneate and entire for the lower third of their length, elsewhere sharply dentate-serrate with 7 to 15 pairs of triangular acute or obtusish teeth, firm-pergamentaceous or subcoriaceous, nearly equally green on both sides, above harshly hirsute with several-celled strongly tuberculate-based hairs, beneath harshly hirsute on all the veins and veinlets with scarcely tuberculate-based hairs, glabrous on the surface, triplinerved 1.5 to 3 cm. above the base, densely prominent-reticulate beneath, prominulous-reticulate above; lower leaves much smaller, elliptic or cuneate-elliptic, 2 to 4.5 cm. long; peduncle about 25 cm. long, naked or with a single bract, bearing an umbelliform cyme of 3 to 6 heads; pedicels densely spreading-hirsutulous, 1.3 to 5.5 cm. long, subtended by linear bracts 1 to 1.5 cm. long; heads 2 to 2.5 cm wide; disk 7 to (maturity) 13 mm. high, 7 to (maturity) 16 mm. thick; involucre 3-seriate, subequal or slightly graduate, appressed, 5 to 7 mm. high, the outer phyllaries oblong-elliptic to oblong-oval, obtuse, herbaceous throughout or indurate at extreme base, about 3-nerved, rather densely hirsute and ciliate, the inner phyllaries oblong, acute or obtuse, ciliate, nearly glabrous on back, with thin subscarious often yellowish tips; rays about 8, golden yellow. fertile, the lamina oblong-cuneate, emarginate or crenate, 9 to 11 mm. long, 3 to 4 mm. wide; disk corollas yellow, glabrous, 6 to 6.5 mm. long (tube 2 mm., enlarged below, throat 3 mm., teeth 1 to 1.5 mm.); pales oblong, glabrous, acute or acuminate, sometimes 3-lobed, lacerate above, 4.5 mm. long; achenes of ray and disk similar, oblong, hispidulous at least at base, 3 mm. long; pappus of about 22 equal, linear-lanceolate, attenuate, hispidulous awns 5.5 mm. long.

Type in the U. S. National Herbarium, No. 1,120,944, collected on an open pampa at Lake Rogagua, District of Yacuma, Province of Beni,

Bolivia, altitude 305 meters, October, 1921, by H. H. Rusby (Mulford Biological Exploration of the Amazon Basin, No. 2164).

ADDITIONAL SPECIMEN EXAMINED:

BOLIVIA: Abundant in open pampa, San Pedro, near Reyes, altitude 305 meters, October 25, 1921, *Rusby* 1315.

A member of the *Calea cymosa* group, which has previously been known only from Brazil, Uruguay, Paraguay, and Argentina. Its closest relative is probably *C. platylepis* Schultz Bip., which has broader leaves, not noticeably rhombic in outline, and densely griseous-pilosulous beneath.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE PAMPA FOX OF THE BOGOTA SAVANNA.

BY GLOVER M. ALLEN.

The small dog-like foxes of the genus *Cerdocyon* are widespread in South America, chiefly at lower altitudes from Patagonia to northern Colombia. They are dwellers in sparsely wooded or savanna country and are nocturnal in habits. At present several races are recognized, all however rather similar in general coloration.

Through exchange with the Instituto de la Salle, at Bogotá, Colombia, the Museum of Comparative Zoology has lately received specimens from the high savanna of Bogotá (altitude 9000 feet), which indicate that the pampa fox of this area is a depauperate pallid race of the lowland *Cerdocyon thous* (Linné). It is well known that a number of other vertebrates of this lofty plateau show characteristic variations from their representatives in neighboring areas. Brother Nicéforo Maria in transmitting the specimens, pointed out that they differ markedly from *Cerdocyon apollinaris* Thomas (Ann. Mag. Nat. Hist., ser. 9, vol. 1, p. 370, 1918) from the more wooded foothills not far to the eastward (type locality Choachi, 5400 feet altitude). For the type specimen of the latter had likewise passed through his hands and was noticeably different in its buffy suffusion throughout, as contrasted with the clear gray of the sides, belly, and feet of the alpine fox. The skulls show more important differences, particularly in the smaller size of the teeth in the latter, and the crowded condition of its upper premolars as a result of the shortened maxilla. It may be distinguished as

Cerdocyon thous germanus, subsp. nov.

Cerdocyon thous (subsp. indet.) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 224, 1916.

Type.—Skin and skull 19850, Museum of Comparative Zoology, from the high savanna of Bogotá, Colombia, altitude 9000 feet.

Description.—General color of upper surface and sides dull gray. The short under fur is pale drab, darkening to a slaty base; the long over-hairs have whitish bases, succeeded by a black then by a white band, and tipped with black. In the dorsal area the two black rings, particularly the terminal one, are more extensive, producing an ill-defined median black stripe, more marked on the tail which is black above in its distal two-thirds and all around at the tip. At the sides of the body and tail the black rings are almost suppressed so that the long hairs are white with fine black tips, or often entirely white. The muzzle, sides of face, throat, and entire under surfaces, including inner side of legs and under side of tail, are whitish, very slightly darkened by the pale-drab under-fur. Chin dusky brown, backs of ears faintly washed with buffy at the base and having a pale brownish area in the center of their upper portion. In the type the feet are pale like the sides, except for the brownish soles of the hind feet, a brownish spot on the metapodials and at the bases of the toes. In a second specimen both fore and hind paws are darker, a grizzled dark brown.

Skull.—The skull of the type is that of an adult but not old animal, with the basal suture just closed, the temporal lyrate area clearly indicated, the parietals roughened for muscle attachment and the permanent dentition well in place but still unworn. Compared with skulls of *C. t. aquilus* (Bangs) from the Santa Marta region to the north, and of *C. t. brasiliensis* (Schinz) from eastern Brazil, that of the Bogotá animal is much smaller, with appreciably smaller teeth. The race *apollinaris*, though geographically not far distant, is described as having the teeth even more robust than those of its neighbors. In the Bogotá skulls the maxillary is absolutely shorter than in the forms mentioned so that a crowding of the premolars results. The first premolar is separated from the canine as usual by a distinct space, but is almost in contact with the second instead of being separated from it by a nearly equal space. The third premolar is even more crowded. In the type it is in contact posteriorly with the fourth, that of the left side is turned strongly inward from the tooth row to be overlapped by the second, while that of the right side is forced outward so as to overlap the second. In another slightly younger skull (M. C. Z. 19849) just acquiring the permanent dentition, both third premolars are forced inward and are overlapped by the second premolars. No such crowding occurs in the other described races. Additional evidence of the unfavorable conditions to which these animals are exposed is seen in the complete suppression of the small third lower molar in the type although in the second skull it can be seen in place but unerupted and partly roofed over by bone as if it were about to be entirely shut in and resorbed.

Measurements.—The skins are unaccompanied by measurements.

The skull of the type measures: condylobasal length 118 mm.; palatal length 59; occiput to front of incisors 125; front of upper canine to back of second molar 51; orbit to premaxillary suture at alveolar level 36; median length of nasals 40; width across upper incisors 15; width outside canines 21; width at outer corners of first upper molars 38; zygomatic width 66;

mastoid width 44; lower tooth row from front of canine to back of second molar 55.

Remarks.—In addition to the two specimens just mentioned, the Museum has a third, a young animal with milk dentition, in which as usually in *Canis*, the first premolar is not present. The American Museum of Natural History possesses a flat skin without skull from the same locality as well as two very young specimens from Fusugasugá, immediately to the south. The occurrence of the species here is taken to indicate that the savanna type of country is attractive to it even though climatic or other conditions are less favorable than those of the lowlands to the eastward where larger size and brighter tints are characteristic of the local races.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

STATUS OF SPERMOPHILA SCHISTACEA LAWRENCE.

BY THOMAS E. PENARD.

In comparing some Gray Seed-eaters from Surinam with a large series of *Sporophila intermedia* Cabanis (= *S. grisea* of authors) from various parts of northern South America, I have particularly noted the shallowness of the maxilla, the darker color of both male and female, and the longer wing and shorter tarsus of the Guiana birds, all suggestive of kinship to the bird described by Lawrence (Ann. Lyc. N. Y., VII, 1862, p. 474) as *Spermophila schistacea*, and listed by Ridgway (Birds of North and Middle America, I, 1901, p. 566) as a subspecies of *Sporophila grisea* under the name *Sporophila grisea schistacea* (Lawrence).

Through the kindness of Dr. Frank M. Chapman of the American Museum of Natural History, I have also been able to compare the Surinam specimens with the type of *Spermophila schistacea* which originally came from Lion Hill Station on the Panama Railroad.

These investigations show that *S. schistacea* is not a form of *S. intermedia*, but a different species, represented in Surinam and French Guiana by a distinct form. In addition to the characters distinguishing *S. schistacea* from *S. intermedia* already pointed out by Ridgway (*l. c.*), I find that the wing formulas of the two species are entirely different, affording an excellent means of identification. The structural characters may be briefly summarized as follows:

Sporophila intermedia.—Maxilla deeper, culmen strongly convex; wing rounded and shorter (less than 60 mm. in the male); *first (outermost) primary comparatively short—shorter than fifth;* tail long; tarsus long (15 mm. or more).

Sporophila schistacea.—Maxilla shallower, culmen not so strongly convex; wing pointed and longer (60 mm. or more in the male); *first (outermost) primary nearly or quite as long as second—very much longer than fifth;* tail short; tarsus short (less than 14.5 mm.).

The Surinam birds possess all the characters of the type of *S. schistacea,* except that the white patches on the sides of the throat of the male are slightly smaller, perhaps less sharply defined, and in some individuals practically obsolete. It is difficult to say whether this character will be found constant, and we certainly would not be justified in separating the Surinam bird on this slight difference. But the females from Surinam are so much darker and so much more olivaceous than a female from Colombia, which I take to be true *schistacea,* that I do not hesitate to describe the Guiana form as a distinct subspecies under the name

Sporophila schistacea arthuri, subsp. nov.

Type.—No. 2,027. Collection of T. E. Penard (now No. 89,377, Museum of Comparative Zoology), adult ♀; Surinam: Lelydorp, 19 October, 1921; collected by Alex Pichot.

Subspecific characters.—Adult female similar to that of *Sporophila schistacea schistacea* (Lawrence), but upper parts darker, much more olivaceous, less brownish; breast band and sides olivaceous brown; middle of belly yellowish; under tail coverts buffy.

Measurements (in millimeters).

Sporophila schistacea arthuri. Six males from Surinam: wing, 61.5 (60.0–62.5); tail, 39.6 (39.0–41.0); tarsus, 14.1 (14.0–14.3); culmen, 11.0 (10.5–11.5).

One male from Tamanoir, Mana R., French Guiana: wing, 62.0; tail, 42.0; tarsus, 14.0; culmen, 10.0.

Three females from Surinam: wing, 57.5, 59.0, 60.0; tail, 37.0, 37.0, 37.5; tarsus, 14.0, 13.5, 13.9; culmen, 10.5, 10.8, 10.5.

Type, adult female: wing, 59.0; tail, 37.0; tarsus, 14.2; culmen, 10.8

Sporophila schistacea schistacea. Type, adult male: wing, 62.0; tail, 42.0; tarsus, 14.2; culmen, 10.4.

One adult female from Colombia: wing, 57.0; tail, 42.0; tarsus, 14.0; culmen, 11.0.

Sporophila intermedia. Fifty males from Colombia, Venezuela, and Trinidad: wing, 56.7 (54.0–59.0); tail, 45.0 (42.0–47.5); tarsus, 16.0 (15.0–17.0); culmen, 10.6 (10.0–11.5).

Eighteen females from Colombia and Venezuela: wing, 53.9 (51.8–56.2); tail, 42.1 (40.0–44.0); tarsus, 16.2 (15.2–17.0); culmen, 10.7 (10.0–11.0).

Remarks.—I take pleasure in dedicating this new form to my brother Arthur P. Penard of Paramaribo, to whose efforts mainly I owe the excellent series of specimens from Surinam.

The female of *S. s. schistacea* (Carnegie Museum, No. 67,706) I found in a large series of Gray Seed-eaters kindly loaned me by Mr. W. E. Clyde Todd. It was collected by M. A. Carriker, Jr., at Pavas, La Cumbre, Valle, Colombia, in July, 1918. This specimen resembles the female of *S. intermedia* in coloration, and might easily be mistaken for that species, but the short tarsus (14.0 mm.) and the long, pointed wing make its identity certain.

The male from French Guiana (Carnegie Museum, No. 61,062) was collected by S. M. Klages at Tamanoir, Mana River, in April, 1917. In this specimen, as in some males from Surinam, the white wing speculum is very small, but I doubt very much whether the size of the wing spot will be found to be of any taxonomic value in dealing with either *S. schistacea* or *S. intermedia*. One of the Surinam birds, an immature male, also has white tips to the median secondary coverts, similar to those on the type of *S. schistacea*.[1]

No doubt there are in collections a number of specimens of *S. schistacea* erroneously identified as *S. grisea*. For example, Sharpe (Cat. Birds Br. Mus., XII, 1888, p. 96) mentions Panama skins with ill-defined white patches on the sides of the neck and with the inner greater wing-coverts tipped with white. Probably these are specimens of *S. schistacea*. Also Berlepsch and Hartert (Nov. Zool., IX, 1902, p. 25) mention a male from Caicara, Venezuela, which is darker, more schistaceous than the other specimens, the throat variegated with white and the wing rather long (63.5 mm.). This is undoubtedly an example of *S. schistacea*, but without seeing the female from that locality it will be difficult to say to which of the two forms it belongs.

Chubb (Ann. Mag. Nat. Hist., Ser. IX, 1921, p. 193) has described an apparently new Seed-eater from Roraima under the name *Sporophila longipennis*. The characters given by him in the original diagnosis, and the fuller description in his Birds of British Guiana (Vol. 2, 1920, p. 429), apply very well to the Surinam bird, so far as they go, with the exception that the Roraima bird is decidedly larger (wing, 65; tarsus, 15), and although Chubb does not mention the shallowness of the maxilla or the pointed wing, I strongly suspect close relationship between *S. longipennis* and *S. schistacea*. Unfortunately I am unable to examine the type of *S. longipennis*, but judging from the measurements and taking into consideration the type locality Roraima, with its peculiar fauna, I feel certain that the name *longipennis* does not apply to the Surinam bird.

It should also be noted that Snethlage (Bol. Mus. Goeldi, VIII, 1914, p. 428), under *S. grisea*, lists three males from Peixi-Boi at the mouth of the Amazon. The measurements (wing, 65; tarsus, 14.0) indicate kinship to *S. schistacea* rather than *S. intermedia*.

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[1]Since the above was written Mr. Todd has loaned me another female and four males of true *schistacea* from Las Ventanas (Santander) and Malagita (Choco), Colombia. The fully adult males, of which there were three in the lot, all have decided white tips to the median secondary coverts and large, well-defined, white patches on the sides of the throat. These characters in the male of true *schistacea*, taken in connection with the much darker coloration of the Surinam female can leave no doubt as to the validity of the Surinam form.

The two species occur together over a great part of their respective ranges. Apparently *S. intermedia* is restricted to Colombia, Venezuela, Trinidad, and British Guiana. I have no positive knowledge of its occurrence in Dutch or French Guiana, but Chubb in his Birds of British Guiana lists a specimen from Takutu Mountains. The range of *S. schistacea* extends from Panama and western Colombia at least to French Guiana.

I am greatly obliged to Mr. Outram Bangs for his opinion in regard to several points involved in my study of these two species.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW FLYCATCHER FROM SURINAM.

BY THOMAS E. PENARD.

Lawrence's Flycatcher is represented in Surinam by a distinct form which I propose to name

Empidonax lawrencei nemoralis, subsp. nov.

Type.—No. 2,021, Collection of T. E. Penard (now Museum of Comparative Zoology, No. 89,286), adult; Surinam: Lelydorp, forest near Schotelweg, 26 April, 1922; Alex Pichot.

Subspecific characters.—Similar to *Empidonax lawrencei lawrencei* Allen of Trinidad, but darker throughout; upper parts much more olivaceous, less brownish; wing bands narrower, breast band much darker. Similar also to *Empidonax johnstonei* Barbour of Grenada, but entire upper parts, including head and tail, darker olive green, head not dusky, throat grayer, breast band darker and more greenish.

Measurements (in millimeters).

Empidonax johnstonei, male adult: wing, 60.0; tail, 54.0; tarsus, 14.5; exposed culmen, 12.0.

Empidonax lawrencei lawrencei, two males: wing, 63.5–65; tail, 55.0–57.0; tarsus, 15.5–15.0; exposed culmen, 13.0–12.0.

Empidonax lawrencei nemoralis, type, adult: wing, 61.5; tail, 55.0; tarsus, 13.5; culmen defective.

Remarks.—The type resembles *E. johnstonei* much more than it does true *E. lawrencei* and probably the three forms differ only subspecifically from each other. The Surinam bird has a decidedly shorter tarsus than that of the two specimens of *lawrencei* from Trinidad.

Empidonax johnstonei has been recorded from Grenada only, and is known from two specimens—(1) the type from St. Andrews, now in the collection of the U. S. National Museum, and (2) a specimen collected by Dr. G. M. Allen in the forest near the Grand Etang, Grenada (*Cf.* Barbour, Proc. Biol. Soc. Wash., Vol. XXIV, p. 58), now in the Museum of Comparative Zoology at Cambridge.

Empidonax lawrencei lawrencei has been recorded from Trinidad, where it is not uncommon in the forest; from the coast region of Venezuela:

Las Quigas and Cumana; and from the Amazon region and the island of Mexiana, Brazil. It would be well to compare the lower Amazonian bird to see whether it is really true *lawrencei* or not.

Empidonax lawrencei nemoralis is known from the type only. Perhaps the bird described by F. P. and A. P. Penard (Vog. Guyana, Vol. II, 1910, p. 258) under "*Empidochanes* n. sp." belongs to this form; at least the measurements (wing, 65; tail, 55) are suggestive. So far as I know the species has not yet been discovered in either French or British Guiana. In this connection it might be well to examine the specimen in the Georgetown Museum listed as *Empidochanes olivus* by Dawson (Handlist, Birds Br. Guiana, 1916, p. 13).

The name *Muscicapa oliva* Boddaert (Tabl. Pl. Enl., 1783, p. 34) based on Daubenton's Pl. Enl. 574, fig. 2, is not applicable to the Surinam bird here described, since the figure unquestionably represents an entirely different species.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

AN ANALYSIS OF "DROMIA DORMIA (LINNAEUS)."[1]

BY MARY J. RATHBUN.

Since 1837 two large Indo-Pacific Dromiids have been confused under the names *Dromia rumphii* or *D. dormia.* Their ranges are not coincident, one species stretching from the Hawaiian Islands southwestward to the Moluccas, the Red Sea and the Cape of Good Hope; the other, from northern Japan to China, Java, the Indian Ocean, Gulf of Aden and Natal. The best figure of the Hawaiian species is that by Seba, the best figure of the Japanese species is that by de Haan.

Both species are broader than long, covered with a close, short pile and with a longer pile on inner surface of chela, on margins of other legs and of carapace; there are 3 frontal teeth (between the antennae), a large conical tooth on the suborbital region (not margin), a V-shaped outer orbital fissure and a series of antero-lateral teeth, the last one of which is behind the branchial groove; in both species the chelipeds bear epipodites and the prehensile legs (fourth and fifth pereiopods) are very nearly the same length, the last pair narrower than the other.

The Hawaiian species is distinguished by great convexity of carapace, the surface rising abruptly behind the front and antero-lateral border. The pile covering the carapace is smoother and more velvety than in the Japanese form. The cardiac and inner branchial grooves are shallow, the outer half of the branchial groove rather well marked, because of a blunt ridge behind it which ends in the tooth at the lateral angle; this tooth is disguised by a brush of long hair which makes it appear more obtuse than it really is; toward the tip it curves forward. There are four other antero-lateral teeth which are conical and blunt-pointed, the first much the largest, the second considerably smaller, the third very small and close to the second and sometimes, in large specimens, on the slope of the second, the fourth tooth intermediate in size between first and second. The greatest interspace is between fourth and fifth teeth. and is partly convex in outline.

The median tooth of the front is large and though narrower than the lateral pair, is more advanced. There is a thickening, without denticle, in the upper margin of the orbit.

[1]Published by permission of the Smithsonian Institution.

The dactyls of the two walking legs (second and third pereiopods) are sensibly shorter than their propodites, subconical, very stout at base, tapering rapidly to a coarse, dark, horny nail; except on the nail the surface is concealed by the same short pile that covers most of the crab; on the distal half of the lower (concave) surface there is a row of 4 or 5 graduated spines, the longest of which is near the nail and the shortest ones are minute.

The curved dactyl of the first prehensile leg (fourth pereiopod) is opposed by a single smaller propodal spine; the dactyl of the last leg is opposed by two smaller unequal spines side by side, while a third, very small, distal spine of the propodus is situated at the other (convex) side of the dactylus.

The sternal sulci of the female are long and gradually converge until near the end when they diverge slightly, terminating just before reaching the middle of the base of the chelipeds; in the latter part of their course they are separated by a prominent smooth ridge.

The Japanese species, on the other hand, is less convex, rising gradually from the margins. The cardiac and branchial grooves are deep; this, together with the frequent occurrence of longer hairs in the short pile, gives the carapace a more uneven and ragged appearance. All the teeth have small, acute, white tips; antero-lateral teeth four, similar, their sides concave near the tips, posterior slopes then becoming convex in outline.

The median tooth of the front is smaller than the lateral pair and less advanced. There is a small sharp denticle on the upper margin of the orbit; this is present in every specimen examined, regardless of size.

The dactyls of the two walking legs are as long as, or longer than, their propodites, and are longer and slenderer than in the Hawaiian species; their upper and lower surfaces are bare along the middle lengthwise, the upper surface bordered on each side by a thick brush of longish stiff hairs which are for the most part flattened out in an almost horizontal plane; these two brushes are continuous at the proximal end of the article, where the hairs are obliquely ascending; below there is a median row of about 13 slender, appressed, graduated spines, which vary little in length, but are longest toward the slender, horny tip of the dactyl.

The propodus of the last leg has only two spines, those forming a chela with the dactyl, and lacks the spine at the opposite side of the dactyl which is present in the Hawaiian form.

The sulci of the female sternum converge until they reach the line between the first and second ambulatories, then are parallel and distant for a ways, then diverge strongly, each terminating at the line between the cheliped and first leg in a large, high, conical tubercle; these tubercles do not touch at base and are inclined away from each other.

Previous to 1837 only one of these species, the Hawaiian one, appears in literature. Rumphius, 1705, briefly describes and figures it (front view) from Amboina. Despite the inaccuracies of the figure, it is identifiable by its great convexity, the character of the ambulatory dactyls, and the evidence of an extra small tooth on the right margin (left in the figure) of the carapace.

The figure given by Seba, 1758, is admirable. The pile had been removed from the carapace except for a marginal rim, and shows the epigastric hump

and the sutures of the after part. The strong marginal teeth are accurately represented, as are also the extremities of the four pairs of legs, including the four spines of the last leg and the three spines of the penultimate leg.

Linnaeus, Fabricius, Latreille and Lamarck in turn (1763–1818) described this species briefly but there is no evidence that any of them had ever seen a specimen; the figure given by Latreille (1818) is a copy of Seba's. During this period the following names were used: *Cancer dormia* Linnaeus, *Cancer dromia* Fabricius and *Dromia rumphii* Weber. The first of these specific names must be adopted, and combined with the generic name *Dromidiopsis* Borradaile. In this genus the sternal grooves of the female end together, the carapace is almost without regions, and there is usually a thorn on the outer side of the last joint of the fifth leg.

In 1837 Milne Edwards described a species under the name of *Dromia rumphii*, which he considered the same as that recorded by his predecessors. He says, however, that the antero-lateral borders are armed with four large teeth, little prominent and having the same form and size; further, that the dactyls of the ambulatories are longer and more slender than in the large European and American Dromias and are armed beneath by very small spines. This then is the second of the species which I have outlined above, the one inhabiting Japanese waters and well figured by de Haan. I therefore name it **Dromia dehaani,** new species.

From Milne Edwards to the present both species have been called *Dromia rumphii* or *D. dormia*. In the synonymical lists which follow I have endeavored to place the various citations correctly. Some authors have had both species in hand and attribute an occasional extra tooth on the carapace margin to age or variation.[1] Few note the unique ambulatory dactyli of *D. dehaani;* they are figured by de Haan and described by Targioni-Tozzetti.

Dana's *Dromia hirsutissima* is not that of Lamarck, which is overlaid with very long but not very dense hair, and has the anterior with the antero-lateral margin forming three well-defined lobes.[2]

Cancer dormitator Herbst, 1790,[3] is perhaps the same as *Dromia hirsutissima*; the type is not extant.

Dromidiopsis dormia (Linnaeus).

Cancer Lanosus Rumphius, D'Amboinsche Rariteitkamer, 1705, p. 19, pl. 11, fig. 1.

Cancer lanosus, calvatus, mas, pronus, Seba, Thesaurus, vol. 3, 1758, p. 42, pl. 18, fig. 1.

Cancer dormia Linnaeus, Amoen. Acad., vol. 6, 1763, p. 413; Syst. Nat., ed. 12, vol. 1, part 2, 1767, p. 1043.—Fabricius, Syst. Entom., 1775, p. 405.

Cancer dromia Fabricius, Species Insect., vol. 1, 1781, p. 501; Mantissa Insect., vol. 1, 1787, p. 320; Entom. Syst., vol. 2, 1793, p. 451.

[1] In weighing the descriptions it must be borne in mind that some authors reckon the posterior branchial tooth as "postero-lateral."

[2] See Desmarest, Consid. Gén. Crust., 1825, pl. 18, fig. 1.

[3] Naturg. Krabben u. Krebse, vol. 1, p. 250, pl. 18, fig. 103.

Dromia rumphii Weber, Nomen. Entom., 1795, p. 92.—Fabricius, Entom. Syst., Suppl., 1798, p. 359.—Latreille, Hist. Nat. Crust., vol. 5, an XI [1803], p. 386; Tabl. Encyc., part 24, Crust., 1818, pl. 278, fig. 1 (after Seba).—Lamarck, Hist. Nat. Anim. sans Vert., vol. 5, 1818, p. 264.—Hilgendorf, MB. Akad. Berlin, 1878, p. 812 (part: Inhambane, Mozambique).—Ortmann, Zool. Jahrb., Syst., vol. 6, 1892, p. 548 (part: Südsee).—Alcock, Jour. Asiat. Soc. Bengal, vol. 68, 1899, p. 137 (part: specimens with 4 antero-lateral spines); Cat. Indian Dec. Crust., part 1, 1901, p. 44, pl. 2, fig. 4 (part).—Lenz, Zool. Jahrb., vol. 14, Syst., 1901, p. 450; Honolulu.—De Man, Abh. Senckenb. Nat. Ges., vol. 25, 1902, p. 687; Ternate; Rumphius Gedenboek, 1902, p. 104.—Nobili, Ann. Sci. Nat., ser. 9, Zool., vol. 14, 1906, p. 144; Obock and Djibouti.—Edmonston, Occas. Papers B. P. Bishop Mus., vol. 8, Honolulu, 1922, p. 33, pl. 1; Hawaiian Islands. Not *Dromia rumphii* Milne Edwards, 1837.

Dromia hirsutissima Dana. U. S. Expl. Exped., vol. 13, Crust., 1852, p. 403; Sandwich Islands and Cape of Good Hope. Not *D. hirsutissima* Lamarck, Desmarest, or *D. hirtissima* Milne Edwards.

Dromia dormia [by error, *dornica*] Balss, Zool. Ergeb. Forsch. westl. u. Zentral. Südafrika, vol. 5, pt. 2, 1913, p. 109; False Bay.

Dromidia hirsutissima Edmonston, Occas. Papers B. P. Bishop Mus., vol. 8, Honolulu, 1922, p. 34.

Range.—Hawaiian Islands (Dana, Lenz, Edmonston). South Sea (Ortmann). Ternate (de Man). Amboina (Rumphius). Red Sea (Nobili). Mozambique (Hilgendorf). Cape of Good Hope (Dana, Stebbing, Balss).

Material examined.—

Hawaiian Islands; U. S. Exploring Expedition (Mr. Richards); 1 female (47873).[1] This is the smallest specimen in the Nat. Mus. collection, 90.8 mm. by 115.7 mm.

Maui, H. I.; U. S. Exploring Expedition (C. Pickering); 1 specimen, comprising carapace, eyes and antennae only (2442), (*Dromia hirsutissima* Dana).

Honolulu; U. S. Fish Comm.; 1 male (48271).

Hawaiian Islands; U. S. Fish Comm.; 1 male, 145 mm. by 182 mm. (50488).

Cape of Good Hope; U. S. Exploring Expedition; 1 male (*Dromia hirsutissima* Dana) (28990).

Dromia dehaani, sp. nov.

Dromia rumphii Milne Edwards, Hist. Nat. Crust., vol. 2, 1837, p. 174 (not synonymy); les Indes orientales. Not *Dromia rumphii* Weber, 1795.—De Haan, Fauna Japon., Crust., 1839, p. 107, pl. 32.—Stimpson, Proc. Acad. Nat. Sci. Philadelphia, vol. 10, 1858, p. 240 [78]; Smithson. Misc. Coll., vol. 49, 1907, p. 177, pl. 21, fig. 7 (abdomen of male); Hongkong.—Hilgendorf, MB. Akad. Berlin, 1878, p. 812 (part:

[1] The numbers in parentheses are catalogue numbers of the U. S. National Museum.

India).—Targioni Tozzetti, Zool. *Magenta*, Crust., 1877, p. 207.—Ortmann, Zool. Jahrb., Syst., vol. 6, 1892, p. 548 (part: Japan).—Henderson, Trans. Linn. Soc. London, ser. 2, Zool., vol. 5, 1893, p. 198; Ceylon.—Alcock, Jour. Asiat. Soc. Bengal, vol. 68, 1899, p. 137 (part: specimens with 3 antero-lateral spines).—Doflein, Abh. k. Bayer. Akad. Wiss., math. phys. Cl., vol. 21, 1902, p. 653; Sagami Bay.

Dromia indica Targioni Tozzetti, Atti Soc. Ital., Milan, vol. 15, 1872, p. 10; Giava. Not *D. indica* Gray, 1831–1844.

Dromia dormia Rathbun, Proc. U. S. Nat. Mus., vol. 26, 1902, p. 32; Japan.—Borradaile, Ann. Mag. Nat. Hist., ser. 7, vol. 11, 1903, p. 298.—Stebbing, S. African Crust., part 3, 1905, p. 61.—Ihle, *Siboga* Exped., Monog. 39 *b*, 1913, p. 22 (Japan and Java Sea).

Dromia rumphi Borradaile, Fauna Maldive and Laccadive Arch., vol. 2, part 1, 1903, p. 576, pl. 33, fig. 1 *a*-1 *d*; Haddumati Atoll.

Range.—Japan (de Haan, Ortmann, Doflein, Rathbun, Ihle). Hongkong (Stimpson). Java (Targioni Tozzetti, Ihle). Indian Ocean (Hilgendorf, Henderson, Alcock, Borradaile). Gulf of Aden.

Material examined.—

Hakodate, Japan; Madoka Sasaki; 1 young male (54493).

Kururi, Tokaido coast, Japan; April, 1894; F. Sakamoto; 1 male, 1 female, holotype (18853); purchased from Garrett Droppers.

Wakanoura, Kii, Japan; 1900; Jordan and Snyder; 1 male (26284); from Stanford University.

Hongkong, China; North Pacific Exploring Expedition (William Stimpson); 2 males, 2 young females (2113) (*Dromia rumphii* Stimpson). One male measures 86 mm. by 102.4 mm., and is the largest specimen in the National Museum collection.

Gulf of Aden; L. M. McCormick; 1 male (42218); from Glen Island Museum.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW SPECIES OF AMERICAN SPIDER CRABS.[1]

BY MARY J. RATHBUN.

The group of small species of *Epialtus* sometimes combined under the name *Epialtus bituberculatus*[2] may be resolved into ten different species, six of which have already been described. Four new species and two new forms are described below. The rare genus *Eucinetops*[3] is enriched by two new species.

Epialtus crenulatus, sp. nov.

Holotype.—Female, ovigerous, Cat. No. 18135, United States National Museum. Lower California.

Measurements.—Female holotype, length of carapace 6.4 mm., width 5 mm.

Description.—Hepatic and branchial widths of carapace equal. Hepatic lobe large, not advanced, anterior margin transverse, forming with the outer margin a rounded lobe with crenulated edge. Branchial lobe small, acute. Rostrum about as broad as long, sides arcuate, extremity truncate, subentire, with a faint indication of emargination; below, a median furrow with a crest on either side.

Epialtus kingsleyi, sp. nov.

Holotype.—Male, Cat. No. 53068, United States National Museum. Florida; collected by A. S. Packard and presented to the Boston Society of Natural History by J. S. Kingsley.

Measurements.—Male holotype, length of carapace 7.7 mm., hepatic width 7.2 mm., branchial width 6.7 mm.

Description.—Rostrum dorsally carinate anteriorly, strongly deflexed, very high, broadest at its middle from which it tapers to a truncate tip; lower surface concave. Hepatic lobe much larger than branchial lobe, extremity broadly rounded, anterior margin nearly transverse, with a low tooth or tubercle about half way between tip and eye; posterior margin con-

[1] Published by permission of the Smithsonian Institution and the Museum of Comparative Zoölogy.

[2] Milne Edwards, Hist. Nat. Crust., vol. 1, 1834, p. 345, pl. 15, fig. 11.

[3] Stimpson, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 191.

vex. Branchial lobe small, sides concave, extremity narrow, acute. Cardiac region very high, conical. Palm gradually increasing in height distally and about twice as long as the strongly arched fingers.

Epialtus longirostris forma **portoricensis,** nov.

Holotype.—Male, Cat. No. 24154, United States National Museum. Ensenada Honda, Culebra Island, Porto Rico; collected by the U. S. Fish Commission steamer *Fish Hawk,* Feb. 9, 1899.

Measurements.—Male holotype, length of carapace 5.7 mm., width 3.7 mm.

Description.—Differs from typical *longirostris*[1] in the rostrum being slightly wider and less thick, and the tip slightly arcuate in dorsal view.

Epialtus hiltoni, sp. nov.

Holotype.—Male, Cat. No. 50599, United States National Museum Laguna Beach, California, collected by William A. Hilton.

Measurements.—Male holotype, median length of carapace 13.6 mm., total length 14 mm., anterior width 12.2 mm., posterior width 12.4 mm.

Description.—Carapace high in median region; lateral wings broad, ascending; anterior or hepatic lobe much the larger, intervening sinus deep. Posterior margin of hepatic lobe convex, anterior margin transverse, with a lobe or tooth near its middle. Branchial lobe triangular, acute. Rostrum broadly oblong, sides subparallel, extremity bilobed, median sinus broad, shallow. Hand elongate, not widening much until just before the fingers, which are short and very wide, outer margin acutely carinate.

Epialtus dilatatus forma **elongata,** nov.

Holotype.—Male, Cat. No. 47090, United States National Museum. Off Duck Key, Florida, 14 feet depth, station 7429, *Fish Hawk.*

Measurements.—Male holotype, total length of carapace 11.5 mm., branchial width 8.3 mm., hepatic width 6.7 mm.

Description.—Differs from typical *dilatatus*[2] in having the rostrum longer, the lateral lobes of the carapace subequal in size and shape, the hepatic lobe with an antero-lateral angle, and the preorbital tooth feeble and obsolescent. Palm of cheliped widening considerably toward distal end; propodal finger arched downward, forming a wide gape into which, just behind the middle, one tooth of moderate size projects from the dactylus.

Epialtus peruvianus, sp. nov.

Holotype.—Male, Cat. No. 54208, United States National Museum. Chincha Islands, Peru; collected by Robert Cushman Murphy, 1919, and received from the Brooklyn Museum.

Measurements.—Male holotype, length of carapace 4.8 mm., greatest width 3.5 mm.

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[1] Stimpson, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 199.

[2] A. Milne Edwards, Crust. Rég. Mex., 1878, p. 140, pl. 27, figs. 4-4*b*.

Description.—Propodus of first and second ambulatories armed with a strong tooth below at distal end. Carapace very uneven. Hepatic lobe very large, recurved, anterior margin transversely concave, outer angle lobiform and prominent, posterior margin slightly convex; branchial lobe very small, acute, sides concave. Rostrum deflexed, thin, oblong, sides parallel to near the tip, where they are thick, recurved and convergent; tip bilobed, lobes small, sinus wide.

Eucinetops panamensis, sp. nov.

Holotype.—Male, Cat. No. 2040, Museum of Comparative Zoölogy. Pearl Islands, Bay of Panama; collected by S. W. Garman.

Measurements.—Male holotype, length of carapace to tip of horns 10.5 mm., width including spines 8.5 mm.

Description.—Rostrum one-third as wide as the fronto-orbital distance; horns short and broad, tipped with a small spine. Carapace high on the median line where it is strongly tuberculate. Lateral angle marked by a small spine. Postocular tooth large, triangular, almost equilateral, obliquely upturned. Eyes exceeding postocular tooth by little more than length of cornea; stalks not tapering. Dactyli of ambulatory legs strongly curved, terminating in long, pale, horny spines.

Eucinetops rubellula, sp. nov.

Eucinetops lucasii Stimpson, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 192, ♂, pl. 2, fig. 3, not *E. lucasii*, ♀.

Holotype.—Male, not extant. Cape St. Lucas, Lower California.

Measurements (estimated from figure).—Male holotype, length of carapace to tip of horns 8 mm., median length 6.7 mm., width of carapace 6.2 mm.

Description.—According to Lockington,[1] the true male of *lucasii* is different from the male described by Stimpson. *E. rubellula*, male, differs, according to Stimpson from *E. lucasii*, female, in having the horns of the rostrum acutely pointed, the antennae narrower with the external angle of the first movable article considerably produced, and the dactyli of the ambulatory legs much shorter. The chelipeds are large, much compressed and crested; carpus with two slight crests confluent posteriorly in a projecting angle or point; hand rather broad, flat, tapering to the slender fingers, not gaping.

[1] *Peltinia longioculis* Lockington, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 76.

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PROCEEDINGS

OF THE

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SOME UNRECORDED NAMES IN THE MURICIDAE.

BY WILLIAM H. DALL.

Having occasion recently to review the history of a Muricoid name, I found to my surprise that it was absent from all the nomenclators and their supplements, and no reference was made in the Zoological Record to the paper in which it appeared.

In 1879 in the Revue et Magazin de Zoologie, pp. 314–348, Jousseaume published under the title "*Etude des Purpuridae*" a revision of the gastropods usually included in the family Muricidae. In this paper after reviewing the history of the mollusca known to the ancients as *purpura* on account of the dye extracted from them to make the Tyrian purple, he gives a list of fifty genera with a description of each, and a species definitely designated as type. This includes a number of manuscript names proposed by Bayle.

In view of the fact that the types are definitely fixed and that a number of the names proposed appear to be absent from all the nomenclators and thus liable to be overlooked, it seems desirable to give a list of these names, with the names of the types selected by Jousseaume.

I have noted a few preoccupied names. Jousseaume was quite right in his contention that the ancients referred to the Mediterranean *Murex* as *Purpura*, but seems to have been ignorant that Martyn had introduced the name *Purpura* into binomial nomenclature for a muricoid shell later called *Cerostoma* by Conrad. Many of the names in this list will be useful as sectional divisions of the Muricidae, but few of them will be considered as of generic rank by serious students. It will be observed that in forming the family Jousseaume does not mention the Trophons, *Eupleura* or *Urosalpinx*. Most of Jousseaume's names are cited, but without references, in Fischer's

Manuel, but the examples given are not always the original types. In C. F. Baker's "Outline of a new Classification of the family Muricidae," 1895, he cites these names as those of Fischer, and not always those types designated by Jousseaume. It is curious that the compilers of nomenclators have missed these names entirely.

Page 323. PURPURA. Type *Murex brandaris* L. (=*Bolinus* Pusch, Pal. Pol. 1837. Not *Purpura* Martyn, Figs. Nondescr. Shells, 1784).
" HAUSTELLUM (Schumacher). Type *Murex haustellum* L.
" TUBICAUDA. Type *Murex brevispina* L.
Page 324. ACUPURPURA (Bayle MS.) Type *Murex tenuispina* Lam. (*Murex* Auct. not Lamarck, 1799).
Page 325. PAZIELLA. Type *Murex pazi* Crosse.
" POIRIERA. Type *Murex zelandicus* Quoy.
" BIPLEX (Perry, 1811). Type *B. perca* Perry.
Page 326. NAQUETIA. Type *Murex triqueter* Born.
" INERMICOSTA. Type *Murex fasciatus* Sby.
" MURICANTHUS (Swainson). Type *Murex radix* Gmel.
Page 327. HOMALOCANTHA (Morch). Type *Murex scorpio* L.
" FAVARTIA. Type *Murex breviculus* Sby.
Page 328. MURICIDEA (Swainson). Type *Murex hexagonus* L.
Page 329. HEXAPLEX (Perry). Type *Murex cichoreus* Gmelin. (=*Murex* s. s. (L.) Lamarck).
" BASSIA (Bayle MS.). Type *Murex stainforthii* Reeve. (Not *Bassia* of Quoy & Gaimard, 1834).
" PHYLLONOTUS (Swainson). Type *Murex imperialis* Swainson. (=*M. pomum* Gmelin.)
Page 330. EUPHYLLON. Type *Murex monodon* Sby.
" CHICOREUS (Montfort). Type *Murex ramosus* L.
Page 331. OCINEBRELLUS. Type *Murex eurypteron* Reeve.
" TRITONALIA (Fleming). Type *Murex erinaceus* L.
" GRACILLIPURPURA. Type *Fusus strigosus* Lamarck.
Page 332. LYROPURPURA (Bayle MS.) Type *Murex crassicostatus* Deshayes.
" OCINEBRINA. Type *Fusus corallinus* Scacchi.
" HANETIA. Type *Murex haneti* Petit.
Page 333. PSEUDOMUREX (Monterosato). Type *Murex bracteatus* Brocchi.
" HETEROPURPURA (Bayle MS.) Type *Murex polymorphus* Bronn.
" VITULARIA (Swainson). Type *Murex vitulinus* Lam.
" CRASSILABRUM. Type *Murex crassilabrum* Gray. (Not *crassilabrum* of Megerle, *fide* Agassiz.)
Page 334. FORRERIA. Type *Murex belcheri* Hinds.
" JATOUA. Type *Purpura jatou* Adanson.
" PTEROPURPURA. Type *Murex macropteron* Desh.

Page 334. CEROSTOMA (Conrad). Type *Cerostoma nuttallii* Conrad. (=*Purpura* Martyn, 1784.)

Page 335. PTEROCHELUS. Type *Murex acanthopterus* Lam. (not *Pterocheilus* of Oken,1815).

" MARCHIA. Type *Murex clava* Kiener.

Page 336. PTERONOTUS (Swainson). Type *Murex pinnatus* Wood (not *Pteronotus* of Gray, 1825).

" PURPURELLUS. Type *Murex gambiensis* Reeve (not *Purpurella* Desvoidy, 1853).

" POROPTERON. Type *Murex unicinarius* Lam.

Page 337. TYPHIS (Montfort). Type *Murex tubifer* Bruguière.

" TYPHINELLUS. Type *Typhis sowerbyi* Brod.

" TYPHINA. Type *Typhis belcheri* Brod. (not *Typhina* of Burmeister, 1834).

" CYPHONOCHELUS. Type *Typhis arcuatus* Hinds.

" TYPHISOPSIS. Type *Typhis coronatus* Brod.

Page 338. HAUSTELLOTYPHIS. Type *Typhis cumingii* Brod.

" PTEROTYPHIS. Type *Typhis pinnatus* Brod.

" LYROTYPHIS (Bayle MS.). Type *Typhis cuniculatus* Duchatel.

" HIRTOTYPHIS (Bayle MS.). Type *Typhis horridus* Brocchi.

" TALITYPHIS. Type *Typhis expansus* Sby.

Page 339. TRIGONOTYPHIS. Type *Typhis fimbriatus* A. Adams.

" TYPHISALA. Type *Typhis grandis* A. Adams.

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PROCEEDINGS

OF THE

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FOOD HABITS OF CALLISAURUS VENTRALIS VENTRALIS (HALLOWELL).

BY HERBERT J. PACK.

The twenty specimens from which this study was made were taken at St. George and Santa Clara, Utah, in June of 1920 and 1921. In the desert parts of extreme southwestern Utah, invaded by an arm of the Lower Sonoran Zone, *C. ventralis ventralis* is by far the most common reptile. This lizard probably is not surpassed in speed by any reptile of the Southwest. In fact, it runs so fast that often the eye can not follow it.

This species is a very voracious feeder and usually has the stomach filled to capacity. It takes both insects and vegetable matter. Plant tissue was found in 45 per cent of the lizards, in which it formed 23 per cent of the total quantity of food. For the twenty lizards vegetable matter formed 10.4 per cent and insects 89 per cent, the remaining .6 per cent consisting of spiders and sand. Bees and wasps were found in 80 per cent of the lizards. Lepidopterous larvae, antlions (usually larvae), hemiptera, and beetles were represented in the order named.

Few observations have been made upon the food habits of this lizard. Merriam[1] states that "this species feeds on insects and the blossoms and leaves of plants in about equal proportion; at least such was the case in the large number whose stomachs were examined." Ruthven[2] failed to find vegetable matter in his Tucson specimens, and with possibly one exception their food consisted wholly of insects. Camp[3] found only insects—grasshoppers, ants, and beetles—in eight specimens from the vicinity of the Turtle Mountains.

[1] N. A. Fauna, No. 7, p. 172.
[2] Am. Mus. Nat. History, Vol. 23, Art. 23, p. 521.
[3] U. of Calif. Pub. in Zoology, Vol. 12, No. 17, p. 520.

STOMACH CONTENTS OF CALLISAURUS VENTRALIS VENTRALIS (HALLOWELL).

No.	Sex	Hymenoptera	Lepidoptera	Coleoptera	Orthoptera	Hemiptera	Neuroptera	Miscellaneous Insects	Spiders	Unidentified Insect Remains	Vegetable Matter	Sand
300	♂	3 Panurgidae	4 Geometrid larvae			1 nymph (unid.)	1 ant lion (Myrmeleon)					1 grain
301	♂	8 bees	3 larvae (unid.)	1 Rhynchophora		3 (unid.)		1 aphid		x	5 small leaf buds, forming 20% of total food	
302	♀					1 nymph(unid)		3 unid. larvae		x		2 grains
303	♂	1 bee	1 Geometrid larva				1 Myrmeleon larva	2 Diptera		x	3 small plant buds, forming 25% of total food	
304	♀									x	Plant tissue and one seed, forming 25% of total food	
305	♂									x	Large bud, forming 50% of total food	
306	♂	1 wasp		1 Coccinellidae						x	3 wild berries, forming 60% of total food	
307	♀	2 Ichneumonidae 2 bees 1 Chalcididae	1 larva (unid.)		1 Acrididae	1 nymph (unid.)	1 Myrmeleon larva		2			
308	♀	1 bee	4 Geometrid larvae	1 Coccinellidae 1 (unid.)	1 Acrididae nymph	2 nymphs (unid.) Cercopidae—2 nymphs and 2 adults; 1 Jassidae nymph				x		2 grains
309	♂	1 Ichneumonidae 1 bee	6 Geometrid larvae	1 (unid.) 1 Meloidae	1 Acrididae			3 (unid.)			Plant tissue, forming 20% of total food	
310	♀	11 bees	1 larva (unid.)	1 (unid.)								
311	♂	3 bees		1 (unid.)			2 Myrmeleon larvae	1 blowfly (Calliphora)	1		1 bud, forming 7% of total food	1 grain
312	♀	3 (unid.)	2 Geometrid larvae	1 larval and 1 adult Coccinellidae 1 Chrysomelid larva 1 Erotylidae	2 Mantids	6 Jassidae	5 Myrmeleon larvae	2 (unid.)				

STOMACH CONTENTS OF CALLISAURUS VENTRALIS VENTRALIS (HALLOWELL)—Continued.

No.	*Sex*	*Hymenoptera*	*Lepidoptera*	*Coleoptera*	*Orthoptera*	*Hemiptera*	*Neuroptera*	*Miscellaneous Insects*	*Spiders*	*Unidentified Insect Remains*	*Vegetable Matter*	*Sand*
313	♀	1 Panurgidae 2 (unid.)				1 (unid.)		1 (unid.)	1		Very small plant stem forming 1% of total food	3 grains
314	♂	2 Apidae 3 (unid.) 1 Panurgidae	8 Geometrid larvae; 10 larvae, likely Geometrids	1 Coccinellidae 2 (unid.)			2 Myrmeleon larvae			x		
315	♀						1 Myrmeleon larva	1 Diptera 2 (unid.) 1 larva		x		
316	♂	7 Panurgidae 5 Perditella 2 Ichneumonidae 2 (unid.)					1 (unid.)	3 (unid.)	1			Many grains
317	♀	16 small ants 1 bee	3 Geometrid larvae; 1 larva (unid.)	1 (unid.)		1 Jassidae 1 (unid.)	1 Myrmeleon larva	1 (unid.)				2 grains
318	♀	4 Panurgidae 1 bee					2 Myrmeleon larvae			x		
319	♂	1 Perditella 3 bees	4 larvae (unid.)		Tree cricket nymph	1 Jassidae 1 Reduviidae 1 (unid.)	1 Myrmeleon larva	1 Diptera 1 (unid.)			Very small bit of plant tissue, forming less than 1% of total food	1 grain

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FOOD HABITS OF CROTAPHYTUS COLLARIS BAILEYI (STEJNEGER).

BY HERBERT J. PACK.

In the accompanying table the results of a study of the food habits of Bailey's collared lizard, *Crotaphytus collaris baileyi* (Stej.) are given. All of these lizards were collected in the southwestern part of Utah in June of 1920 and 1921 except No. 565 which was taken May 5, 1906, at Thompsons in Grand County.

This examination of stomach contents discloses the fact that Bailey's collared lizard is a mixed feeder, taking both insects and vegetable matter. It appears that insects constitute the more important item of food, for while seven of the sixteen lizards had taken vegetable matter every one including these seven had eaten insects. Grasshoppers and beetles are by far the most frequently eaten insects, while bees and wasps, lepidopterous larvae, and other insects are less often taken. There is no evidence that this reptile preys upon other lizards, as is the case with the leopard lizard. Furthermore, while the collared lizard is thus a mixed feeder, taking both insects and vegetable matter, the leopard lizard apparently feeds only upon insects and other lizards.

Very few observations have been recorded on the food habits of this species. Camp[1] found that "one stomach contained two chewed grasshoppers, and another three orthopterous insects and four small beetles." Ruthven[2] states that "as far as observed their diet consists exclusively of insects—grasshoppers, beetles, and locusts," which is at variance with the evidence herewith presented.

[1] Univ. Calif. Pub. in Zoology, Vol. 12, No. 17, p. 521.
[2] Bul. Am. Mus. Nat. His., Vol. 23, Art. 23, p. 513.

STOMACH CONTENTS OF CROTAPHYTUS COLLARIS BAILEYI (STEJNEGER).

No.	Sex	Coleoptera	Orthoptera	Lepidoptera	Hymenoptera	Miscellaneous Insects	Spiders	Miscellaneous Animal Remains	Vegetable Matter	Sand	Notes
550	♀	1 (unid.)						x			
551	♀	1 (unid.)	2 adults and 2 nymphs of Acrididae	1 larva		1 Pentatomidae				1 grain	
552	♂	1 (unid.)							3 pods and 2 leaves of leguminous plants forming 75 per cent of total food		
553	♂	1 Chrysomelidae 1 (unid.)	2 nymphs of Acrididae		1 Sphecidae	2 unid. larvae 1 larval Myrmeleonidae 2 (unid.) 1 Hemiptera 1 aphid			16 pods and parts of 3 leaves of leguminous plants, forming 60 per cent of total food; also dried stick ½ inch long		
554	♀	1 Rhynchophora	2 nymphs of Acrididae	1 measuring worm (Geometridae)							
555	♂	1 large Scarabaeidae	1 nymph of Acrididae						Piece of green leaf and other vegetable matter, forming 15 per cent of total food		
556	♂	1 (unid.)	2 nymphs of Acrididae							2 small pieces of gravel	
557	♂		2 nymphs of Acrididae	1 larva		1 (unid.) 1 Jassidae					
558	♂	1 large Scarabaeidae	3 nymphs of Acrididae							1 grain	
559	♂				2 (unid.)	2 larvae (unid.)			Stomach filled almost entirely with leaves, forming 90 per cent of total food		
560	♂			1 larva	1 large wasp	1 (unid.) 1 cicada					
561	♂	2 (unid.)	1 Gryllidae						Plant tissue (leaves), forming 50 per cent of total food	1 large grain	
562	♀		4 nymphs of Acrididae	2 larvae	1 (unid.)					3 large grains	Juvenile
563	♀	1 Coccinellidae 5 large Scarabaeidae	2 nymphs of Acrididae		3 (unid.)				Plant tissue, forming 15 per cent of total food	1 grain	
564	♀	1 (unid.)	5 nymphs and 1 adult Acrididae	1 larva					1 green leaf, forming 5 per cent of total food		
565	♀	6 (unid.) 1 larva									

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THE FOOD HABITS OF CNEMIDOPHORUS TESSELLATUS TESSELLATUS (SAY).

BY HERBERT J. PACK.

From a study of the food habits of the common western variety of race-runners, *Cnemidophorus tessellatus tessellatus* (Say), it becomes evident that this lizard, in common possibly with the widespread eastern species, is the most beneficial lizard in North America. Fourteen species and varieties of race-runners are recognized in the United States, but only two have a wide geographical distribution. One of these is *C. tessellatus tessellatus*, the most common and most widespread western form, while the other is the well-known *C. sexlineatus* of the East and South.

The sixty-three specimens whose stomach contents formed the basis of this study were taken from various localities throughout the greater part of the range of this species in western Utah. From the accompanying table we see that Lepidoptera, largely caterpillars, form 37.7 per cent of the total bulk of food. Grasshoppers constitute 14.4 per cent. These two groups of insects alone, caterpillars and grasshoppers, form about 52 per cent of the total food. The item next in importance is beetles, representing 14.2 per cent, of which one-sixth is wireworms. Remaining we have miscellaneous insects, 14.27 per cent; arachnids, 8.2 per cent; unidentified insect and animal remains, 9.0 per cent; and sand and bits of wood, 2.23 per cent. Hymenoptera, usually considered as one of the most beneficial orders of insects, represent less than 1 per cent of the total food. Without entering into a discussion of the economic status of the various items of food, it is evident that a high percentage of the total food consists of noxious insects. It will be noted that speci-

mens 331 to 334, inclusive, contained bits of wood. These are four of the ten specimens taken at Clearfield. The area in which the specimens were collected has a very sandy soil, covered by a rather dense growth of sagebrush. This sand is not loose and shifting but in most places is firmly packed and covered by a coat of debris. The bits of wood were no doubt swept in with the grasshoppers just as sand is often ingested along with insects. One other specimen only, number 339, from Rockville, contained bits of wood.

In arriving at a correct estimate of the value of this reptile other things than just the nature of its food must be considered. *C. tessellatus tessellatus* is a large lizard, attaining a maximum length of over 12 inches, of which 3¼ to 4 inches represents body length. It is therefore physically possible for this lizard to consume rather large quantities of food because of its size. Furthermore, although occurring in the desert parts of the country where its insectivorous habits might not have so much economic bearing, this lizard is by no means confined to waste places. It is usually found in a dry sandy area, but this habitat often adjoins cultivated land which it may frequent in search of food. This is illustrated in specimen number 335 taken in an alfalfa field in Lehi. In addition to other food, this individual had eaten 18 alfalfa weevil larvae forming 40 per cent and 2 larvae of the alfalfa butterfly forming 38 per cent of its stomach contents. In the drier parts of Davis County these lizards often come into alfalfa fields, orchards, and other cultivated fields.

The numbers of race-runners in agricultural sections are much fewer now than formerly. Great numbers have disappeared with the reclamation of land, and unfortunately there has been an accompanying wanton destruction of them by firearms. Where the race-runner comes in contact with cultivated lands it renders a service to agriculture only less than that of our most useful insectivorous birds because its daily food requirements are not so great.

A detailed analysis of the stomach contents is given in the following table:

STOMACH CONTENTS OF CNEMIDOPHORUS TESSELLATUS TESSELLATUS (SAY).

No.	Sex	Lepidoptera	%	Orthoptera	%	Coleoptera	%	Miscellaneous Insects	%	Arachnids	%	Unidentified Animal Matter	%	Notes
325	♂			1 Acrididae nymph	75			1 insect (unid.)	25					
326	♀									1 spider	100			
327	♂			10 Acrididae nymphs 2 Acrididae adults	86			1 Lygaeidae	7			Insect remains	7	
328	♂			1 Acrididae nymph	50							Insect remains	50	Juvenile
329	♀			8 Acrididae nymphs 1 Mantidae nymph	90 1			1 Chrysopidae larva 1 small moth 2 ants	1 2 3	2 spiders	3			
330	♀			1 Acrididae	25	1 beetle	50					Animal remains	25	
331	♂			2 Acrididae nymphs	25									Juvenile; contained small pieces of dried wood—75%
332	♀	1 larva	10	2 Acrididae nymphs	70									Juvenile; contained small pieces of dried wood—20%
333	♂			8 Acrididae nymphs	95			1 Scolops (family Fulgoridae)	1	1 spider	5	1 larva Insect remains	.5 2.5	Juvenile; contained bits of dried wood —0.5%
334	♂			1 Acrididae	60			1 Myrmeleon larva 1 insect (unid.)	2 10			Animal remains	21	Juvenile; contained bits of dried wood—5%; sand—2%
335	♀	2 larvae of alfalfa butterfly	38	1 Acrididae	15	18 larvae of alfalfa weevil P. posticus	40	1 Jassidae	3	1 spider	4			Taken in alfalfa field
336	?	2 adults	95					1 fly	5					Juvenile; only a few days old
337	♂					1 large Scarabaeidae	95	1 fly	5					
338	♂	1 adult	5	4 Acrididae nymphs	50			1 Diptera 1 larva	5 5			Animal remains	35	
339	♂	1 larva	80									Animal remains	10	Contained piece of dried wood—10%
340	♀											Insect remains	95	Contained 4 small pebbles—5%
341	♀													Stomach empty
342	♂	5 larvae	85					1 insect (unid.)	5			Animal remains	10	
343	♂	1 pupa 4 larvae	10 60					1 large Diptera	20			Insect remains	10	

STOMACH CONTENTS OF CNEMIDOPHORUS TESSELLATUS TESSELLATUS (SAY)—Continued.

No.	Sex	Lepidoptera	%	Orthoptera	%	Coleoptera	%	Miscellaneous Insects	%	Arachnids	%	Unidentified Animal Matter	%	Notes
344	♀	2 larvae	25			1 beetle	25					Animal matter—probably larval remains	50	
345	♀	4 larvae	40					2 Myrmeleon larvae	20			Larval remains	40	
346	♂	6 larvae	90			1 beetle	6							Sand—1%
						1 pupa	3							
347	♂	4 larvae	70							1 spider	24	Animal remains	5	Sand—1%
348	♀	1 larvae	98											Sand—2%
349	♀	3 larvae	50			2 large Scarabaeidae	49							Sand—1%
350	♀	10 larvae	74	1 small Acrididae nymph	1					2 Solpugidae	24			Sand—1%
351	♀									1 large Scorpion	100			
352	♂	2 larvae	92			beetle remains	8							Juvenile
353	♂	4 larvae	75			1 beetle	10							
		2 pupae	10			1 larvae	5							
354	♂	4 larvae	50			1 wireworm (Family Elateridae)	25							
		2 pupae	25											
355	♀	11 larvae	95					2 mealy bugs	2			Animal remains	2	Sand—1%
356	♀	7 larvae	75	1 Acrididae nymph	3	1 beetle	8					Insect remains	9	Sand—1%
		1 pupa	4											
357	♀	6 larvae	60											
		10 pupae	40											
358	♀	2 larvae	90	grasshopper remains	10									
359	♀	7 larvae	80									Insect remains	2	
		7 pupae	18											
360	♂	7 larvae	50	1 Acrididae nymph	2	3 beetles	24	3 Diptera	18					
						2 larvae	4	1 Jassidae	2					
361	♂	2 larvae	45			6 wireworms	45	1 Diptera	2	1 spider	3			Sand—1%
		2 pupae	4											
362	♂	4 larvae	58			2 beetles	30	1 small bee	2	1 Scorpion	10			
363	♀	5 larvae	42			9 wireworms	55							
						1 beetle	3							
364	♂	7 larvae	100											
365	♂													Empty; 1 round worm in stomach
366	♂							1 insect (unid.)	100					
367	♂							1 larva	45	1 Solpugidae	45	Animal remains	10	
368	♀	1 larvae	95									Animal remains	5	Juvenile
369	♀	2 larvae	12	5 Acrididae nymphs	60			1 insect (unid.)	2	1 spider	18			1 small pebble—2%
								2 Myrmeleon larvae	6					
370	♂	6 larvae	80	2 Acrididae nymphs	10	1 small beetle	2					Animal remains	7	Sand and 1 small pebble—1%

STOMACH CONTENTS OF CNEMIDOPHORUS TESSELLATUS TESSELLATUS (SAY)—Continued.

No.	Sex	Lepidoptera	%	Orthoptera	%	Coleoptera	%	Miscellaneous Insects	%	Arachnids	%	Unidentified Animal Matter	%	Notes
371	♂	5 larvae	50	4 Acrididae nymphs	45	1 beetle	3	1 insect (unid.)	2					
372	♀	1 larva	5	4 Acrididae nymphs	95									Juvenile
373	♂	11 larvae 1 adult	30 10			8 Rhynchophora 5 beetles	50	1 Myrmeleon larva	2	1 Solpugidae	7			Sand—1%
374	♂	1 moth	50	1 Acrididae nymph	25			1 Jassidae	3	2 spiders	22			
375	♀	26 larvae	80			beetle remains	10	1 Myrmeleon larva 1 insect (unid.)	2 2	1 Solpugidae	5			Sand—1%
376	♂			2 Acrididae nymphs	15	1 beetle	20	2 insects (unid.) 2 Hemiptera 1 Myrmeleon larva 1 termite	14 10 10 5	3 spiders	15	Animal remains	10	Sand—1%
377	♂							14 Jassidae 1 larva 1 insect (unid.)	30 9 9	6 spiders	50			2 small pebbles—2%
378	♀	29 larvae	60			3 beetles	14	4 Jassidae 2 Myrmeleon larvae	5 12	1 Solpugidae	5	Insect remains	3	Sand—1%
379	♂					remains of 6	70			2 spiders 1 Solpugidae	20 10			
380	♀	21 larvae	60					7 Jassidae 1 small Hymenoptera 1 small ant 20 termites 2 hemiptera	5 3 2 15 4	1 spider 1 Solpugidae	5 5			Sand—1%
381	♀					1 beetle	30	1 bee 2 hemiptera	40 30					
382	♂					1 beetle	25	1 Myrmeleon larva 1 Reduviidae 1 mealy bug	24 20 5	4 spiders	25			Sand—1%
383	♀	2 larvae	20			3 beetles	25	1 Myrmeleon larva 1 Jassidae	20 4	3 spiders	25	Animal remains	5	Sand—1%
384	♂					1 beetle	10	53 small Jassidae 1 Myrmeleon larva 1 insect (unid.)	55 10 9	3 spiders	15			Sand—1%
385	♀	1 larva	25					2 Jassidae 1 mealy bug 1 insect (unid.)	20 10 25	1 spider	20			
386	♀					1 beetle 1 larva	45 5	1 mealy bug	5			Insect remains	45	
387	♂											Insect remains	100	
Avg. per cent		37.7		14.4		14.2		14.27		8.2		9.0		Bits of wood—1.73 Sand —0.5

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PROCEEDINGS

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TWO NEW SPECIES OF CALAMARIA FROM BORNEO.

BY DORIS M. COCHRAN.

While studying a collection of reptiles received from Dr. W. L. Abbott and collected by Mr. H. C. Raven in Borneo, I came upon two species of *Calamaria* which seem to be new to science.

Calamaria ventralis, new species.

Diagnosis.—Ventrals 249; no preocular; a small but distinct postocular; diameter of eye less than half its distance from mouth; four upper labials, third and fourth entering eye; frontal as broad as long, three times as wide as supraocular, shorter than parietals; symphysial in contact with anterior pair of chin-shields.

Type.—U. S. N. M. No. 51637; Sungai Merah, Borneo; H. C. Raven, collector.

Description.—Rostral well visible from above; frontal as broad as long, three times as wide as supraocular, shorter than parietals; no preocular; a small but distinct postocular; diameter of eye less than half its distance from the mouth; four supralabials, second and fourth largest, third and fourth entering eye; two pairs of chin-shields in contact with each other, the anterior pair in contact with the symphysial; scales in 13 rows; ventrals 249; anal entire; subcaudals in 14 pairs; tip of tail blunt. Color (in alcohol) dark gray above, each dorsal scale with a lighter streak in the center; a white lateral stripe on the outer half of the second and the inner half of the first scale rows; several white spots on each side toward the anterior part of the body, the first large and prominent, the second smaller, the others decreasing and appearing only as scattered white scales toward the middle of the body; top of head uniform grayish; upper lip and temporal region white; a white band around the tail interrupted narrowly on the upper surface; underside of tail with two light stripes; a white spot on tip of tail; ventrals anteriorly light brown, spotted with dark on the edges and in the mid-ventral line, the amount of dark color increasing toward the middle of the body, the light areas becoming more and more effaced with the darker color towards the tail; occasional scales on the ventral surface entirely or partly pure white.

Remarks.—This species has a greater number of ventral plates than any

other member of the genus excepting *C. gracillima*, which has 300 to 320 ventrals. *C. gracillima* has a very small supraocular confluent with the postocular. In *C. ventralis* the supraocular is of moderate size and is perfectly distinct from the postocular.

C. lovii, the only other comparable species, has the first three upper labials subequal, the third only entering the eye. *C. ventralis* has a large second labial and a very small third labial, both of which enter the eye.

Calamaria raveni, new species.

Diagnosis.—Ventrals 172; a very minute preocular; a distinct postocular; diameter of eye less than its distance from mouth; five upper labials; frontal as broad as long, four times as broad as supraocular, much shorter than parietals; first pair of lower labials separating symphysial from chin-shields.

Type.—U. S. N. M. No. 51638; Sungai Merah, Borneo; H. C. Raven, collector.

Description.—Rostral well visible from above; frontal as broad as long, four times as broad as supraocular, much shorter than parietals; a very minute preocular; one postocular; diameter of eye less than its distance from the mouth; five supralabials, third and fourth entering eye; first pair of lower labials separating symphysial from chin-shields; two pairs of chin-shields in contact with each other; scales in 13 rows; ventrals 172; anal entire; subcaudals in 16 pairs; tip of tail bluntly pointed. Color (in alcohol) purplish gray above, a white lateral band on the second and third rows of scales; some of the scales of the first row white-centered; head white above, with grayish spots from the frontal to the rostral and around the eyes; tail pure white above, gray beneath, with white mottling on the subcaudals; ventrals white, their ends irregularly blotched with purplish gray.

Remarks.—The new species bears rather close resemblance in scale-formula and in coloration to *Calamaria lumholtzii*, also from Borneo, recently described by L. G. Andersson (Meddel. Zool. Mus. Kristiania, Nr. 7, 1923). Dr. Andersson says that the ventral plates of *C. lumholtzii* are "uniform light," while in *C. raveni* the outer edges of the ventrals are purplish gray, this color occasionally covering the whole of a ventral plate. *C. lumholtzii* is said to have no preocular, while *C. raveni* possesses a minute but very distinct preocular.

The new species is named in honor of its collector, Mr. H. C. Raven.

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OF THE

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A NEW SPECIES OF ELEUTHERODACTYLUS FROM THE DOMINICAN REPUPLIC.

BY DORIS M. COCHRAN.

The presence of a new species among a collection of frogs sent to the United States National Museum from Santo Domingo was pointed out to me last summer by Dr. G. K. Noble of the American Museum of Natural History. On his subsequent visit to the island, he was able to secure a large number, and to take many splendid photographs of the living frogs in their natural surroundings. The species may be described as follows:

Eleutherodactylus abbotti, new species.

Diagnosis.—Toes free; chest smooth, belly granular; head moderate, without ridges; vomerine teeth in two slightly oblique groups behind and between the choanae; a large, loose subgular pouch extending in very prominent folds on sides of throat and forming a strong fold posteriorly between fore-limbs; first finger shorter than second.

Habitat.—Dominican Republic.

Type.—U. S. N. M. No. 65055, Laguna, Samaná Peninsula, Dominican Republic; Dr. W. L. Abbott, collector; May, 1922.

Description of type specimen.—Tongue very broad, emarginate behind; vomerine teeth in two short and very slightly oblique groups some distance behind choanae, their outer ends not extending beyond inner borders of choanae; head moderate, without ridges; a large, loose subgular pouch extending in very prominent folds on sides of throat and forming a strong fold posteriorly between fore-limbs; nostril much nearer snout than eye, its distance from eye nearly equalling diameter of latter; upper eyelid much narrower than interorbital space; tympanum equal to one-half the diameter of eye, its distance from eye somewhat less than its diameter; disks of fingers large; first finger longer than second; toes free; disks of toes large; first toe reaching slightly beyond first subarticular tubercle of second toe; subarticular tubercles well developed; two well-developed metatarsal tubercles; no plantar tubercles; no tarsal fold; bent limbs being pressed along sides, knee and elbow overlap; hind limb being extended along sides,

heel reaches beyond eye; hind limbs being placed vertically to axis of body, heels overlap considerably; a series of elongate glands forming an interrupted dorsolateral line from above tympanum to groin; a heavy oblique glandular ridge from posterior angle of eye to shoulder, below which is a shorter one from tympanum to humerus; skin above shagreened, with scattered irregular glandular tubercles especially on the flanks; throat, chest and anterior aspect of femur smooth, rest of underside coarsely granular.

Dimensions.

	mm.
Tip of snout to vent	19
Width of head	6
Tip of snout to posterior border of tympanum	7
Diameter of eye	2.4
Diameter of tympanum	1.2
Fore leg from axilla	11
Hind leg from vent	29
Vent to heel	18

Color (in alcohol).—Above brownish gray, with a line between orbits and a much darker x-shaped mark between the shoulders; a pale line from tip of snout, extending over canthus rostralis, outer edge of supraocular and along the glandular dorso-lateral line to the groin; a broad, dark brown band from tip of snout over loreal region to eye; an oblique dark line on supra-tympanal gland, expanding into a wide band on flanks; a very narrow, sharply defined light vertebral line from level of nostrils to vent, intersected above latter by a similar line on posterior aspect of femur, tibia and on sole of foot; lips brown with small pale dots; a pale line from tympanum to humerus extending over post-tympanal glands; limbs brownish gray, marbled and indistinctly cross-barred with paler color; underside whitish.

Remarks.—Two other specimens from the same locality resemble the type closely in dentition and proportions. No. 65056 is slightly more brownish, the x-mark on the back is more distinct and the pale vertebral line is lacking as well as the intersecting line on the hind leg. The general coloration of No. 65057 is much grayer, the whole snout in front of the interorbital dark band much paler than the back; the dorso-lateral line is paler and wider; the lores and lips are pale, the dark band on the side of the head being reduced to a blackish line from the tip of the snout along the canthus rostralis and supra-tympanal gland to the shoulder; the flanks are scarcely darker than the back; the vertebral line is also absent in this specimen as is likewise the line on the hind leg. The new species is named for its collector, Dr. W. L. Abbott.

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PROCEEDINGS

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ADDITIONS TO OUR KNOWLEDGE OF SHIPWORMS.

BY PAUL BARTSCH.[1]

Since the publication of Bulletin 122, U. S. National Museum, "A Monograph of the American Shipworms," a large amount of material has come to hand, among which are a new subgenus and three new species from American waters, which are here described. In addition to these, the monographing of the Philippine forms and a study of the West Pacific members of the family have brought to light the fact that several additional superspecific groups will have to be recognized, and to these I am also giving a status in the present paper.

Bankia (Neobankia) orcutti, new species.

Orcutt Shipworm.

Shell small, subglobose, the anterior median portion pinkish, the rest white. The anterior portion with the usual sinus and reflected callus, which extends over the anterior external margin of the anterior part. From this the dental ridges extend first downward then backward, fan-shaped. These dental ridges are finely serrated at their free border and are about as wide as the spaces that separate them at the posterior margin. The umbones of the type are but slightly eroded, and I am therefore led to believe that the specimen, the largest in my possession, is not fully grown. It shows thirty-six ridges. The anterior and median parts meet in a curved line. The anterior median part is marked by rather broad dental ridges which are separated by slender lines only. The denticles, too, are very closely crowded. There are eighteen of these dental ridges in the line continuous with the ventral margin of the anterior part. The middle median portion forms a depressed groove, and is rather narrow. It is marked by coarse U-shaped lines of growth. The posterior median portion is a little broader than the anterior and middle median portions combined, and is marked by rather coarse lines of growth. The posterior part forms a moderately large auricle, which is slightly constricted at its junction with the posterior median portion. The interior is bluish white; the junction of

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

the anterior and median portions are marked by a strong raised cord. The middle median portion is marked by a strongly impressed rough groove, and bears at the ventral margin the usual knob, while from under the umbone the broad, irregular flat blade extends ventrally for two-thirds the length of the cavity. The posterior part projects as a shelf over the posterior median part with a decidedly hollow cavity behind it. The posterior part is concavely spatulate in outline. The pallet is the most peculiar we have so far seen. The cone-in-cone shaped segments are closely crowded. The membrane covering the inside of the segments is finely fimbriated distally, while on the outside it is cut into a series of short, strong spines, which give to each segment a fine comblike appearance.

The type, Cat. No. 348191, U. S. N. M., was collected by C. R. Orcutt in Bacochibampo Bay, Sonora, Mexico. It measures: height, 3.4 mm.; length, 3.1 mm.; diameter, 3 mm. The pallet measures: length, 3.6 mm., of which 1.7 mm. go to the stalk; diameter of blade, .7 mm.

Zopoteredo, new subgenus.

In the present subgenus the posterior part overlaps the median part on the inside and is completely united with it, leaving no cavity between it and the median part at the anterior margin of the posterior part. In this respect the shell almost resembles *Psiloteredo*. In *Psiloteredo*, however, there is scarcely any indication of a suture at the junction of the anterior margin of the posterior part with the median part, while in the present subgenus there is a conspicuous demarcation. The pallet of the present form differs from all the other known *Teredos* in having the calcareous portion semi-disc shaped, that is, very short and broad, and the corneous portion partly slit and infolded in the median line on the outside, so as to practically divide that part into a double cup, as in *Teredothyra*, but this is not a true double cup, for it does not involve the calcareous portion.

Type *Teredo* (*Zopoteredo*) *clappi*, new species.

Teredo (Zopoteredo) clappi, new species.

Clapp Shipworm.

Shell subglobular, pale olivaceous horn colored. The anterior portion of the anterior part shows the usual curved sinus with a reflected smooth callus, from the edge of which the dental ridges radiate backward in a fan-shaped manner, spreading first downward and then backward. At the posterior extremity they are about half as wide as the dental ridges. The latter are finely serrated on their free border. In the type the umbones are largely eroded, but fifty-four ridges are present. It is probable that more than that number have been eroded. The posterior margin of the anterior part joins the anterior margin of the median part in a curved line. The anterior portion of the median part is very broad and crossed by prominent dental ridges, which join the ridges of the anterior part almost at right angles. The dental ridges of the median part are marked with numerous tubercles which are finely denticulated at their free margin. Of these, thirty-seven are present in the type in a line continuous with the ventral

border of the anterior part. The middle median portion is narrow and marked by rough, curved lines. The posterior median portion is about half as wide as the anterior median portion, and is marked by rough, upward curved incremental lines. The posterior part or auricle is very narrow and separated from the posterior median portion by a narrow groove. The interior is bluish white. The umbones are quite strong, with the usual blade springing from the under side. The blade, which is scythe shaped, curves downward and forward. The junction of the anterior and median parts is marked by a thickened cord. The middle median portion is somewhat roughened and bears the usual knob at its ventral termination. The posterior part is attached to the posterior median portion in such a way that no cavity appears behind it, but there is a conspicuous groove showing the termination of the anterior margin of the posterior part. It is very broad and its extent would scarcely be surmised by the inconspicuous auricle shown on the outside. The pallets have a long, symmetrically curved stalk. The calcareous portion of the blade bends down over the stalk and invests it as a sheath for some little distance. The calcareous blade is short and rather broad, almost forming a semicircular disc. The corneous portion on the distal end is fully as long as the calcareous part, and bears a deep impression on its outer margin in a median line, which almost divides this part into a double cup, suggesting in that manner *Teredothyra*. The outer portion of the calcareous lining of the burrow shows a double chambered tube with a calcareous rib at the lateral median border, which is evidently coincident with the bifid aspect of the corneous portion of the pallet.

The type, Cat. No. 348189, U. S. N. M., was taken from a piece of oak timber, probably an old ship's keel, by the author, at Key West, Florida, last June. The type measures: height, 4.8 mm.; length, 4.3 mm.; diameter, 4.2 mm. The pallet measures: length, 3.5 mm., of which 2.3 mm. go to the stalk; diameter of blade, 1.2 mm.

Cat. No. 348190, U. S. N. M., contains a lot of additional specimens from the same log, and Cat. No. 348188, U. S. N. M., an alcoholic specimen received from the Marine Piling Committee of the National Research Council, their No. 997 Y D 701 A, transmitted by Dr. W. F. Clapp, for whom I take pleasure in naming the species.

Teredo (Teredothyra) atwoodi, new species.

Atwood Shipworm.

Shell subglobular, pale brown. Umbones eroded. The anterior portion with a narrow, smooth zone anteriorly, which is slightly reflected backward as a thin callus. From this the dental ridges spread in a fan-shaped manner, curving first slightly downward then almost straight to the posterior margin of the anterior part. These ridges are triangular and exceedingly finely denticulated at their free margin, where they are separated by spaces a trifle wider than the width of the ridges. 47 of these are present in the type, though many must have been lost at the eroded umbone. These ridges join the dental ridges of the anterior median part almost at right angles. The anterior median portion is about three times as wide as the

middle and posterior median portions combined. The dental ridges are closely approximated, separated, in fact, by mere impressed lines, and bear numerous closely crowded, elongated tubercles, which have their long axes at right angles to the dental last. The middle median portion is about as wide as the posterior median portion, but the middle median portion is crossed by rather strong, curved lines of growth, which become enfeebled on the posterior median portion. The posterior part forms a slender auricle which projects as a weak claw. Interior pale brown. The umbonal knob only moderately strong, provided with a slender blade. The ventral knob also rather feeble. The anterior and median portion fuse in a tumid line. The posterior margin does not form a projecting shelf, but fuses with the posterior portion of the median part without a sign of suture. Pallets long, spatulate, bifurcated at the free end, where they are doubly cupped, with a short twisted stalk marked off from the blade by a raised ring. The calcareous tube lining shows two siphonal openings.

The type, Cat. No. 348186, U. S. N. M., was taken from creosoted piles in Guantanamo Bay, Cuba, and transmitted to me by Colonel William G. Atwood of the Committee on Marine Piling Investigations of the National Research Council, for whom I take pleasure in naming the species. It measures: height, 5.7 mm.; length, 5.3 mm.; diameter, 5.4 mm. The pallets measure: length, 9.5 mm., of which 2.5 mm. go to the stalk; diameter, 2.4 mm.

An additional lot of specimens from the same station is entered as Cat. No. 348187, U. S. N. M.

This species is the second of this subgenus known from the West Atlantic. The first one, *Teredo* (*Teredothyra*) *dominicensis* was described in my "Monograph of the American Shipworms," Bulletin 122, U. S. Nat. Mus., 1922. The present species is at once distinguished from that by its much larger size.

Eoteredo, new genus.

Blade not projecting from the under side of the inside of the umbones, but attached to the middle of the broad shelf that constitutes the inward projection of the posterior part of the shell. Pallets unknown.

Type *Eoteredo philippinensis* Bartsch.

All the shipworms so far examined have the blade extending from the inside of the umbone. The present form marks an entirely different type of departure, for here it is attached to the middle of the shelf formed by the inward projection of the auricle. I deem this sufficiently distinct to merit generic separation. It is unfortunate not to have pallets of this species, which would at once show to which of the three genera that I have recognized in my monograph the present genus is most nearly related.

Eoteredo philippinensis, new species.

Philippine Shipworm.

Shell subglobular, yellowish white, with the posterior portion forming the merest trace of an auricle on the outside. Umbones eroded even in very young specimens. The anterior part very broad with its anterior portion

terminating in a somewhat curved sinus, the edge of which is slightly reflected posteriorly as a thin callus. The rest of the anterior part is marked by dental ridges, which make an even open curve from the anterior margin ventrally, then posteriorly to their posterior termination, where they join with the dental ridges of the posterior median part. 82 of these ridges remain in the type and a good many more must have been eroded at the umbone. The ridges of this anterior portion are triangular with their free border finely, evenly serrated. The posterior median portion covers two-thirds of the posterior part, and is marked by dental ridges which join those of the anterior part at right angles. The denticles here are broad and sharply cusped. The median middle portion is about one-eighth the width of the posterior median portion and is marked by curved, rough lines of growth. The posterior median portion is about as wide as the middle median portion and marked by feebler continuations of the lines of growth than those that characterize the middle median portion. The posterior part, or auricle, constitutes a very small projection when viewed from the outside, the merest indication of a claw, as it were. Interior bluish white. The anterior and median portion are marked by a roughened suture. The umbonal and ventral knobs are prominent. The erosion of the posterior umbonal region, even in young specimens, forms an opening in this region on the inside. Anteriorly this is bordered by a strong shelf which extends from the umbones to the posterior ventral margin as a shelf. From the under side of the middle of this shelf the broad blade bends down toward the ventral knob. It is the peculiar position of the blade in this instance which has prompted me to give to this form a generic designation. Pallets unknown.

The type, Cat. No. 311281 U. S. N. M., comes from a piece of wood dredged at U. S. Bureau of Fisheries Station 5243, off Uanivan Island, Pujada Bay, S. E. Mindanao, in 218 fathoms on gray mud bottom. The type, the largest specimen, measures: height, 4.2 mm.; length, 3.9 mm.; thickness, 4.2 mm.

Cat. No. 311282 U. S. N. M., contains additional specimens which were obtained at the same station.

Coeloteredo, new subgenus.

In this subgenus the blade of the pallet forms a half hollow cone; that is, the outer portion is convex while the inner portion of the blade is almost flat. The entire structure is very thin. The stalk is short with the basal half expanded into an oval knob, which is fully three times as wide as the narrower neck of the stalk.

Type *Teredo* (*Coeloteredo*) *mindanensis*, new species.

Teredo (Coeloteredo) mindanensis, new species.

Mindanao Shipworm.

Shell small, subglobular, white, the extreme anterior portion of the anterior part with a moderately deep sinus that is covered with a smooth callus, which is slightly reflected over the exterior portion. The remaining

anterior part is crossed by moderately strong dental ridges which first bend downward and then backward in an even, gentle curve, separated at the posterior extremity by spaces about twice as wide as the dental ridges. These dental ridges slope a little more abruptly dorsally then ventrally, and are very finely denticulated at their free border. There are forty-two of these in the type, in which the umbone is partly eroded. A perfect specimen would therefore show a larger number. The anterior part of the median area is marked by closely crowded dental ridges, which are about as wide as those of the anterior area. The denticles of these are quite fine. Of these ridges twenty-two are present in a line parallel to the ventral margin of the anterior part. The middle median portion is slightly concave and crossed by the non-denticulated decidedly curved continuations of the dental ridges of the anterior median portion, and fine incremental lines. The posterior median portion is marked by rather rough lines of growth, and is a little wider than the anterior and middle portions of the median part combined. The posterior part is developed into a rather pronounced auricle, which is marked by a series of strong wavy lines, appearing almost like ridges. The posterior median part bends rather abruptly downward to join the auricle. The interior is white. The junction of the anterior and median portion is marked by a rather strong cord. The middle median portion forms a slightly depressed roughened groove, at the basal termination of which the usual strong knob is situated. The auricle overlaps the posterior median portion decidedly and forms a rather strong shelf. The cordlike markings described for the exterior are also apparent on the inside. A strong, somewhat irregular curved blade extends from the inner side of the umbone two-thirds of the way toward the basal knob. The pallets consist of half a hollow cone; that is, the external portion is curved while the inner portion is almost flat. The cavity of the cone extends to the insertion of the stalk. The stalk is short and bears an expanded knob at its free end.

The type, Cat. No. 310975, U. S. N. M., was collected in a piece of wood dredged during the U. S. Bureau of Fisheries Albatross Philippine Expedition at Station 5252, in 28 fathoms on coral bottom, off Linao Point, Gulf of Davao, Mindanao. It measures: altitude, 2.2 mm.; length, 2.2 mm.; diameter, 2.2 mm. The pallets measure: length, 2.6 mm.; diameter, 1.3 mm., of which 1.2 mm. go to the stalk.

A lot of specimens from the same piece of wood are entered as Cat. No. 246127, U. S. N. M.

Nototeredo, new subgenus.

Shell as in *Neoteredo*; that is, with the posterior part so attached to the posterior median portion of the median part as to form a decided shelf, which projects inward. Pallets spoon shaped as in *Psiloteredo.*

Type *Teredo* (*Nototeredo*) *edax* Hedley.

In my "Monograph of the American Shipworms," Bull. 122, U. S. Nat. Mus., 1922, I recognized among those having spoon shaped, not terminally cupped pallets, two subgenera, *Teredora* and *Psiloteredo.* In *Teredora* we have the posterior part shaped like a spatula and attached to the posterior

portion of the median part in such a way that a shelf projects inward about as much as the auricle projects outward. In *Teredora*, too, the pallets have a nail-like depression on the outside which may be marked by concentric lines of growth, or these may become even riblike, and here we may have longitudinally radiating riblets, usually confined to the basal portion of the nail-like part. These, likewise, may be strong and riblike. In *Psiloteredo* the posterior part fuses with the posterior median portion in such a manner on the inside that no shelf projects. In fact, in some of the species it is difficult to note even the suture. The pallets are spoon shaped, with the outer distal portion slightly excavated.

In the present subgenus we have the posterior portion projecting inwardly over the posterior median part to form a strong shelf, as in *Neoteredo*. It differs from this at once by the possession of entirely different pallets, which are like those of *Psiloteredo*.

I am indebted to Mr. C. Walton, Peterhead, South Australia, for a lot of specimens of this species recently received, which reveal the fact that a new group designation is required to embrace it.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

MAMMALS OF THE DISTRICT OF COLUMBIA.

BY VERNON BAILEY.

INTRODUCTION.

The first formal list of the mammals of the District of Columbia,[1] comprising 38 species, was published in 1896. Since then nine additional species have been taken within the area, many interesting notes have accumulated, a number of technical names have been changed, and the old list has become quite inadequate for the present growing interest in outdoor life. The long-felt need of brief untechnical descriptions of species to aid in the identification of the obscure or rare forms is now supplied. It is to be hoped that a closer study of our local fauna will add other species to the list and that fuller notes on habits will render a future revision still more satisfactory than the present.

AREA INCLUDED.

As in the previous list a circular area with a radius of 20 miles from the Capitol as a center is adopted. This seems to represent the original animal life of the District of Columbia better than does the area within the present restricted boundary lines of the District, much of which is now occupied by the city proper. All but a very few of the notes however refer to the inner half of this radius and most of them to the original 10 mile square formerly included within the District. The present area reaches well beyond the farthest corners of the Geological Survey quadrangle and includes many swamps, marshes, glens, cliffs, and forested areas, now not fully explored, that promise worthy discoveries. Not half and probably not a quarter of it has been carefully examined or trapped over for mammals.

[1] List of Mammals of the District of Columbia, by Vernon Bailey. Proc. Biol. Soc. Washington, Vol. X, pp. 93–101, May 28, 1896.

HISTORICAL.

The early natural history of the District of Columbia, including records of mammals for the region about Washington has been well presented by W. L. McAtee, in Bulletin I., of the Biological Society in 1918, but there is still a rich field in old journals and manuscripts and in obscure publications which will eventually throw much light on the actual conditions of the animal fauna in its primitive state.

Of the mammals known formerly to occur in or near the District of Columbia, but no longer found here, may be noted the buffalo, elk, white-tailed deer, beaver, panther, wolf, marten, black bear, and the bottle-nosed dolphin, or porpoise.

The porpoise was last seen in the river near Georgetown in 1884, and was then common in the lower part of the Potomac, but has now become scarce.[1] Being more or less migratory in habits its reappearance is not improbable.

ACKNOWLEDGMENTS.

My own notes have been freely supplemented by those of other members of the Biological Survey and the Biological Society. So far as possible credit is given with each note, but for the preservation of specimens and the records that go with them it is obviously impossible to give full credit in all cases. Even a list of those who have actually contributed to the net results would include most of the local naturalists from Baird down to the present time, and include, besides mammalogists, a large number of ornithologists, entomologists, herpetologists, conchologists, botanists, and others with only the keen outdoor interest of the world in which we live.

For more than the ordinary contributions of specimens and notes, however, I wish to express my indebtedness to Dr. C. Hart Merriam, Dr. E. W. Nelson, Dr. A. K. Fisher, Dr. T. S. Palmer, Dr. Wilfred H. Osgood, Mr. Morris M. Green, Mr. Edward A. Preble, Mr. A. H. Howell, Mr. N. Hollister, Major E. A. Goldman, Mr. Gerrit S. Miller, Jr., Dr. Charles W. Richmond, and Mr. J. H. Riley.

FAUNAL POSITION.

The District of Columbia lies wholly within the Carolinian division of the Upper Austral Zone, but in a comparatively

[1] The Pastime, Vol. 3, No. 2, p. 16, Aug., 1884.

narrow belt between the Austroriparian, which comes the up coast as far as Norfolk; and the Alleghanian, which follows down the mountains only a short distance to the westward. As a natural result of proximity a few Alleghanian species drift down the streams and find footholds on the cold slopes of high banks and cliffs, and in cold gulches, or in cold swamps and sphagnum bogs, where very local conditions afford more or less congenial environment. *Microsorex* from near the hemlock slopes on the west side of the Potomac above Plummer Island, and *Synaptomys* from the sphagnum swamps near Hyattsville are good examples. The red squirrel is here on the edge of its zone, which is mainly Alleghanian. The red-backed mouse (*Evotomys*) may yet be found on some of the cold slopes of the river bluffs.

On the other hand the Austroriparian rice rat (*Oryzomys palustris*) reaches up from the south with the live oaks almost to the edge of the District (to near Colonial Beach, Virginia) and will probably be added to the District list when the Patuxent marshes are explored. There is one specimen of the southern shrew (*Sorex longirostris*) recorded for the District, and the Carolina shrew *Blarina brevicauda carolinensis* comes close to the southern border. The golden mouse (*Peromyscus nuttallii*) was recorded for the District in 1861 by Haley in Philp's "Washington Described," but as no specimens are known to have been taken nearer than the Dismal Swamp, Virginia, this Austroriparian species is not included in the present list. A number of specimens of the Rafinesque bat (*Nycticeius humeralis*), which is mainly an Austroriparian species, are merely the free wanderers of a winged species near the edge of its real zone.

Class MAMMALIA: Warm-blooded animals that nurse their young.

Order MARSUPIALIA: Pouched animals.

Family DIDELPHIIDAE: Opossums, etc.

OPOSSUM, VIRGINIA OPOSSUM.

Didelphis virginiana virginiana Kerr,

In size the opossum about equals the ordinary house cat. It has naked ears, long nearly naked, prehensile tail, and soft gray fur. The female has an external abdominal pouch, in which the young are carried and nursed for about 76 days after birth before they first emerge. The period of gestation is about 16 days, and the young when born are very rudimentary, about the size of small navy beans, weighing about a fifth of a gram each. An adult male measures in total length 780, tail 298, hind foot 70 mm.;

in inches, 30.7, 11.8, 2.75. A large male caught near Woodley Road in December, 1919, weighed 8 pounds.

Opossums are common about Washington, where their tracks may be seen on the muddy or sandy shores of creeks and ponds, or sometimes in fresh snow. The print of the projecting thumb on the hind foot characterizes the track, as well as the pointed nose and little eyes do the face. Mainly nocturnal and great wanderers at night they are rarely seen in the daytime unless routed out of an old burrow, a hollow log or tree, from among the rocks, or under a brush heap. They are good climbers and when chased by the dogs will go to the tops of the tallest trees. In the spring of 1894 I found one fast asleep on a large branch of a white oak near the Adams Mill Road entrance to the Zoological Park, and since then others have been found in the trees in the heart of the city where they had wandered during the night. A few are usually kept in the Zoological Park, but are too sleepy to be of much interest to diurnal visitors.

J. H. Riley tells me of a Negro who with the aid of a dog caught over seventy opossums in one fall and winter near Falls Church.

A female not yet fully grown was brought to me by Frederick Coville, in December, 1917, from a night hunt near Washington. I kept her in a box most of the winter, feeding her scraps from the table. Any kind of meat was eagerly eaten, as were vegetables, cereals, fruit, milk, and a great variety of food. In fact anything edible was rarely refused. She was perfectly tame but slow and stupid and would rather "play possum" than run away.

In the spring she was sent to the Zoological Park, and on May 21, placed in a cage with a mate. On August 28 she was found to have seventeen young, probably several weeks old, which had just emerged from the pouch. Evidently the family was too large for one small mother to raise, nine to eleven being the usual number, and seven of these died. Thirteen and fourteen were the highest previous records I had known, but J. H. Riley reports a large female captured by a neighbor near Falls Church, which was said to have seventeen young. Riley himself found a female in a hollow log late in April, with nine very small young in the pouch, each fastened to a nipple.

During the winter fat opossums are temptingly displayed in Center Market, where usually offered at the moderate prices of 50 cents to $1.50 each. When scalded and the hair removed they much resemble fat pigs and by many are considered a great delicacy. They are tender and of good flavor, but usually very rich and oily. Their light gray fur is long and soft, and when in prime condition is so attractive that in recent years it has been much worn as capes, collars, and muffs.

Order GLIRES: Gnawers.

Family SCIURIDAE: Squirrels, chipmunks, woodchucks, etc.

RED SQUIRREL.

Sciurus hudsonicus loquax Bangs.

These are the smallest of our tree squirrels, about half the size of the gray squirrels. Their upperparts are bright reddish brown, brightest in winter

and with a black stripe along each side in summer, and the lower parts are mainly white. Adults measure in total length about 340, tail 137, hind foot 50 mm.; in inches 13.4, 5.4, 2.

From 1902 to 1906 red squirrels were common in the woods of the Zoological Park and about Washington, but in recent years they have become very scarce and are rarely seen near the city, though in 1918 Dr. Dearborn told me they were common near his place at Linden, Maryland, between the District line and Takoma Park, and Riley reports them still so common near Falls Church as to be something of a nuisance among cultivated nuts. Specimens in the U. S. National Museum were collected near Washington in 1886, by Dr. C. Hart Merriam; in 1888 by M. M. Green; in 1889 by Dr. A. K. Fisher; in 1896 by Vernon Bailey; at Laurel, Maryland, in 1886 by George Marshall; at Baileys Crossroads, Virginia, in 1888 by E. M. Hasbrouck; at Falls Church, Virginia, in 1896 by C. G. Rorebeck, and in 1897 by James H. Gaut; at Four Mile Run, Virginia, in 1897 by W. H. Osgood; at Marshall Hall, Maryland, in 1899 by Dr. Sylvester D. Judd, and at Plummer Island, Maryland, in 1908 by H. S. Barber. The same year Dr. A. K. Fisher reported one seen swimming across the Potomac near Plummer Island, and in 1914 another living near the cabin until caught and eaten by a Cooper hawk. He also reported them on the island in 1919 and 1920. In December, 1906, W. L. McAtee saw one feeding on seeds of the tulip tree in Rock Creek Park. Some years ago they were common in the Soldiers Home grounds, and Preble tells me they were formerly common at Marshall Hall, and that one or two lived in a pine grove near Wisconsin Avenue and Fulton Street in 1919. I have seen a few in Rock Creek Park, near the Bureau of Standards, near Hyattsville, and in the woods west of the Potomac River, and occasionally have heard their cheery *ch-r-r-r-r-r-r* where they were not seen.

Their bulky nests of grass, moss, and cedar bark fibers are sometimes seen in the branches of trees and usually can be distinguished from the gray squirrel nests by their smaller size and finer material, and from flying squirrel nests by larger size and coarser material. They also make their nests in the hollows of trees.

Nuts and acorns generally furnish these squirrels an abundance of food but they have a wider range of diet than the gray squirrels and eat many seeds, berries, and mushrooms.

They are beautiful and attractive little squirrels, and their decrease in abundance would be more regrettable but for the fact that they are known occasionally to rob the nests of birds.

CAROLINA GRAY SQUIRREL.

Sciurus carolinensis carolinensis Gmelin.

The native gray squirrels are about twice as large as red squirrels, and a little more than half as large as fox squirrels. Their tails are large and puffy, the upperparts clear brownish gray and the lowerparts white. Total length 480, tail 220, hind foot 66 mm.; in inches 18.9, 8.7, 2.6. An old female that came to my windowsill for peanuts and sat on the scales to eat

them weighed 1 pound and 7 ounces. Another female weighed 1 pound, 8 ounces.

From the beginning of my own observations in the District in 1891 gray squirrels were common in the woods around Washington up to the edges of the city. They were frequently seen at the edges of Washington Heights, and on the hill around the old house since used as an office for the Zoological Park, and throughout the extensive areas of the Zoological, Rock Creek, and Woodley parks, the Soldiers Home, Marshall Hall, and Mount Vernon. They were also found in the extensive woods along both sides of the Potomac River above Georgetown, but in unprotected woods were exceedingly shy and rarely seen. The extensive areas of native forest with old hollow walnut, butternut, hickory, chestnut, beech, and oak trees afforded safe retreats and an abundance of choice food for the squirrels which lived in their hollows or built bulky nests of sticks and leaves in their branches.

In 1894 E. A. Preble saw one in the Smithsonian grounds, but whether this was an escaped pet or a wanderer from the suburban parks was not known. Later several lots of squirrels were released in the parks. The late Dr. Wm. L. Ralph purchased many gray squirrels and liberated them in the Smithsonian grounds, where up to the time of his death in 1907, he fed and cared for them in both fair and stormy weather with keen interest and enjoyment, as recorded by Dr. A. K. Fisher in his biography. They soon became common in the Mall, in the fine old forest then stretching from the Capitol grounds to the Monument, and spread to the White House grounds, LaFayette Square, and other city parks. In 1900 they were a common feature of the parks, and were occasionally seen along the tree-lined streets in town. Since hunting with guns and dogs was first prohibited in the District (in 1906), the squirrels have not only increased in numbers, but become comparatively tame in the woods as well as in the city parks.

In 1909 an old squirrel took up her residence in a bird house in the hickory tree in my back yard at 1834 Kalorama Road, and on the 28th of the following February she had 4 young in the nest. They were not seen out of the box until April 2 when nearly half grown squirrels. They were soon able to take care of themselves and were apparently weaned about May 20. This was the earliest litter noted, but others have been born early in March. Young have been raised in my yard every year since, and often an old squirrel raises a second litter of young which appear out of the nest in September or October. Four is the regular number of young, but there have been two litters of five.

Alley cats catch some of the young squirrels and occasionally an old one, but for over twenty years I have managed to keep one or two families of squirrels around the place to the great delight of the neighborhood children and to our own constant enjoyment.

In the parks the squirrels are a continual source of interest and pleasure to thousands of children and invalids, as well as to the general public who hurry by with a look, a word, or a peanut for greeting. During snowy weather the squirrels are sometimes fed by the District police, and with nuts and acorns from the trees and peanuts from passersby they generally

fare well. In dry weather, however, they often have to go a long distance for water as they are thirsty animals, requiring water at least once a day and drinking several times a day if a supply is available. Often they are obliged to leave a locality where water is not to be had.

At times, especially in spring, they are greatly pestered by fleas and mites. If noticed scratching or if they show rough and patchy coats, a teaspoonful of good flea powder (pyrethrum) mixed with a teaspoonful of powdered sulphur, thrown into their nests, will usually destroy both pests. The squirrels sometimes cause annoyance by digging up the freshly planted bulbs in our yards in winter, but will rarely disturb them when set down five inches below the surface of the ground where they are also safe from too early sprouting.

The psychological value of a defenseless wild animal in our midst to be protected, fed and guarded by the people through interest rather than by force of law, can not be overestimated.

BLACK SQUIRREL; NORTHERN GRAY SQUIRREL.

Sciurus carolinensis leucotis (Gapper).

The northern squirrels are slightly larger than the Carolina. Their upperparts are clear light gray in winter, and brownish gray in summer in the gray phase, but they are more or less dichromatic, in some localities a few and in others half or nearly all of the individuals being black all over. Measurements, total length 500, tail 220, hind foot 70 mm.; in inches, 19.7, 8.6, 2.7.

Black individuals of these squirrels have been introduced and liberated in the National Zoological Park and evidently are increasing, spreading, and breeding true to color. Mr. N. Hollister, Superintendent of the Park, on March 11, 1919, contributed the following note:

Two shipments of black squirrels have been received from Ontario and liberated in the Park. The first shipment of ten was from Rondeau Provincial Park, Morpeth, Ontario, May 18, 1906; and these squirrels were immediately liberated in the northwestern part of the Zoo where they were very much at home. They have since been constantly in the Park, especially from the vicinity of the great flight cage to the Klingle Valley, and they have spread northward to Cleveland Park and nearly to Chevy Chase. During the winter of 1919 two appeared near the Park office and they are now frequently seen in the vicinity.

FOX SQUIRREL.

Sciurus niger neglectus (Gray).

The fox squirrels are the largest of our squirrels, being nearly twice as heavy as the gray, with rich buffy or orange lowerparts, and buffy or yellowish gray upperparts, with crown and nose often blackish. Total length 598, tail 289, hind foot 78 mm.; in inches 23.5, 11.4, 3.1.

Fox squirrels are now rare in the vicinity of Washington, but apparently not entirely exterminated. In 1905 I saw one on the Virginia side of the Potomac just above Plummer Island; on October 22, 1916, Francis Harper

saw one just above Great Falls on the Maryland side of the river; and in September, 1919, J. H. Riley reported one killed about 3 miles south of Falls Church. There are specimens in the U. S. National Museum from Maryland, taken at Laurel, Patuxent River at Priest Bridge, and North Chesapeake Beach, and from Virginia at Accotink, Hampstead, Clark County, and at Blumegrove, Bluemont, Osso, and Hightown.

The squirrels brought into Center Market for sale every winter are said to come from Virginia, but no definite locality can be assigned to them by the dealers. They probably come from the foothills and mountains considerably west of Washington. In 1861 Haley in Philp's "Washington Described" says (p. 23), "The most interesting species is the cat squirrel (*Sciurus cinereus*), a very large, heavy kind occurring in different varieties of color, as red, gray, and black. It is confined to a limited area in Virginia, Maryland, Pennsylvania, Delaware, and New Jersey."

Highly prized game animals, these large and handsome squirrels have been persistently hunted until on the verge of extermination over much of their original range. But for their great intelligence and skill in hiding and keeping out of sight they would long since have vanished from our remnants of forest. If as vigorously protected as they have been persecuted they would soon increase and again we should see their long plumy leaps through the trees and hear their husky barking in our too-silent forests. They are superb squirrels, in size and beauty far surpassing the grays and just as easily tamed. In Ann Arbor, Detroit, Madison, and other cities they are as common and tame in the city parks and streets as our gray squirrels are here.

Fox squirrels, some of which may be of southern forms, have been liberated at various times in the Zoological Park and have been observed from time to time during the past few years in Cleveland Park and adjoining wooded sections. Mr. N. Hollister, superintendent of the Park, reports importations of seven from Wichita, Kansas, in 1899; of one from South Carolina, in 1902; of eight from Arion, Iowa, in 1903; of one from Richmond, Virginia, in 1904; and one from Columbia, Tennessee, in 1916.

CHIPMUNK.

Tamias striatus striatus (Linnaeus).

Chipmunks are considerably smaller than the red squirrels, with slender tails and shorter legs. The five black and two white or buffy stripes on the rusty brown back distinguish them from any other eastern mammal. An adult measures in total length 233, tail 88, hind foot 35 mm.; in inches 7.2, 3.5, 1.4.

These little striped ground squirrels are fairly common in many of the patches of woods around Washington, up to the very edge of the city, where cats are not too numerous. They are occasionally seen running over the ground and over logs or rocks, or even up the trunks of trees, for they are good climbers. They live in hollow trees, logs, or holes in the ground where they build soft nests and lay up stores of nuts, seeds, and grain for winter use, filling their capacious cheek pouches and emptying them in the storage

chambers near their nests. They also become well covered with fat in the autumn, and during the cold weather of winter hibernate for a long or short period according to the weather. Farther north they hibernate for about five months, but here they may be seen out of their dens at any time of winter during a period of warm weather. They are generally sleepy and quiet until their breeding season begins in March or April.

Late in summer and in autumn their rapid chipper of alarm is most often heard and occasionally also the slow *chuck, chuck, chuck,* of their call note.

They feed on a great variety of nuts, acorns, seeds, berries, insects, lizards, and such small game as they can catch. As pets they will eat a great variety of scraps from the table and are gentle and full of bright interesting ways.

SOUTHERN WOODCHUCK; GROUND HOG.

Marmota monax monax (Linnaeus).

The woodchuck is a heavy, short-legged animal with short ears and short bushy tail, in color grayish brown above and rusty below, with blackish tail and feet. When full grown it will measure in total length about 665, tail 153, hind foot 88 mm.; in inches 26, 6, 3.5, and weigh about 10 or 12 pounds.

Woodchucks are common on the bluffs on both sides of the Potomac River above Chain Bridge, and on High Island, Plummer Island, Scott Island, Cupids Bower, and other islands in the river. Riley reports a very few at Falls Church and they occur in some numbers in the farming country between there and the Potomac, as well as in other locations around the District. Hollister reports one seen in the Zoological Park in 1919. The abundance of rocks along the river bluffs afford them unusually safe retreats in which to escape dogs and other enemies. On Plummer Island where no dogs are allowed, a few woodchucks became quite tame and come out on the rocks close to the cabin where the club members can watch them feeding or sitting in the sunshine. They generally select rocky slopes, or steep hillsides for their dens and burrows, but also make large and conspicuous burrows on level ground, in the woods, or occasionally out in fields. Their trails and burrows may often be found, but usually the animals are very shy and keep out of sight when people are around. Their loud whistle is sometimes heard from a considerable distance, and it is generally a warning note to others of the family that danger is approaching.

Woodchucks feed mainly on green vegetation, and are especially fond of clover and most farm crops, so it is necessary to keep their numbers well reduced in farming districts. In woods and wild land they do no harm and add much of interest to the quiet places.

In autumn they become very fat and during the coldest part of winter hibernate deep down in their burrows. In this climate they may come out on warm days in winter, but farther north they hibernate securely for about five or six months.

On March 26, 1917, Prof. D. E. Lantz noted thirty-eight woodchucks displayed in Center Market for food. Three days later thirty-six of them

had been sold for a dollar a piece. By many they are highly prized as game animals.

Family PETAURISTIDAE: Flying squirrels.

FLYING SQUIRREL.

Glaucomys volans volans (Linnaeus).

The small flying squirrels of the Eastern States are scarcely as large as chipmunks, but when spread on their two broad membranes into a nearly square, flat gliding plane, steered by the wide, horizontally flattened tail, they look much larger than they really are. They have large black eyes, short ears, soft silky fur of a drab gray on the upperparts and creamy white below. Adults measure in total length 232; tail 101, hind foot 30 mm.; in inches, about 9.1, 4, 1.2.

In the woods around Washington up to the very edges of the city they are fairly common, although rarely seen on account of their strictly nocturnal habits. In 1888 and 1889 Morris M. Green found several pairs living in woodpecker holes in trees along Rock Creek, in the Soldiers Home Grounds, and along Eastern Branch. One day in 1893 Preble and Hasbrouck found at least fifteen in woodpecker holes in two dead oak stubs near Mount Vernon, discovering them by pounding on the trees in which they lived. One got into a trap I had set for a wood rat at the west end of Chain Bridge, and I have often made them fly from a hollow tree just below the Connecticut Avenue Bridge, and in many places in Rock Creek Park. At Falls Church Riley reported finding twelve living in hollows in one tree, and one that he saw sail to a tree 90 feet from its starting point. Generally they live in hollow trees or old woodpecker nest holes, but in 1902, when trapping with Theodore Roosevelt, Jr., we found several of their nests in the dense evergreen tops of red cedar trees along Broad Branch where we could go at any time and tap on the trees and see the squirrels come out and fly away to the nearest trees. The nests were neat balls of finely shredded cedar bark with round holes at one side like marsh wrens' nests. On April 12, 1917, at our Boy Scout camp on the Virginia side of the river just above Plummer Island, E. A. Preble and Francis Harper found a family of young flying squirrels in a bark nest in the fork of a tree at the edge of camp. The young were examined very gently, but the following morning the old squirrel had removed them to safer quarters. A family of 6 young reported by Prof. Lantz at Silver Spring, Maryland, left their nest about July 20, 1917. On Plummer Island in 1906 Dr. Fisher had five of his seventeen gourds, hung on trees on the island, occupied by flying squirrels, and on May 17, 1908, an old female was nursing her young in one of the gourds not far from the cabin. In the sixth story of the Ontario Apartments Mr. Henshaw for several winters has fed flying squirrels on his windowsill at night. They would come up the stucco walls and enter his room if the window was open, sometimes burying nuts under his sofa cushions and behind his books.

In the still woods at night one often hears their fine shrill squeak or whistle, and occasionally a soft little *pat* as one alights on the side of a tree,

but for such common animals they are little noticed. They may be found in the daytime by pounding with a hatchet on the base of an old tree that contains a hollow or an old woodpecker hole and watching to see if a little round head and black eyes appear at the door. If one does appear more vigorous pounding will generally send it off on wide spread membranes to the next tree and often to the next and the next. They are often caught by boys and tamed, and if taken young make delightfully gentle and interesting pets. The only trouble is they want to sleep all day and play all night.

Family MURIDAE: Rats, mice, etc.

NORWAY RAT.

Rattus norvegicus (Erxleben).

The common Norway, brown, wharf, or house rats with their pointed noses, small eyes and ears, nearly naked tails, and coarse brown fur are the embodiment of all that is offensive in the rodent family. Large individuals will measure in total length 415, tail 192, hind foot 43 mm.; in inches 16.3, 7.5, 1.7, and weigh about a pound, rarely two pounds. Usually quarter or half grown individuals are seen, as fortunately few ever reach extreme old age.

Natives of the Old World these rats came to America in ships about 1775, and have spread over a large part of the continent. They are numerous throughout Washington and the District of Columbia, not only in dwellings, stables, storehouses, markets, along the wharves, in the alleys and back yards where cover and food can be found, but in parks, fields, and gardens, and especially around dump heaps and trash deposits. In places they swarm on the river flats burrowing in dikes and banks, in dry weather living in the flat ground or among rocks or under cover of dense vegetation, brush, or logs.

They eat almost anything that is edible and unlike most small mammals seem indifferent about cleanliness or sanitation. They run through mud and sewage and swim across streams and are often filthy and covered with sores and with the fleas that convey bubonic plague to human beings. They breed rapidly, beginning when half grown and producing 6 or 8 to 12 or 13 young at frequent intervals throughout the year. They cause great loss of property, are a menace to health and should be destroyed at every opportunity.[1] Owls are their greatest enemies and should be carefully protected. Dr. Fisher has taken 434 rat skulls from barn owl pellets found in the Smithsonian towers.

BLACK RAT.

Rattus rattus rattus (Linnaeus).

The black rat is smaller and slenderer than the brown rat, with much longer, slenderer tail, larger ears and eyes, and generally of a dull or plumbeous black color all over. A medium sized adult measures in total length 397, tail 223, foot 36, and ear (dry) 20 mm.; in inches approximately 15.6, 8.8, 1.4, .8.

[1] See Bull. No. 33, Biological Survey, U. S. Dept. of Agr. Also more recent circulars.

These rats are native in the islands of the western Pacific but have been carried in ships to ports all over the world. They were brought to America before the brown rats were known here, and at one time were the common rat of the Eastern States, but have gradually disappeared before the larger species, except along the shores or near shipping ports. Two specimens were taken in Center Market in January and February, 1912, supposed to have been brought in boxes of dates from Egypt. Another, apparently of this species, was taken alive April 20, 1923, on a river boat at the Seventh Street wharf, and others may be expected at any time along the Potomac water front.

ROOF RAT.

Rattus rattus alexandrinus (Geoffroy).

The roof rat is very similar in proportions and general characters to the black rat, but is usually grayish brown above and white below. A fair sized individual measures in total length 435, tail 230, foot 37, and ear (dry) 21 mm.; in inches approximately 17, 9, 1.4, .8.

Native in the more southern islands of the western Pacific these rats have been carried in ships over much of the world. They rarely penetrate to a great distance from the coast and seem never to have been recorded from the vicinity of Washington until very recently when several were taken alive, in April, 1923, on one of the river freight boats at the Seventh Street wharf. They are evidently kept away from the cities and settlements by the larger and fiercer brown rats, but are occasionally found in the Southern States in the woods and along streams, where they climb trees and vines and make their nests when possible well above the ground and out of the reach of numerous enemies.

HOUSE MOUSE.

Mus musculus musculus Linnaeus.

The common house mouse, with its sharp nose, small eyes, long, tapering tail, and mouse gray or mouse brown fur and rank mousey odor is too well known to most people. An adult specimen measures in total length 160, tail 80, hind foot 19 mm.; in inches 6.3, 3.1, .75; and weighs about 20 grams.

There is no record of their first introduction from the Old World to America, but it may have been in the Mayflower. They are now almost all over the settled parts of the continent, and are usually most numerous in the cities, and in and around buildings, but in many places have become established in fields and waste places. In Washington they are numerous about buildings, in the alleys, under rubbish or any cover in back yards or vacant lots, in lumber piles, wood piles, and especially in weed patches or tall grass in parks or waste places. Potomac Park and the flats along the river and creeks were swarming with them before they were cleared and kept mowed and clean. They are found on almost every farm, not only in buildings, but in the fields and along fence rows from which they enter the grain fields and shocks and stacks.

As their name indicates, they prefer to live indoors, in basements and cellars and attics, between walls, floors, and ceilings of houses, or in storerooms, barns or granaries, where they occasion much annoyance and loss of property. They crowd into buildings during the first cold weather of winter, seeking protection, warmth and food. A few mouse traps well baited with rolled oats, bread, or bacon, or better with all three, will usually keep them caught out of any building. Dr. Richmond, a bird lover, who does not keep cats, finds that by trapping the mice thoroughly at the beginning of winter he has little trouble for the rest of the year. Dr. Fisher has taken 817 skulls from the pellets regurgitated by barn owls which formerly inhabited the towers of the Smithsonian building.

WHITE-FOOTED MOUSE.

Peromyscus leucopus noveboracensis (Fischer).

The white-footed mouse, woods mouse, or deer mouse, is about the size of the house mouse, but with larger eyes and ears, softer fur, and much brighter, prettier expression. The upperparts are buffy brown, and the feet and lowerparts and lower half of the tail pure white. The young are slaty gray. Adults measure in total length approximately 175, tail 73, hind foot 20 mm.; in inches 6.9, 2.8, .75. Weight about 20 to 24 grams.

These bright little native mice are common in the woods up to the very edges of Washington, but are nocturnal and rarely seen except by naturalists and boys who take enough interest in the wild creatures around them to want to make their acquaintance. They are found in hollow trees or logs, or in walls, banks, or rock piles where they make soft nests in well hidden cavities from which they come out at night and gather seeds or grain and nuts for food. They climb trees and are as active, bright, and pretty as squirrels. Only rarely do they enter buildings, or do any serious mischief unless in grain fields, where they help themselves to a small amount of grain or dig up some of the planted seeds.

They are too quick and nervous for good pets, but are extremely interesting in captivity, and very fond of spinning their hollow wheels or revolving disks at night.

WOOD RAT.

Neotoma pennsylvanica Stone.

These native rats differ greatly in both appearance and habits from the house rats, although about the same size. They have large ears and eyes, very long mustaches, round hairy tails, and soft fur. The upperparts are buffy gray, lowerparts and feet pure white. An adult specimen measures in total length 388, tail 172, hind foot 42 mm.; in inches 15.2, 6.7, 1.6.

Wood rats are common in cliffs, caves, and rock slides along the west side of the Potomac River from Chain Bridge to Great Falls, but no trace of them has been found on the east side of the river, even in the most ideal situations, and only recently have they appeared on Plummer Island. They live among the rocks and in places block the doorways of their little caves and clefts with sticks, chips, and bark and such other building material as they can find and carry. Scattered remains of food plants, nut

and acorn shells, and sometimes dry or freshly cut green plants mark the entrances of their dens and their long black pellets scattered about near by are unmistakable evidence of their presence. They are mainly nocturnal but I have seen them running among the rocks when disturbed in the daytime. They have a musky odor but the flesh is white and delicate and better than that of squirrel or rabbit.

The two to four young are raised in soft nests among the rocks.

VIRGINIA MUSKRAT.

Fiber zibethicus macrodon Merriam.

Muskrats with their thin, naked, flattened, rudder tails, large webbed hind feet, short ears, and coats of dense soft fur are fitted for a life passed mainly in the water. In color they vary from a golden brown to dark brown and black, with paler lowerparts. Adults measure in average total length 620, tail 274, hind foot 88 mm.; in inches 24.5, 10.7, 3.4.

Muskrats are common in all suitable localities about Washington, in the marshes on both sides of the Potomac, as well as in Rock Creek and many other small tributary streams. E. A. Preble tells me they used to be common in natural ponds on the Potomac Flats near the present site of the Lincoln Memorial. Hollister in his "Synopsis of the Muskrats" lists specimens from Washington, Kensington, Forest Glen, Branchville, Laurel, Broadwater, and Arlington. They have been seen in broad daylight in the Zoological Park swimming in Rock Creek. In the marshes along both sides of Anacostia River muskrat houses are common and a few are usually seen from the railroad in the ponds and marshes just west of the bridge across the Potomac. The creek banks are in many places perforated by their burrows as along the streams muskrats generally live in bank dens rather than houses.

Large numbers of skins are brought to the market by local trappers from the big marshes farther down the river, and during the open season muskrat meat is one of the standard articles of game in Center Market where it is usually sold under the name of "marsh rabbit." The meat is dark but of very good flavor and quite free from the musky odor that is often noticeable on the skins.

MEADOW MOUSE; FIELD MOUSE.

Microtus pennsylvanicus pennsylvanicus (Ord).

These are heavy bodied, short eared, short tailed, short legged little field mice with small beady eyes and long soft, dark brown or blackish fur. They measure in total length about 171, tail 46, hind foot 21 or 22 mm.; in inches 6.7, 1.8, .76; and weigh from 35 to 45 grams, rarely 56 grams.

They are probably the most abundant native mammals all around and up to the very edges of Washington, and even press into the city and have been taken in the city parks and on vacant lots. They fairly swarmed over the river flats and marshes, including Potomac Park, until the ground was cleared of weeds and wild grass, and seeded down and kept mowed and clean. Up to 1919 many places in Potomac Park were honeycombed with

their burrows and runways. Soft clean nests are made of fine grass and leaves, either underground or on the surface, where the young are born and raised, and where much of their time is spent. From the burrows they make little roads or runways over the surface of the ground, under grass or weeds, or the cover of vegetation, and along these runways are strewn fragments of cut grass and plant stems from remains left from their food. They feed mainly on green vegetation, roots, and bark, but are also fond of seeds and grain and do considerable mischief in fields and orchards. They breed rapidly, producing four to eight young at a time at frequent intervals throughout the year, and if protected from their natural enemies increase at an astonishing rate. Owls and many hawks feed on them extensively and keep their numbers within bounds, without which no crops could be raised. From the barn owl pellets in the Smithsonian towers Dr. Fisher has taken the skulls of 3,730 meadow mice.

PINE MOUSE.

Microtus pinetorum scalopsoides (Audubon and Bachman).

These little brown mice are smaller than the meadow mice with relatively shorter ears, tails, feet, and fur. The fur is more velvety in texture and the color is a dull chestnut brown above and buffy brown below. They measure in total length about 125, tail 20, hind foot 16 or 17 mm., in inches 4.9, .75, .60.

They are found all through the woods and fields and uplands around Washington up to the edges of the city and are often associated with the pine timber on dry, sandy ridges. They are by no means restricted to pine timber however, and may be found almost anywhere except on low, wet ground. They live in burrows that often take the form of ridges, the ground being pushed up from just below the surface in long ridges that may be traced for rods over mellow soil. These are usually not so high or large nor the tunnels so large as those of moles, but in many cases the mice use the mole runways. They also make surface runways under cover of leaves, grass, and weeds, and in the covered runs safely penetrate fields, gardens, and open ground.

Pine mice live extensively on roots, tubers, bulbs, and the bark from roots and stems of many plants, including trees and shrubs. In orchards and yards they are especially mischievous, killing many fruit trees and flowering or ornamental shrubs, often taking all the bulbs from flower beds and destroying garden vegetables. They store bulbs and seeds in the burrows and at Falls Church, Virginia, J. H. Riley has found where they had stored seeds of the persimmon in underground cavities. They are among the most destructive of the native rodents in the Eastern States, and are so protected by their burrowing habits from their natural enemies that it becomes necessary to poison them for the protection of trees and crops.[1] Their comparative immunity from predacious birds may be judged by the fact that only 73 of their skulls were found by Dr. Fisher in the barn owl pellets in the Smithsonian towers.

[1]See Farmers' Bull. No. 670, Field Mice as Farm and Orchard Pests, by David E. Lantz, U. S. Department of Agriculture. Also later circulars.

Their destruction by snakes and shrews which can readily enter their burrows and capture the occupants is probably greater than that by overhead enemies.

COOPER LEMMING MOUSE.

Synaptomys cooperi cooperi Baird.

The Cooper lemming mice resemble meadow mice in general appearance but have grooved upper incisors and very short tails, and are more grayish in color. The upperparts are grayish brown, lowerparts buffy gray or whitish. An adult male measures in total length 130, tail 19, hind foot 20 mm.; in inches 5.1, .75, .75.

In 1888 Dr. A. K. Fisher examined some pellets of long-eared owls from Munson Hill, Virginia, and among 176 skulls of small mammals found three of this lemming mouse. Another skull was found in the stomach of a red-tailed hawk killed at Sandy Springs, Maryland, March 24, 1890. In 1896, I set a line of traps through a sphagnum swamp near Hyattsville, Maryland, and caught four of these rare mice, and the following year W. H. Osgood and A. H. Howell took specimens in the same swamp, while in 1899, Gerrit S. Miller, Jr., took three specimens 2½ miles west of Beltsville, Maryland. In this part of their range they take advantage of the coolness retained in the sphagnum swamps. At Hyattsville I found their runways common through the cool damp sphagnum moss, which keeps all below it cool and often protects the ice underneath from melting until long after the rest of the winter's ice has vanished. In this swamp the mice were able to live in comfort, as shown by their runways, nests of grass, and cut stems of grass along their runways. The Hyattsville swamp has since been drained and filled up but many others remain where these mice may be looked for.

SMALL EARED HARVEST MOUSE.

Reithrodontomys humilis impiger Bangs.

Harvest mice are slender little animals with rather small ears and long tails. They most resemble the white-footed mice but are smaller and slenderer with deeply grooved upper incisors. From half grown house mice, which they most resemble, they differ in slender tails that do not taper appreciably. Their upperparts are russet brown, lowerparts buffy gray. Adults measure in total length about 125, tail 61, hind foot 16 mm.; in inches 4.9, 2.4, .60.

The little harvest mouse was first taken at Fort Myer on December 6, 1896, by Louis di Zerega Mearns. Another was taken at Falls Church, May 7, 1897, by J. H. Riley, and on May 15, 1902, about a mile south of Alexandria a third was taken in a line of traps which I was showing Theodore Roosevelt, Jr., how to set for small mammals.

One skull was found by Wetmore in a barn owl pellet from the Smithsonian tower in 1916, and two more in 1917, while in 1920 Dr. Fisher reports a total of 15 skulls from the pellets of these owls. These are the only records so far for the vicinity of Washington, and the only others are from the type locality, at White Sulphur Springs, West Virginia. Apparently it is not a common species anywhere. The one from Fort Myer was taken

in a trap set under a fence between a cultivated field and a strip of woodland. The one from near Alexandria was caught in an out-of-sight trap baited with rolled oats in a little runway in the grass on the edge of a dry meadow. The one from Falls Church was taken in a trap set in a pine mouse runway.

In habits they are somewhat like the field mice, living in open country under cover of grass, weeds, and grain, making little runways over the surface of the ground and probably building neat little nests on or above the surface in weeds or bushes as do other closely related species. So little is known of their distribution and habits that they offer a most attractive subject of study for ambitious young naturalists.

Family ZAPODIDAE: Jumping mice.

CAROLINA JUMPING MOUSE.

Zapus hudsonicus americanus (Barton).

In size about like the white-footed mouse but with grooved upper incisors, very long hind legs and feet, long slender, nearly naked tails, and rather small ears. In color they are dull yellowish brown along the back, bright orange buff along the sides, and creamy white below. One caught at Chevy Chase measured in total length 202, tail 121, hind foot 29; in inches 8, 4.75, 1.1. Weight of female 19.2 grams on July 26; 41 grams when fat on November 26.

In 1861 Washington was given as the southern limit of range of this mouse in Philp's "Washington Described" (p. 23). In 1886 George Marshall collected 3 specimens for Dr. Merriam at Laurel, Maryland, and the same year Dr. Merriam caught one in his hands on the Virginia side of the river just above the west end of Aqueduct Bridge. Henshaw collected one the same year that is labeled "Washington." In 1888 Morris M. Green caught several at a point a quarter of a mile below the west end of the Old Long Bridge. They were caught in his hands in the daytime in the weeds around brush heaps about fifty yards back from the river. In 1896 Rorebeck collected one at Falls Church, Virginia; in 1899 Geo. R. Bryan collected one at Marshall Hall, Maryland; in 1903 Kenneth Beale collected one at Branchville, Maryland; in 1906 Dr. Fisher took one at Sandy Springs, Maryland; in 1909 I caught one near Chevy Chase; and in 1913 Dr. E. W. Nelson took one near Cabin John Bridge. J. H. Riley found one in a barn owl's nest, April 1, 1917, at Falls Church. E. A. Preble has collected two, one at Chevy Chase, D. C., and one near the Bureau of Standards, August 4, 1920, and A. H. Hardisty, one on the canal at the District line in 1921. Dr. Fisher reports fifty skulls taken from barn owl pellets from the towers of the Smithsonian.

Apparently jumping mice are well distributed over the surrounding country but are never numerous or even common. They keep in grassy or weedy places, in open country, but leave no runways or signs except little heaps of cut grass stems 2 or 3 inches long, and their grassy nest balls on the surface of the ground. While mainly nocturnal they are occasionally startled from their nests and go bounding through the grass in long frog-like leaps, then stop and sit quietly unless followed up.

If carefully approached they can be easily caught in the hands, and are very gentle and quiet if carefully held. They feed largely on seeds of grasses, cutting and drawing down the stems until the heads are reached. In autumn they become very fat and hibernate for the winter. One brought to the Biological Survey in December, 1899, was in the torpid stage of its winter's sleep, but evidently was not kept at the right temperature, for it died before waking up.

Specimens taken on October 7, 10, and 25, and as late as November 2 and others as early as April 23 indicate a longer period of activity than is enjoyed by more northern species.

A female taken by Dr. Fisher at Sandy Springs, Maryland, May 19, 1906, contained six large fetuses.

Order LAGOMORPHA: Rabbits and Rabbitlike animals.

Family LEPORIDAE: Rabbits and hares.

EASTERN COTTONTAIL.

Sylvilagus floridanus mallurus (Thomas).

The dark rusty gray fur, medium long ears, and short puffy, curled up cottony tail are familiar to all who go into the country about Washington. An adult cottontail will measure in total length approximately 446; tail 65; hind foot 94; ear 59 mm.; in inches 17.5, 2.5, 3.7, 2.3.

Cottontails are abundant about Washington, up to the edge of the city, even coming into the vacant lots and city parks. About February, 1904, one came under one of the windows of the Biological Survey in the red brick building now occupied by the Bureau of Entomology. After nibbling the grass and weeds for awhile, it snuggled down into a nestlike hollow of a grass plat and remained while Howell got his camera and took an excellent picture of it at about a 6-foot focus.

In spite of constant persecution by boys and dogs by day and cats by night the cottontails hold their own surprisingly well and may be seen by the roadsides or in walking across the grassy fields and untrimmed wood lots as well as in all the surrounding woods and parks. They were still found in 1919 in Potomac Park before the brush and weed patches had been cleared out near the lower point. They are skillful in hiding and dodging and taking advantage of safe retreats under brush-heaps, logs, stumps, or in rock piles and walls, but usually they do not get far from some safe cover.

Great numbers are brought into the markets, and at the old price of 25 cents each, they were cheap and excellent game. During the war, in 1918 and 1919, with the advance in price of other meats, they went up to 75 cents, and came into market in numbers greater than ever before.[1]

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[1] NEW ENGLAND COTTONTAIL.
Sylvilagus transitionalis (Bangs).

These large, short eared cottontails with black crown patch and very coarse rusty brown and black fur over the back are readily distinguished from the common eastern cottontails by skull characters, but only vaguely by the darker rusty and more blackish upperparts.

They have been recorded from the District (North American Fauna No. 29, p. 199, 1909) and from Alexandria, but the record based on two young taken in a nest in the

Order CARNIVORA: Flesh eaters.

Family FELIDAE: Cats.

HOUSE CAT.

Felis domestica Gmelin.

Variable in size, form, and color, and probably derived from several ancestors, some of which date back at least to early Egypt. A large individual will weigh about 10 pounds.

The common house cats, introduced from the Old World countries, turned into the alleys at night to forage from garbage cans, then to wander to the woods, and fields, have become common and feral in all sheltered places throughout the District. Supposedly mousers, they much prefer birds and prey heavily upon many of the native species, especially the ground dwelling sparrows and low nesting robins, catbirds, thrushes, and even quail and woodcock. I have never known one to catch an English sparrow, but on several occasions when a song sparrow has taken up its residence in our back yard, a few mornings later the feathers have been found scattered on the ground. On several occasions I have found cats eating my gray squirrels in the back yard, in spite of cat proof fences and all efforts to protect the squirrels and birds. Except as kept within bounds as house pets cats quickly revert to most destructive predatory animals, and at present are a great check on the abundance of small game in this part of the country.

EASTERN BOBCAT; WILD CAT.

Lynx ruffus ruffus (Gueldenstaedt).

These large, short-tailed, spotted, dark-gray cats with tasseled ears and crested cheeks are about twice the size and weight of the house cat. An adult male from Virginia measures in total length 889, tail 153, hind foot 172 mm.; in inches 35, 6, 6.75. A female 712, 140, 165; in inches 28, 5.5, 6.5.

A. H. Hardisty tells me that two bobcats were caught near the Patuxent River near Upper Marlboro in the winter of 1918–19, and another was seen near there in September, 1919. This brings their present range barely within the twenty mile radius, but it is not improbable that they come nearer to the Capitol. They were recently and probably are still common in the Dismal Swamp and along the Alleghany Mountains in Virginia, and they have been reported from the Blue Ridge country still nearer. In 1775 they were reported here by Andrew Burnaby.[1]

Soldiers Home grounds by Dr. C. W. Richmond on June 20, 1886, was erroneously included under this species, and a specimen which I bought on January 1, 1904, of a colored man on the street, who said he killed it at Alexandria, probably came from West Virginia where they are common and are often included in shipments of rabbits to market. At that time I did not know that men posing as hunters went about the streets selling game from the market stalls and, recognizing an interesting specimen, I saved it and innocently labeled it as coming from Alexandria. These cottontails belong to the Transition Zone of the Allegheny Mountains, and there is no unquestionable record of their occurrence nearer Washington than White Sulphur Springs and Travellers Repose, West Virginia.

[1]Burnaby, Andrew, Travels through the Middle Settlements in North America in the years 1759 and 1760, London, 1775.

In 1861 Haley, in Philp's "Washington Described," p. 22, reported them as formerly roaming over the District of Columbia but not found at that time, although, he continues, it is even quite possible they still exist as stragglers.

Family CANIDAE: Wolves, dogs, foxes, etc.

RED FOX; EASTERN RED FOX.

Vulpes fulvus fulvus (Desmarest).

In form the red foxes are slender and graceful, with long legs, long tail, prominent ears. When in full long fur they appear almost as large as a small collie dog but their body is very light and slender. The usual color is orange rufous, with belly and tip of tail white; legs and back of ears black. The various color forms called *cross fox*, *silver gray*, and *black fox* are darker phases running to complete melanism. An adult male from Wilmington, Massachusetts, measures in total length 1053, tail 403, hind foot 169 mm.; in inches 41, 16, 6.6.

Red foxes are not uncommon about Washington and extend considerably farther south, although there seems to be a general idea that they originally ranged farther north and came to the vicinity of Washington about 1800. During the years from 1768 to 1775, George Washington did a great deal of fox hunting in the vicinity of Mount Vernon and Washington, most of the foxes being of this species, as shown by their making long runs before the hounds and occasionally taking refuge in holes in the ground. D. B. Warden in writing of the District of Columbia in 1816 says "the gray and red fox frequent this region and sometimes carry off pigs, lambs, and poultry."[1]

In 1889 Morris M. Green saw a red fox on the west bank of the Potomac River opposite Washington. A specimen in the National Museum collection from the Zoological Park is labeled Virginia and was received October 5, 1894. Another specimen is a young only a few weeks old taken near Rockville, Maryland, by Cecil Allnut, April 2, 1913. In 1917, Dr. Fisher reported the tracks of two red foxes on Plummer Island in the Potomac, where they had been hunting cottontail rabbits on a fresh snow. He and Wetmore saw one on the Virginia shore opposite the Island in 1922.

In November, 1917, N. Hollister told me that a red fox had recently been seen several times in Rock Creek Park and the Zoological Park, and in January, 1920, I saw their unmistakable tracks along Rock Creek above the Joaquin Miller Cabin. In the spring of 1922 young were seen by Smith Riley that had evidently been raised in Rock Creek Park.

It is perhaps well for small game and poultry that they are not abundant, but their considerable value for fur and the chase keeps them under control in any settled region. Still it is to be hoped that they may never entirely disappear from our local fauna.

[1] Chorographical and Statistical Description of the District of Columbia, p. 159, Paris, 1816.

GRAY FOX; TREE FOX; SWAMP FOX.

Urocyon cinereoargenteus cinereoargenteus (Schreber).

The gray fox is about the size of the red, but seems smaller because of shorter legs and tail, and shorter fur. Its tail instead of being cylindrical is laterally compressed, with a black dorsal crest and black tip. The general color of the upperparts is coarse gray; sides of belly, legs, and throat, and under surface of tail rich rufous; feet and back of ears and sides of nose black; part of belly and throat white. An adult male from Big Sandy, Tennessee, measures in total length 1,005, tail 372, hind foot 135 mm.; in inches 39, 14.5, 5.5. Weight of one 10 pounds, 2 ounces.

During the years from 1768 to 1775 George Washington recorded in his diary frequent fox hunts in the vicinity of Mount Vernon and about Washington. In 1785, after the Revolution and before his presidency, he again took up fox hunting as a sport. In the very brief entries in his diaries, now on file in the Library of Congress, he does not distinguish the kind of foxes, but as many were quickly treed by the dogs, it is evident that such were of this tree climbing species.

In writing of Bladensburg, Maryland, in 1816, D. B. Warden says, "the gray and red fox frequent this region and sometimes carry off pigs, lambs, and poultry."[1]

Specimens labeled Washington, 1852, were listed by Baird in his Mammals of North America.

In 1889 Morris M. Green was told by a farmer on the Virginia side of the Potomac opposite Washington that gray foxes were sometimes seen there. In 1895 Dr. A. K. Fisher saw tracks of gray foxes at Munson Hill and other places in Virginia. On June 9, 1916, foxes were reported killing chickens at the Experiment Station near Beltsville, Maryland. An old male and a couple of half grown young were trapped from a family that were visiting the poultry yard at night, and as usual the old male was the first to be caught. One of the young had a few chicken feathers in its stomach. On May 15, 1919, I saw their tracks along the cliffs on Cupid's Bower in the Potomac, and Preble tells me that a few still range the valley of Bullneck Run.

Usually these foxes are kept away from farms by the dogs as they are not very swift and are easily treed. They live and breed in hollow trees or logs, or among rocks, are mainly nocturnal in habits, and are rarely seen, even where common, unless caught in traps or driven to refuge by dogs. Their fur is rather coarse and harsh but prettily colored and in recent years of considerable value.

Family PROCYONIDAE: Raccoons, etc.

RACCOON.

Procyon lotor lotor (Linnaeus).

The raccoons have been called the little brothers of the bear and even Linnaeus described them under the genus *Ursus*, but the resemblance to

[1] Chorographical and Statistical Description of the District of Columbia, Paris, p. 159, 1816.

bears is only slight and superficial. They have heavy bodies, long furry tails, naked soles, and full soft coats of fur. They are yellowish or silvery gray with a black mask across the face and eyes, and five black rings around the tail. A male from Dismal Swamp, Virginia, measures in total length 860, tail 285, hind foot 110 mm.; in inches 34, 11.3, 4.4, respectively. A very large and fat individual in Minnesota weighed 30½ pounds, but half that would come near the usual weight when not very fat.

Raccoons are still common about Washington and their long babylike tracks may be seen along Rock Creek in the Park, as well as along the banks of the Potomac and Eastern Branch scarcely beyond the edges of the city. In June, 1914, on the bank of Rock Creek opposite the mouth of Piney Branch, I saw the brown gray fur of a coon's back in a hollow, high up in a big tulip tree. Their tracks are found on muddy or sandy shores along the Potomac River. Coons frequent streams and ponds where frogs, crawfish, and mussels are to be found, and in the autumn they fatten on nuts, acorns, and green corn.

After more than a century of unrestricted hunting they still afford considerable sport for those who care for the all-night coon hunt with dogs and lanterns. A few skins are brought into the markets for fur and at Christmas time nicely dressed fat raccoons may be bought in Center Market by those fond of their rather rich oily meat. If they hibernate at all in this climate it is only for short periods of unusually cold weather. Their tracks are seen at all times of winter in mild weather, and winter food of acorns and nuts seem to be generally abundant.

Family MUSTELIDAE: Weasels, minks, otters, skunks, etc.

EASTERN SKUNK.

Mephitis putida Boitard.

The skunk is a heavy-bodied, short-legged, bushy-tailed little animal, with short ears, small eyes, and naked-soled plantigrade feet. The color is normally shiny black, except for a narrow white stripe between the eyes, a broad white stripe from the back of the head diverging into two side stripes along the back, and usually a white tip to the long bushy tail. Measurements of average adults are, total length 575, tail 229, hind foot, 60 mm.; in inches 22.6, 9, 2.3.

In 1894, a skunk was found under a house in the middle of Georgetown. It was treated with carbon bisulphide and made into a specimen for the Biological Survey collection. There are several other specimens from the District, and the animals are fairly common along the Potomac River above Georgetown, where their tracks may be seen in the dusty roads along the canal, almost any morning. I have found both tracks and burrows on the west side of the Potomac above Chain Bridge, and they have been seen on Plummer Island. Tracks are occasionally seen still nearer the city and sometimes an unmistakable skunk odor blows into town. In 1861, Haley, in Philp's "Washington Described," says, "The skunk is almost as much a nuisance as ever."

It is probable that skunks will never entirely disappear from any exten-

sive part of their original range, as they seem able to adapt themselves to settlement in spite of dogs and traps. Their fur has considerable value, and the skins with narrow white stripes, and excess of black bring the highest price. Skunk skins are often brought to the fur buyers in Washington, and next to the muskrat are one of the commonest furs of the region.

OTTER.

Lutra canadensis canadensis (Schreber).

The body of the otter is long and slender, the tail tapering, the legs short, the feet webbed, the ears short and sharp, the eyes are small, and the fur dense and glossy. The color is dark umber or liver brown, slightly paler below and grayish on throat and cheeks. The measurements of a large male from Louisiana show a total length of 1,170, tail 372, hind foot 135 mm.; in inches 46, 14.6, 5.3.

Otters are still found along the Potomac River and most of the streams in and around the District of Columbia. Almost every winter tracks are seen or some of the animals captured. In the National Museum collection are specimens labeled Washington, D. C., No. 4929, J. C. McGuire, without date; one taken at Eastern Branch, near Bennings, by E. S. Schmid in 1895; one killed at Seven Locks on the Canal above Glen Echo, by C. S. Scheffer, in 1907, and a skin of an immature individual from the Zoological Park labeled Virginia, 1902, W. H. Spangler. In 1909, Kenneth Beale saw a fresh skin at a local fur store, said to have come from Virginia only three miles from Washington, D. C. J. H. Riley remembers one killed in a creek near Falls Church when he was a boy. A. B. Baker reported an otter killed on the ice at Bennings in 1900; tracks were seen at Seven Locks on the Canal in 1909, and on Plummer Island in 1910 and 1922. Major W. A. Frankland saw a large otter in Rock Creek above the bridge at the northern end of Rock Creek Park, on April 10, 1920, and A. H. Hardisty saw one swimming across the Potomac near Seneca the same month.

In habits the otters are largely aquatic, being powerful, rapid swimmers but rather clumsy on land. In winter they travel long distances under the ice, but occasionally come out and run over the ice or slide on the snow. Most of their food is taken under water and consists largely of fish, crustaceans, and frogs. They are usually wary and not easily trapped, and as they have practically no enemies but man they hold their own fairly well over even the settled parts of the country. Their skins are valuable, ranging generally from $10 to $20 for good pelts. The unplucked fur is dark brown, glossy and durable, and the plucked fur is very fine and soft, of a golden brown color.

MINK.

Lutreola vison lutreocephala (Harlan).

The mink has a long slender body, short legs, fuzzy tail, short wide ears, and small beady eyes. Its fur when prime is full and soft, with a loose covering of glossy outer hairs. The color, mink-brown, varies from liver brown to dark umber; the tail is blackish toward the end, usually the chin

and sometimes the throat have a few irregular white spots. The measurements of an adult male from Branchville, Maryland, show total length 640, tail 229, hind foot, 81 mm.; in inches 25.2, 9, 3.2. The female is much smaller, 525, 182, 64 mm.; in inches 20.6, 7.2, 2.5. A fair-sized male taken at Chain Bridge, November 27, 1920, measured 610, 225, 68, and weighed 2½ pounds.

Mink are still fairly common about Washington, and their tracks may be seen in the snow, or on muddy or sandy shores along almost any stream about the city. They follow down Rock Creek into the Park, and sometimes into the Zoological Park, and below under Connecticut Avenue Bridge. They are found along Eastern Branch, and all along the Potomac River. The high price of fur for the several years past has stimulated trapping and the number of mink caught around Washington each winter keeps them down to a minimum of abundance. They are wary and secretive in habits, not easily caught in traps except by the use of scented bait, and great care is necessary in placing and concealing the traps. They are largely nocturnal in habits, living in holes or hollow banks, under drift wood, or in hollow logs or trees. They swim and dive with much freedom and skill, and climb trees readily, so they have as many means of escape from enemies as they have resources in capturing their prey. They live on fish, frogs, crustaceans, mice, and small rodents, birds, poultry, or almost any small game they can capture. At times they do considerable damage in the poultry yards, but their value for fur partly pays for their occasional depredations while it keeps their numbers well reduced.

J. H. Riley tells me of an old trapper who caught six minks in one trap inside of two weeks in the town of Falls Church, Virginia, and also of an old mink that visited his hen house and killed 22 chickens one night, returned the next night and killed 16 chickens, and the next day was caught by a dog as it returned for more.

NEW YORK WEASEL; ERMINE.

Mustela noveboracensis noveboracensis (Emmons).

The weasel is a slender-bodied little animal, with short legs, long slender tail, short ears, beady eyes, sharp nose, and keen expression of face. Its color in summer is dark brown, darkest on face, and black on the outer two inches of tail; the lowerparts are rich yellow. In winter at Washington it is usually lighter brown with the belly pale yellow or nearly white. Farther north and in the mountains the species becomes pure white in winter except for the tip of the tail, which is always black. Two taken in winter at Sandy Spring and Gaithersburg, Maryland, were in the white winter coat. An adult male measures in total length 390, tail 132, hind foot 43 mm.; in inches 15.4, 5.2, 1.7. A female 315, 95, 35 mm.; in inches 12.4, 3.7, 1.4. A breeding female from Mount Vernon measured 305, 100, 34, and weighed 3¼ ounces.

Weasels are by no means rare about Washington. Their tracks are occasionally seen in the snow or along the shores of streams. In the National Museum collection are a number of skins labeled Washington and

caught near the city. One of these I caught in April, 1896, a short distance above Chain Bridge on the west side of the Potomac River in a trap set among broken rocks for wood rats. J. H. Riley has taken a number at Falls Church, Virginia. Dr. C. W. Richmond tells me that a weasel was caught about 1887 near the old Central High School on 7th and P Streets Northwest. An old female and a nearly full-grown young one were obtained from a farmer's boy near Mount Vernon by E. A. Preble, May 11, 1920, the stomach of the old one containing remains of a mouse and a lizard, that of the young one the remains of a meadow mouse. Preble tells me that he occasionally sees their tracks in the valley of Bullneck Run, Virginia.

Weasels are bold and inquisitive hunters, often coming about buildings, or even into towns in pursuit of their principal prey, mice and rats and other small rodents. Occasionally they do some mischief in poultry yards, killing considerable numbers of young and old birds, thus making a bad reputation which is generally remembered longer than the great amount of good they do in destroying rodent pests. They are cruel, bloodthirsty little savages with nothing lovable in their natures, but their fearless self-confidence often compels our admiration. In the north their white fur with the black tipped tail is of some value as ermine, but in this latitude their plain brown skins are rarely saved even when they get into the traps set for minks and other fur bearers.

Order INSECTIVORA: Insect eaters.

Family TALPIDAE: Moles.

EASTERN MOLE.

Scalopus aquaticus aquaticus (Linnaeus).

The mole is a compact little animal with no functional eyes or ears, a beaklike, naked nose, large spadelike front feet with five rigid claws, small hind feet, no visible legs, short, nearly naked tail, and dense plushlike fur of a brassy brown color. An average adult measures in total length 163, tail 28, hind foot 20 mm.; in inches 6.4, 1.1, .74.

Moles are abundant around Washington up to the edges of the city and on the vacant lots next to the woods. Their characteristic ridges are seen on open lots, even among the paved streets, but in old fields and pastures are most conspicuous.

Moles are great burrowers and with their large front feet, worked by powerful muscles, push up ridges along the surface of the ground by main strength, working so rapidly that a new ridge may be seen rising at the rate of about a foot a minute. They also make deep and elaborate burrows in the earth, and push up mounds of earth from below, but are best known by their tunnels near the surface, which are their feeding grounds, where earthworms and numerous insects and small animal forms are encountered and greedily devoured. Generally their stomachs contain mainly earthworms or insect remains, but sometimes they contain a little vegetable matter. Moles are often accused of destroying bulbs, plants, and crops, but the

real culprits are usually the pine mice or meadow mice, which follow their runways or make similar, but slightly smaller, tunnels of their own.

STAR-NOSED MOLE.

Condylura cristata (Linnaeus).

The star-nosed mole is almost as large as the common mole with a much longer and at times much swollen tail, and a radiating disc of delicate pink, fleshy tentacles surrounding the flattened end of the nose. The minute and sightless eyes are buried under the skin, and the ears are mere openings under the fur. The front feet are short and spadelike, but not so wide as those of the mole. The fur is dense and soft, of a brownish black color. Adults measure in total length 192, tail 72, hind foot 28 mm.; in inches 7.5, 2.8, 1.1.

Star-nosed moles are not common about Washington, but occasionally one is found and usually saved for a specimen. Haley in Philp's "Washington Described," p. 22, 1861, reports the star-nosed mole as finding its southern limit here. An old specimen in the National Museum is labeled Corcoran Branch, July, 1858, Elliott Coues. On May 22, 1888, Morris M. Green found a nest of five about half grown young under an old log on the flats between the canal and the river about a mile above Georgetown. In 1889 Dr. Fisher found the skull of one in the stomach of a screech owl, taken near Washington on June 2,[1] and later found 12 skulls in the pellets of barn owls from the Smithsonian tower.

At Falls Church, about 1892, Riley saw one that had been drawn up alive in a bucket of water from a well, and in 1899 he secured one that was dug out by a dog and was mounted for the National Museum collection. On May 1, 1898, W. G. Johnson found a quarter-grown young at College Park, Maryland, and sent it to the Biological Survey collection. On November 3, 1907, one was found dead in a road near Branchville, Maryland, by Prof. F. E. L. Beal. On May 20, 1910, one was caught by a cat a mile south of Glendale, Maryland, and brought to the Biological Survey by Dr. Rodney H. True. On February 1, 1913, an adult male was caught by T. H. Scheffer near a small stream in a marsh near Brookland, D. C. It had the greatly swollen tail and sexual glands of the breeding season. Another male caught near the same place on March 3 in a mole trap showed less sexual development and a less swollen tail. Others have been taken near Chevy Chase, Brightwood, Woodside, Cabin John Bridge, Lanham, Laurel, and Marshall Hall.

These moles are not easily caught in traps and may be much more common than is generally supposed. They burrow in the damp soil of marshes and low lands, in places making ridges like those of the common mole, but usually pushing up little hills of black earth in disposing of the material from their deeper burrows.[2] They rarely come above the surface of the ground unless by accident or in the exictement of the breeding season in late

[1] Hawks and Owls of the United States, Bull. 3, Div. Orn. & Mamm., U. S. Dept. Agr., p. 171, 1893.

[2] Merriam, C. Hart, Mammals of the Adirondack Region, p. 146, 1884.

winter or early spring. In life the delicate fleshy, fingerlike filaments radiating from the end of the nose are in constant motion apparently in the effort to touch, feel, and recognize objects with which they come in contact in their subterranean life, so taking the place of the functionless rudiments of eyes in the search for earthworms and insect food.

Family SORICIDAE: Shrews.

SHORT-TAILED SHREW.

Blarina brevicauda brevicauda (Say).

These are the largest of our shrews, with heavy bodies, short legs, short tails, pointed noses, minute eyes, concealed ears, and velvety fur. Their color is plumbeous or sooty black, with a metallic luster when the fur is smoothed down. The teeth as in other shrews are tipped with dark brown. A Washington specimen measures, total length 112, tail 23, hind foot 15 mm.; in inches 4.4, .9, .6. This is smaller than the typical form farther west and north, but not quite small enough for *Blarina brevicauda carolinensis* farther south. A specimen from the Rappahannock River near Warsaw, Virginia, can, however, be referred to *carolinensis*.

The short-tailed shrews are among the commonest small mammals of the district, being found in the woods and fields, and in brushy or weedy places up to the very edges of the city, and even on vacant lots where there is sufficient cover of old grass, weeds, boards, or suitable protection from the light of day and overhead enemies. Like other shrews their eyes are very small and probably of less use to them than the pointed, flexible nose in finding the insects and other small animal life on which they feed.

They burrow mainly near the surface, in rich mellow soil, make roadways over the surface of the ground under cover of old vegetation, or follow the roadways and tunnels of the meadow mice and pine mice. At the lower end of the Zoological Park in 1893, in a Schuyler mouse trap, I caught one of these shrews by the neck and a meadow mouse by the hips. The trap was set across a runway and evidently the shrew was pursuing or had hold of the back part of the mouse when they ran through my trap and were both caught.

They are very fond of meat and eat any mice or small animals or even their own kind when found in traps and are of great value in keeping down the abundance of small rodents, as well as insects, bugs, worms and snails.[1] While savage little brutes in their own small world they are practically harmless and very useful animals in their relations to human economy.

LEAST SHORT-TAILED SHREW.

Blarina parva (Say).

These are the smallest of our short-tailed shrews, but with heavier bodies than the small species of *Sorex*. Their feet are small, tails short, noses

[1] See Merriam, C. Hart, Mammals of the Adirondack Region, pp. 164–173, 1884; and Shull, A. Franklin, Habits of the Short-tailed Shrews, Amer. Naturalist, Vol. XLI, pp. 449–522, 1907.

pointed, eyes minute, ears hidden, and fur soft and velvety. Their upperparts are sepia brown, the lowerparts ashy gray. An adult male from Brightwood, D. C., measures in total length 78, tail 18, hind foot 10 mm.; in inches 3.1, .7, .4.

Although widely distributed from New Jersey to Nebraska, Texas, and Georgia, these little shrews seem always scarce or so obscure in habits as to be rarely found except by owls. In 2,262 pellets of barn owls from the Smithsonian tower, Dr. Fisher took 61 of their skulls, and in pellets from long-eared owls from Munson Hill, Virginia, there were 23 of their skulls among 176 of other small mammals.[1]

In 1890 Prof. W. B. Barrows, then a member of the Biological Survey, picked up one of these little shrews in Brookland and brought it to the office. In 1896 I caught one near Brightwood in an old grassy field where the Military Road enters Rock Creek Park, and the same year J. H. Riley caught one in an old stump in a field at Falls Church. In 1913, 1914, and 1915, A. H. Howell collected four specimens near his place at Woodridge, a suburb in the northeastern quarter of Washington. A number of specimens have been taken by George Marshall at Laurel, Maryland.

Little is known of the habits of these shrews, except that specimens are occasionally taken in traps set in field mice runways or in tiny runways under old grass that seem to be made by the shrews themselves for their convenience in getting about over the surface of the ground and catching their insect food.

BACHMAN SHREW; CAROLINA SHREW; SOUTHERN SHREW.

Sorex longirostris Bachman.

This is the only eastern *Sorex*, except *fisheri* from the Dismal Swamp, that has the third unicuspid tooth smaller than the fourth. Its size is very small, the ears rather conspicuous, the nose not longer than in other shrews. The color of the upperparts is chestnut brown, of the underparts ashy gray. Measurements of a series of specimens from North Carolina show a total length of 86, tail 32, hind foot 10.7 mm.; in inches 3.4, 1.3, .45.

Hollister reports a specimen of this rare little southern shrew in the National Museum, collected by C. Girard, labeled Washington, D. C., and entered in the museum catalogue April 19, 1855, as No. 637. There seems to be no clue to the exact locality where it was collected or to the exact date of collection, but Bachman's type of the species described in 1837 was taken in the swamps of the Santee River, South Carolina, and others have been taken on dry uplands. The only other specimen from the vicinity of Washington was collected by C. K. Rorebeck, at Falls Church, Virginia, January 3, 1897, and is now in the National Museum collection. One taken by Dr. M. W. Lyon at Chesapeake Beach, Maryland, July 3, 1908, is the next nearest to Washington. Other specimens have been taken in Georgia, South Carolina, North Carolina, Alabama, Indiana, and Illinois.[2]

[1] Hawks and Owls, Bull. 3, p. 141, 1893.

[2] Hollister, N., Proc. U. S. Nat. Mus., vol. 40, p. 379, 1911.

MARYLAND SHREW.

Sorex fontinalis Hollister.

This tiny shrew is one of the smallest known species of its genus and probably next to the smallest known mammal of North America. It is very slender and delicate with long sharp nose, minute eyes and relatively long tail. Its color is sepia brown above, brownish gray below. Measurements, total length 90, tail 31, hind foot 10 mm.;[1] in inches 3.51, 1.4, .4.

In February, 1896, I caught three of these little shrews in mouse traps set under logs, and in runways through the sphagnum moss in a cold swamp near Hyattsville, in the same locality and situations with the lemming mouse (*Synaptomys*), and later two other specimens were taken there by Dr. Fisher.

On November 6, 1898, Gerrit S. Miller, Jr. caught one in a cold spring swamp near Beltsville, Maryland, and the three from Laurel, Maryland, were caught by George and E. B. Marshall. The one from Sandy Springs was found dead in a path so no idea of habits or habitat were obtained.

In 1920 only 13 specimens of *Sorex fontinalis* were known. These were all collected near the District of Columbia, in Maryland, at localities as follows: Beltsville, 2; Hyattsville, 5; Hollywood, 1; Laurel, 4; Sandy Springs, 1. The fact that none have been taken in the great amount of trapping on the uplands indicates a mainly swamp habitat for the species. Nothing is known of their habits except the little gained through specimens caught. They live under cover of moss, logs, and marsh vegetation, through and under which they make tiny burrows and roadways. Some of those caught were in meadow mouse or lemming mouse runways. They take meat bait and, like other shrews, probably live mainly on insects and other forms of small animal life found on or under the surface of the ground.

LEAST SHREW.

Microsorex winnemana Preble.

In size, as its name indicates, this is the smallest of all the shrews and therefore the smallest known mammal in North America, being very slender and delicate, with its tail about three times as long as its hind foot. In color the upperparts are grayish brown, the lowerparts ashy gray. Measurements of type: total length, 78, tail 28, hind foot 9 mm.; in inches 3.08, 1.1, .35.

This rare species was discovered and described by Edward A. Preble of the Biological Survey, who says, "On April 25, 1903, while searching for salamanders * * * on the Virginia shore of the Potomac above Plummer Island [near Stubblefield Rapids] I dislodged from the decayed interior of a large fallen log a tiny shrew. The rarity of any species of long-tailed shrew in the vicinity of Washington caused me to take special pains in preserving the specimen. Later, when I examined it carefully, I was surprised to find that it belonged to the genus *Microsorex*, hitherto unknown

[1] For detailed characters see original description by N. Hollister, Proc. U. S. Nat. Mus., vol. 40, p. 378, 1911.

to occur south of Ohio and New York. It was apparent that the specimen represented an undescribed form, but its characterization was deferred in the hope that other specimens would be detected. This did not occur until January 24 of the present year [1910] when William Fink of Berwyn, Maryland, found a second specimen in the decayed heart of a dead chestnut tree which he cut from a dry hillside at some distance from water." The detailed description then follows[1] and under *Remarks* he adds "*Microsorex winnemana* is the smallest species of shrew (and therefore the smallest mammal) thus far discovered in America. The specific name *winnemana* (beautiful island) is in allusion to Plummer Island, the home of the Washington Biologists' Field Club, near which the type specimen was taken."

Here is a field to inspire any energetic young naturalist, a remarkable species with only two specimens known, and a fair clue given to habits and habitat. Who will be the next to bring in specimens, dead or alive, and add something to our meager fund of knowledge of the wild life about us?

Order CHIROPTERA: Bats.

Family VESPERTILIONIDAE: Northern Bats.

HOARY BAT.

Nycteris cinerea (Beauvois).

The hoary bat has 32 teeth, is the largest of our eastern bats, with ears short and rounded, the top of the feet and tail membranes well furred, and the fur full and soft. Its color is yellowish brown frosted with white, its throat and wing linings buffy. Average adults measure in total length 135, tail 58, hind foot, 11 mm.; in inches 5.2, 2.26, .45. Spread of wings 15 to 16 inches.

A specimen taken October 2, 1892, at Laurel, Maryland, one taken October 20, 1897, and another May 26, 1904, at Chain Bridge, seem to be the only records for the vicinity of the District of Columbia; but other records from Baltimore, Maryland, New Jersey, South Carolina, and Pennsylvania, bring its range on all sides of the District. It is a wide-ranging migratory species, and evidently covers the whole area. With a boreal breeding range across the continent, and a migratory range in winter from Canada to at least the southern border of the United States, it may be looked for at Washington in the fall and spring migrations. Its size readily distinguishes it on the wing from the smaller bats, but it is a late and rapid flyer and not easily secured for specimens. Dr. Fisher tells me that this is the only bat known to the District fauna that has not been taken in the cabin at Plummer Island.

RED BAT.

Nycteris borealis borealis (Müller).

The red bat has 32 teeth, is medium sized, with short, rounded ears, mainly naked inside and on rims, and with the top of tail membranes and

[1] Proc. Biol. Soc. Washington, vol. 23, p. 101, 1910.

feet well furred. Its color is bright rusty or pinkish yellow, with a slight frosting of white-tipped hairs over back and breast. In total length it measures 117, tail 52, hind foot 10, spread of wings 330 mm.; in inches 4.5, 2.1, .4, 13.

This is one of the commonest bats to be seen flying about in the evenings, either in the open places in the woods, or about the houses in the city. It often comes out so early in the evening that its bright colors are easily recognizable as it flies softly about in search of flying insects. Apparently it is in part resident here, although a migratory species in at least the northern part of its range. Specimens collected about Washington bear dates of April, May, June, July, August, September, October, and November. At Arlington on March 1, 1919, I saw several flying about on a warm evening soon after sundown, while it was so light that their unmistakable colors could be recognized. The evening was warm and still, but the nights had been frosty for a week past, and very cold only two weeks before. Wetmore saw half a dozen of these bats flying about before dusk at the border of the woods near Lorton, Virginia, on November 17, 1917, and collected one of them. Prof. Cooke saw one near his "Wickiup" at Viresco on the Virginia side of the Potomac at midday January 1, 1913. It lit on the ground near him and its bright red fox color was very striking. A warm and springlike day had probably brought the bat out of its hibernating quarters.

An old female collected near Falls Church, Virginia, by Riley, June 3, 1905, contained 3 large embryos nearly ready for birth. A female shot by A. H. Hardisty near the northwest corner of Rock Creek Park, May 11, 1918, contained 3 embryos.

In a paper on the number[1] of young of this bat Dr. Marcus Ward Lyon, Jr., records an adult female nursing four young brought into the National Museum alive by Mr. C. J. Lawson of Washington, D. C., on June 18, 1902. Photographs of the family were secured and shown in a plate, a young one at each of the adult's nipples, where they held on with great tenacity, each having in its mouth a good deal of its mother's hair in which its hooked milk teeth firmly caught. The young were less than a third grown, but their combined weight, alive, was 12.7 grams, while that of the mother was but 11 grams.

In the Merriam collection is a female taken June 22, 1889, with two young clinging to her. On July 11, 1908, a half grown red bat was picked up on Seventeenth Street near the Corcoran Art Gallery, where it had probably fallen while learning to fly. Another young apparently just able to fly was collected at Plummer Island July 15, and another near Washington, July 24. Two to four young are the usual numbers. Little is known of the breeding habits or whether the young always cling to the mother until old enough to fly or whether they hang up part of the time in the leafy tips of branches, heads downward, where their parents spend the daylight hours.

As with other bats their food consists of a great variety of flying insects caught on the wing.

[1] Lyon, Dr. Marcus Ward, Jr., Observations on the Number of Young of the Lasiurine Bats. Proc. U. S. Nat. Mus., vol. 26, p. 425, 1903.

SILVER-HAIRED BAT.

Lasionycteris noctivagans (LeConte).

These bats have 36 teeth; are medium in size, with wide, naked, somewhat quadrate ears; upper surface of tail membrane hairy near the base; fur long and soft. Color black or dusky brown with silvery tips to the hairs over back and belly; ears, feet, and membranes black or blackish. Measurements, total length 116, tail 47, hind foot 10, expanse 298 mm.; in inches 4.5, 1.85, .4, 11.7.

This is a wide ranging boreal species over the northern and mountainous parts of the continent, and a few specimens have been taken about Washington during their migrations southward. On November 12, 1885, Dr. Fisher shot one between Arlington and Rosslyn, Virginia, and in the National Museum collection are skins labeled Washington, D. C., January, 1893, and another Smiths Island, Virginia, September 3, 1893. Dr. Fisher collected another at Plummer Island, October 6, 1906, and Hardisty one near Georgetown October 17, 1918. On November 12, 1905, Preble saw five or six bats on an open hillside in the woods north of Piney Branch and west of Eighteenth Street, some of which were recognized as almost certainly of this species. All of these dates indicate migratory records.

In northern New York Dr. Merriam records the silver-haired as the most abundant breeding species of bat, and says the two young are born about the first of July.[1] At Ossining, New York, where the species is abundant, Doctor Fisher took 28 out of the siding of a house in June, which would indicate a breeding record.

LARGE BROWN BAT.

Eptesicus fuscus fuscus (Beauvois).

Total number of teeth 32; size rather large; ears of medium length, pointed, and wholly naked; wing and tail membranes mainly naked; fur glossy. Color bright hazel or hair brown, paler on belly; ears and membranes dark brown or blackish. Measurements, total length 112, tail 42, hind foot 11, expanse 300 mm.; in inches 4.4, 1.6, .45, 11.8. Weight of adult male 15.2 grams, of female 14.2 grams.

These large brown bats are common residents about Washington and may be recognized on the wing by their size and brown color. They fly at evening about our front doors and along the streets and alleys, as well as in open spaces in the woods, with a strong, rapid, but very erratic flight as they pursue their winged prey. They are resident throughout the year, breeding in summer and hibernating in nooks and corners of the houses in winter either in the same dark recesses where they spend the daylight hours or in special cavities selected for warmth and protection. They often enter open doors and windows and fly about the rooms, catching insects and lighting on the ceilings or walls. Open and vacant buildings are favorite hunting grounds for them. They live also in hollow trees, and in caves and clefts among the rocks, and have been found hibernating in rolled-up

[1] Merriam, C. Hart, Mammals of the Adirondack Region, p. 190, 1884.

awnings. In the cabin on Plummer Island Dr. Fisher caught one in a mouse trap set on the window sill, January 21, 1907. Almost every winter during the coldest weather of January specimens are brought in from apartment houses or private residences where found flying about the rooms, awakened from their hibernation by the heat. These are always found to be excessively fat, but with empty stomachs, showing that they have been for a long time dormant.

The earliest seen flying outside were reported by Dr. T. S. Palmer on March 22, 1911, on Biltmore Street. They were large, brown bats and probably of this species. The evening was warm, and maples, elms, and poplars were in blossom, but there were no leaves on the trees, and few summer birds had arrived. On March 26, 1919, they were seen flying about my front door at 1834 Kalorama Road, while it was light enough to recognize the species. The forsythia, Japanese quince, and hyacinths were then in full bloom. These bats remain active in autumn up to October.

Usually in the West but one young is raised in a season, but there are records of two. On July 31, 1919, I found a pair dead in front of Stoneleigh Court on Connecticut Avenue, where they had evidently been knocked down and killed, or caught in the building and thrown out. The female contained two minute embryos the size of No. 8 shot, that would have been born in May or June of the next year. Another was taken August 7 in the same condition. Riley obtained a young with eyes not yet open on June 14, 1899, from a colony in an old church in Falls Church, Virginia.

From their habit of hunting about houses they are presumably one of the most useful species of bats as insect destroyers.

EVENING BAT; RAFINESQUE BAT.

Nycticeius humeralis (Rafinesque).

Total number of teeth 30, only one upper incisor and one upper premolar on each side. Size small, ears small, pointed, and with short tragus, tip of tail free of membrane. Color dark brown with very black ears and membranes. An adult specimen measures in total length 95, tail 35, hind foot 9 mm.; in inches 3.7, 1.4, .35. Weight of adult female, 9.5 grams.

This is an abundant southern bat, occurring but rarely as far north as Washington. Two specimens taken near Washington by Wm. H. Rhees, May 22, 1882, are in the National Museum collection. A female was taken at Linden, Maryland, August 11, 1896, and one taken at Oxon Hill, June 2, 1903. A female in the Biological Survey collection, U. S. National Museum, was taken at Plummer Island, September 7, 1910, by H. S. Barber. At Falls Church, Virginia, J. H. Riley reports specimens taken July 28, 1898, July 9, 1902, July 28, 1906, and July 29, 1914. A female taken by A. H. Hardisty, July 9, 1918, in Prince George County, Maryland, near the District Line, apparently had young, as the single pair of subaxillary mammae showed signs of being used.

On May 17, 1919, one of my Boy Scouts brought me a bat of this species that he had found in a crack near the top of a telephone pole at the north end of Connecticut Avenue Bridge. This also was a female and later

when it died in captivity was made into a specimen and turned in to the Biological Survey collection.

On May 20, 1920, Alex. Wetmore brought me a specimen taken in his house the previous evening at 1819 Hamline Street, Northeast. It was a female containing two small embryos.

While specimens have been taken as far north as Riverton, Virginia, and Carlisle, Pennsylvania, the main range of the species is in the lower Austral Zone west to Texas. With all the collecting done about Washington the number of specimens is so small that the only conclusion is that we are beyond the edge of its main range.

GEORGIAN BAT.

Pipistrellus subflavus (F. Cuvier).

Total number of teeth 34; size small; ears small, pointed, nearly naked; tragus short and wide; fur short and woolly; color pale russet or yellowish brown above, lighter and brighter below; ears and membranes light brown. Measurements, total length 84, tail 37, hind foot 8 mm.; in inches 3.2, 1.45, .32.

This is generally the most abundant small bat in and around Washington. Specimens have been taken during every month and at frequent intervals from April 29 to October 17. They may be seen every warm summer evening, flitting softly between the trees in the parks, or along the streets with irregular zigzag flight as they catch their food of flying insects. Often their pale colors can be recognized when they first appear in the early dusk of evening, their small size distinguishing them from the brighter-yellow red bat. During the day they sleep in some dark retreats in buildings, or in hollow trees, or under bark.

In the Merriam collection, now in the U. S. National Museum, are 16 specimens taken by Dr. Richmond May 14, 1887, under the roof of a barn near the Soldiers Home. They were part of a colony suspended in a cluster in somewhat the form of a hornets' nest from the roof in one corner of the building. Those taken were captured after the colony was dislodged. On May 3, 1896, Dr. F. V. Coville found one hanging in a bunch of elm leaves low over the water at High Island and gave it to me for a specimen. On August 18, 1904, J. H. Riley caught one in the bird gallery in the Smithsonian building. On April 29, 1914, Dr. T. S. Palmer brought me one that he had caught in his house on Biltmore Street, where it may have entered through a window, or come out of some hibernating retreat.

A specimen taken by A. H. Hardisty near Brookland on June 1, 1918, contained two embryos and had the usual arrangement of mammae, one on each side of the breast, more nearly subaxillary than pectoral. Another taken by Preble near Washington, June 3, 1899, contained two embryos, and in the Merriam collection in the U. S. National Museum is a female taken July 3, 1888, that was nursing young.

DUSKY GEORGIAN BAT.

Pipistrellus subflavus obscurus Miller.

In size and proportions about the same as *subflavus* but color duller and

darker, less yellowish and with dark tips of hairs on back more conspicuous.

This dark colored northern form described by Gerrit S. Miller, Jr., from Lake George, New York, is probably not a resident of the District. Two specimens taken as they were flying over the river near Plummer Island, September 9, 1905, are typical in color. They may have migrated from their northern habitat, or merely wandered out of their regular range after the breeding season was over.

LITTLE BROWN BAT.

Myotis lucifugus lucifugus (LeConte).

Total number of teeth 38, 2 upper incisors, and 3 upper premolars to each side. Size small; ears short, not reaching tip of nose, narrow and pointed with slender tragus; membranes mainly naked; fur smooth and glossy. Color, dull hazel brown above, buffy below, ears and membranes dusky brown. Measurements, total length 86, tail 37, hind foot 9, forearm 38.8 expanse of wings 260 mm.; in inches 3.4, 1.45, .35, 1.5, 10.2.

This is the common little brown bat of Washington and vicinity, and many specimens have been taken in May, June, July, and August. In 1888 and 1889, Morris M. Green and Dr. C. W. Richmond collected large numbers of them in the crevices between the timbers of the Old Long Bridge across the Potomac. Of these 10 adults and 15 young taken June 16, and a nursing female taken July 3, are in the Merriam collection, now a part of the U. S. National Museum collection. An old male and female and two half-grown young were collected at Plummer Island, August 1, 1897, by Dr. W. H. Osgood, and two males were collected August 24 and 31, by Dr. A. K. Fisher.

While common breeding summer bats, their winter habits and their places of hibernation are little known. In 1920, the first small bats seen, apparently of this species, were flying about in the woods on the evening of March 19, but some of the Boy Scouts reported small bats seen a week earlier.

At Falls Church, Virginia, J. H. Riley shot two females, each containing one large embryo, one on June 26, 1906, and the other on June 21, 1907.

SAY BAT.

Myotis subulatus subulatus (Say).

Total number of teeth 38; size small; ears long and narrow, reaching beyond tip of nose; fur soft and glossy. Color bright hazel brown above, buffy brown below; ears and membranes light brownish. Measurements, total length 95, tail 41, foot 9, forearm 35, expanse 247 mm.; in inches 3.7, 1.6, .35, 1.4, 9.7.

The Say bat closely resembles the little brown bat, but specimens are readily distinguished by longer ears, which laid forward reach well beyond the tip of the nose. It seems not to be very common, but occasionally one is taken near Washington. In the National Museum collection is a specimen taken by P. L. Jouy, at Alexandria, Virginia, in August, 1875. Gerrit S. Miller, Jr., took two at Forest Glen on May 10 and 26, 1896. Another

was taken in the Smithsonian grounds by John J. Veit, September 23, 1919. In the Biological Survey collection are five taken at Plummer Island, March 27 and 31, May 28, August 17, and September 14, from 1902–1910, by Fisher, Osgood, McAtee, Maxon, and Barber.

LEAST BROWN BAT.

Myotis winnemana Nelson.

From *Myotis lucifugus*, which it resembles, this tiny bat may be distinguished by its smaller size, smaller ears, and shorter forearm and blackish face. The color is bright chestnut-brown above, grayish brown below, muzzle and sides of head dusky, ears and membranes black. Measurements of type specimen, total length 82, tail 39, hind foot 8, forearm 30.5, expanse of wings 225 mm.; in inches 3.2, 1.5, .3, 1.2, 8.8.

This smallest of our eastern bats was described in 1913, by Dr. E. W. Nelson, from three specimens taken on Plummer Island in the Potomac River, 10 miles above Washington. The type and one topotype are adult males collected by Dr. A. K. Fisher, August 24 and 31, 1907, as they flew about in the cabin after dark. The only other specimen then known was a female taken from a hibernating colony of bats in a cave at Rutland, Vermont, by George L. Kirk, on April 10, 1913. Apparently it is a rare species or more would have been taken. Dr. Nelson considered it our eastern representative of the *M. californicus* group.

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PROCEEDINGS

OF THE

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THREE NEW KANGAROO RATS OF THE GENUS DIPODOMYS.

BY E. A. GOLDMAN.

One of the results of a visit by the hunter-naturalist, Charles Sheldon, to the coastal region of central Sonora, in 1922, was the discovery of a new form of *Dipodomys deserti*. The species had been collected on the international boundary, but there seems to be no previously published record of its occurrence in Mexico east of the Colorado River and Gulf of California. The new subspecies and two new races of *Dipodomys spectabilis* are described as follows:

Dipodomys deserti sonoriensis, subsp. nov.

Sonora Kangaroo Rat.

Type from La Libertad Ranch, 30 miles east of Sierra Seri, Sonora, Mexico. No. 242306, ♂ adult, U. S. National Museum (Biological Survey collection), collected by Charles Sheldon, January 3, 1922.

General characters.—Closely allied to *Dipodomys deserti deserti*, but general color of upperparts decidedly darker, more heavily overlaid with black, the buffy element of a vinaceous instead of ochraceous tone. Skull differing in detail, especially the weaker development of the maxillary arches and jugals.

Color.—*Type:* Upperparts in general light vinaceous-buff, rather heavily overlaid or mixed with black, especially on rump; nose, area at base of vibrissae, and orbital rings distinctly blackish; under parts, fore limbs, hip stripes, hind feet above, and sides of tail white as usual in the species; tail blackish above (tip missing in type), a narrow dusky median line below.

Skull.—Closely resembling that of *D. d. deserti*, but maxillary arches weaker; lachrymals larger, their extension along posterior border of maxillary arches equalling about one-half the distance to outer angle (extension distinctly less than one-half this distance in *D. d. deserti*); jugals more slender; squamosal (as viewed from above) less broadly articulating with parietal; mastoid bullae more fully inflated along line of contact with parietals.

Measurements.—*Skull of type* (no external measurements available):

Greatest length (median line), 45; greatest breadth (between outer sides of audital bullae), 31.5; breadth across maxillary arches, 24.7; greatest length of lachrymal, 4. 4; maxillary toothrow, 5.5.

Remarks.—Specimens from parts of southwestern Arizona are somewhat darker in color of upper parts than typical *Dipodomys deserti*, and apparently grade toward the form here described. *D. d. sonoriensis* probably has an extensive range over the sandy plains of northwestern Sonora.

Specimens examined.—Two (the type, skin and skull, and an additional skull), from the type locality.

Dipodomys spectabilis baileyi, subsp. nov.
Bailey's Kangaroo Rat.

Type from 40 miles west of Roswell, New Mexico. No. 97185, ♂ adult, U. S. National Museum (Biological Survey collection), collected by Vernon Bailey, June 13, 1899. Original number 6961.

General characters.—Closely allied to *Dipodomys spectabilis spectabilis*, but decidedly larger; color usually slightly paler; skull larger, more massive and differing in detail, especially the greater expansion of zygomatic arches; tail extensively tipped with white as in *D. s. spectabilis*.

Color.—*Type* (rather worn pelage); upper parts in general near pinkish buff, purest on cheeks, shoulders, and sides, becoming light buffy on head, moderately mixed with black especially over top of head and back; under parts, postauricular spots, fore limbs, hind feet above, usual hip stripes, and tail at extreme base all around pure white; tail beyond extreme base blackish inconspicuously mixed with gray above and below to near white tip where it becomes pure black all around, the sides white to subterminal area mentioned; hind legs above ankles blackish all around (interrupted in most specimens by a white line along inner side); soles of hind feet brownish black.

Skull.—Similar to that of *D. s. spectabilis*, but larger, more massive, rostrum relatively shorter, maxillary arches heavier, the upper surface projecting farther forward beyond frontals (as viewed from above); mastoid bullae relatively as well as actually larger; incisors relatively heavier.

Measurements.—*Type:* Total length, 385; tail vertebrae, 283, hind foot, 58. Average and extremes of two adults from region of type locality: 381 (380–382); 280 (279-281); 58 (58–58).

Skull.—*Type:* Greatest length on median line, 45.6; greatest breadth (between outer sides of audital bullae), 30.6; breadth across maxillary arches, 26.8; least width of supraoccipital (near interparietal), 1.7; maxillary toothrow, 6.6.

Specimens from numerous localities from northwestern New Mexico to western Texas are referable to *D. s. baileyi*. This form intergrades in southwestern New Mexico with typical *D. s. spectabilis*.

Dipodomys spectabilis zygomaticus, subsp. nov.
Chihuahua Kangaroo Rat.

Type from Parral, southern Chihuahua, Mexico. No. 96432, ♂ adult, U. S. National Museum (Biological Survey collection), collected by E. A. Goldman, September 17, 1898. Original number 13030.

General characters.—Closely resembling *Dipodomys spectabilis spectabilis*, but color of upperparts slightly darker, the buffy element more heavily mixed with black; skull broader posteriorly across mastoid and audital bullae; outer sides of zygomata divergent posteriorly (sides nearly parallel in *spectabilis*). Similar to *D. s. cratodon*, but differing in cranial details, especially the smaller incisors, lesser inflation of mastoid bullae, and posterior divergence of zygomata.

Color.—Type (fresh pelage): Upper parts in general near light ochraceous-buff, palest on head, rather heavily overlaid or mixed with black, especially over top of head, back and rump; black facial areas conspicuous; under parts, fore limbs and hip stripes pure white as usual in the species; lower part of hind legs (above ankles) black, interrupted by a white line along inner side; hind feet white above, dusky below along median line of soles; tail (except extreme base which is white) mixed black and grayish above and below to near white tip where it becomes black all round; sides of tail white to black subterminal zone.

Skull.—Similar to that of *D. s. spectabilis*, but broader and more massive; broader especially posteriorly between outer sides of audital bullae; mastoid and audital bullae more expanded in front of meatus; jugals less nearly parallel, more divergent posteriorly. Resembling that of *D. s. cratodon*, but incisors smaller; mastoid bullae less evenly rounded or inflated; supraoccipital and interparietal broader; jugals less bowed inward, more divergent posteriorly.

Measurements.—Type: Total length, 340; tail vertebrae, 197; hind foot, 54. Average and extremes of four adults, including type, from type locality: 341.5 (334–352); 201.5 (195–212); 52.2 (49–54).

Skull (type): Greatest length on median line, 44.2; greatest breadth (between outer sides of audital bullae), 30.7, breadth across maxillary arches, 27.2; least width of supraoccipital (near interparietal), 2; maxillary toothrow, 6.2.

Remarks.—While close alliance with the other forms of *D. spectabilis* is indicated by the general characters this kangaroo rat differs in rather well marked cranial details, especially the laterally projecting mastoid and audital bullae. The lateral development of the audital bullae, affording increased surface for squamosal attachment as compared with other forms, apparently is associated with the posterior divergence of the zygomata.

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

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PROCEEDINGS

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NEW GENERA AND SUBSPECIES BASED ON ARGENTINE BIRDS.

BY ALEXANDER WETMORE AND JAMES L. PETERS.

In the course of our joint studies of the Argentine avifauna based on collections made in 1920 and 1921 two additional forms have become apparent which, with diagnoses of two genera not at present recognized, are outlined in the present paper.

Nycticryphes, gen. nov.

Characters.—Similar to *Rostratula* Vieillot[1] but bill more decurved at tip; tip of bill expanded, with the distal end distinctly pitted; a median groove on the gonys; a slight web between outer and median toes; tail strongly wedge shaped; median rectrices tapered, soft in structure at the tip; median upper and lower coverts longer than the lateral rectrices.

Type.—*Totanus semi-collaris* Vieillot[2] which will now stand as *Nycticryphes semicollaris* (Vieillot).

Remarks.—As the genus *Rhynchaea* Cuvier[3] has *Scolopax capensis* Linnaeus as type it is a synonym of *Rostratula*. *Rynchina* Fleming[4] and *Rhynchæna* Gloger[5] are emendations of *Rhynchæa* Cuvier.

Though superficially similar to the Old World painted snipes, the South American species is strikingly different in structural characters.

Stigmatura budytoides inzonata, subsp. nov.

Characters.—Similar to *Stigmatura budytoides budytoides* (d'Orbigny and Lafresnaye)[6] but white blotches on inner webs of four outer rectrices reduced to small spots on the first (outermost) three and lacking on the fourth. Similar also to *S. b. flavocinerea* (Burmeister)[7] but lores and superciliary stripe yellow; wing edgings paler and yellow of underparts clearer.

[1] *Rostratula* Vieillot, Analyse, 1816, p. 56, type *Scolopax capensis* Linnaeus.

[2] Nouv. Dict. Hist. Nat., vol. 6, 1816, p. 402. (Paraguay.)

[3] Regn. Anim., vol. 1, 1817, p. 487.

[4] Philos. Zool., vol. 2, 1822, p. 255. ("R. capensis.")

[5] Hand-und Hilfsb. Naturg., 1842, p. 424. ("Rhynchæna, Rhynchœa!")

[6] *Culicivora budytoides* d'Orbigny and Lafresnaye, Mag. Zool., 1837, Cl. II, p. 56. (Valle Grande, Bolivia.)

[7] *Phylloscartes flavo-cinerea* Burmeister, Reise La Plata-Staaten, vol. 2, 1861, p. 455. (Valleys of Sierra Uspallata, Mendoza, Argentina.)

Description.—Type, Museum of Comparative Zoology, Cat. No. 86,172, adult male in fresh fall plumage, from Tapia, Province of Tucumán, Argentina, collected April 9, 1921, by James L. Peters (orig. No. 4256). Entire upperparts citrine drab; lores and superciliary stripe straw yellow; a blackish spot in front of the eye; auriculars straw yellow anteriorly, shading posteriorly into the color of the upperparts; throat straw yellow shading into amber yellow on the abdomen; sides of chest washed with dark olive buff; flanks darker than straw yellow; under tail coverts straw yellow tipped with dark olive buff; wings chaetura drab, inner webs edged with whitish basally; externally the outer secondaries narrowly edged with whitish; inner secondaries broadly edged and tipped with whitish; primary coverts blackish; secondary coverts blackish broadly tipped with gray number 10 forming a broad patch or band; tail almost black, all but the outermost pair of rectrices faintly edged with citrine drab; outermost rectrix white on the outer web with broad white tip, and a small white spot on the middle portion of the inner web; the next two pairs less broadly tipped with white and white spot on the middle portion of the inner web small or indistinct. Legs and feet blackish (from dried skin).

Measurements (in millimeters).—Males, 6 specimens, wing 56.0–61.8 (59.6); tail 70.7–77.5 (75.3); culmen from base 11.0–11.5 (11.2); tarsus 20.5–22.4 (21.6).

Female, 1 specimen, wing 54.2 (tail imperfect); culmen from base 11.3; tarsus 20.5.

Type specimen (male), wing 59.5; tail 77.5; culmen from base 11.5; tarsus 22.0.

Range.—Known from the Province of Tucumán (Tapia), northwestern Argentina.

Remarks.—The skins from Tapia have been compared with one specimen of *Stigmatura b. budytoides*, a bird from the Lafresnaye collection, which while not a co-type, is an authentic specimen bearing a label in the handwriting of Lafresnaye.

Entotriccus, gen. nov.

Characters.—Similar to *Knipolegus* Boie[1] but primaries greatly narrowed with the sixth to the tenth (outermost) distinctly falcate; seventh primary longest; tenth primary shorter than the first.

Type.—*Muscisaxicola striaticeps* d'Orbigny and Lafresnaye[2] which now becomes *Entotriccus striaticeps* (d'Orbigny and Lafresnaye).

Remarks.—The characters given for this genus serve to distinguish it not only from *Knipolegus* but also from all other known Tyrannidae. Mr. Ridgway apparently had this bird in mind when he described the genus *Phœotriccus*[3] but as he cited as type *Cnipolegus hudsoni* Sclater[4] *Phœotriccus* must be used for that bird.

[1]Boie, Isis, 1826, p. 973, type *Muscicapa comata* Lichtenstein.

[2]Mag. Zool., 1837, Cl. II, p. 66. (Chiquitos, Bolivia.)

[3]Proc. Biol. Soc. Washington, vol. 18, Sept. 2, 1905, p. 209.

[4]Proc. Zool. Soc. London, 1872, p. 541, pl. 31. (Eastern Río Negro, Río Negro, Argentina.)

Mimus patagonicus tricosus, subsp. nov.

Characters.—Similar to *Mimus patagonicus patagonicus* (d'Orbigny and Lafresnaye)[1] but decidedly paler gray above.

Description.—Type, U. S. Nat. Mus. Cat. No. 237,199, male, collected at Lujan de Cuyo, Province of Mendoza, Argentina, July 8, 1912, by Renato Sanzin (orig. no. 33). Crown, hind-neck and back paler than mouse gray; streak across lores dark neutral gray; superciliary stripe extending from nostrils back over eye to hind part of head white; streak behind eye dark mouse gray; fore part of cheeks whitish, becoming avellaneous on ear coverts and lower sides of neck, barred faintly and narrowly on cheeks with dark mouse gray; lower back and rump dull wood brown; upper tail coverts mouse gray; wing-coverts basally fuscous-black, all tipped broadly with white shading to avellaneous toward the back; alula, primaries and secondaries dull black; primaries margined and tipped with white, secondaries tipped with white, margined and washed with avellaneous; primary coverts dull black tipped with white; bend of wing white; rectrices dull black, median pair tipped with grayish, others tipped broadly with white, the tips wider on the two outermost feathers; outer rectrix with outer web and a narrow line on outer margin of inner web white; throat white; lower fore-neck and upper breast smoke gray with a faint wash of white and avellaneous at the tips of the feathers; middle lower breast and abdomen tilleul-buff; sides and flanks between wood brown and avellaneous; under tail-coverts dull pinkish buff; under wing coverts tilleul-buff; axillars mouse gray; anterior tibia white becoming dark neutral gray behind. Bill, tarsus and feet black.

Measurements (in millimeters).—Males (2 specimens), wing 109.5–110.6;[2] tail 103.3–104.8;[2] culmen from base 18.0–19.1;[2] tarsus 34.2[2]–34.3.

Females (3 specimens) 107.5–110.0 (108.5); tail 102.0–103.8 (102.9); culmen from base 18.0–19.0 (18.3); tarsus 33.7–37.0 (35.2).

Range.—Known from the Province of Mendoza (Lujan Cuyo, Mendoza, and El Salto, above Potrerillos), Argentina.

Remarks.—Immature birds in fresh fall plumage are much darker than adults but are still distinctly grayer than skins in similar stage from northern Patagonia.

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[1] *Orpheus patagonicus* d'Orbigny and Lafresnaye, Mag. Zool., 1837, Cl. II, p. 19. (Patagonia.)

[2] Type.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW MARINE TANAID AND ISOPOD CRUSTACEA FROM CALIFORNIA.

BY PEARL LEE BOONE.

The numerous contributions of Tanaid and Isopod Crustacea from the west coast of North America received at the United States National Museum since the publication of Dr. Harriet Richardson's masterly "Monograph on the Isopods of North America," have necessitated an additional report on this fauna. Delays in the publication of this work make it desirable to give status now to the new forms found. The one new genus and new species of Tanaid and the two new genera and five new species of marine Isopods herein described will be more fully discussed and illustrated in a forthcoming monograph.

Order: TANAIDACEA.

Family: APSEUDIDAE.

Genus: **Dalapseudes,** new.

Second antennae without scale. Exopods present on both pair of gnathopods. Epipodytes present on last five pairs of legs. Three pairs of pleopoda are present, the branches of which are well developed. Eyes present. Abdomen consists of six distinct segments. Mouthparts well developed. Unique.

Type: *Dalapseudes pedispinis,* new species, from Laguna Beach, California.

Dalapseudes pedispinis, new species.

Body elongated, narrow, gradually tapering posteriorly.

Head with frontal margin produced into a semiconvex, subtriangulate median rostral process between the basal joints of the first antennae. Eyes large, reddish brown, occupying ocular processes articulated to the head. The first pair of antennae has a peduncle of two articles, the basal one relatively stout and slightly longer than the distal. The biramose flagellum consists of a superior branch composed of seven slender articles, and an

equal inferior branch composed of seven articles; all the joints of the antennae are set with long hairs. The greater antennae are about as long as the head. The second antennae extend slightly beyond the second joint of the peduncle of the first antennae and consist of a peduncle of two slender articles and a flagellum of four rings. The peduncle of the second antennae is sparsely set with long hairs but there is no scale present.

Thorax: The first segment of the thorax is coalesced with the head, forming a carapace; the second is a little shorter than those following, the third and fourth are subequal, each being a little longer than the second; the fifth, sixth and seventh are about equal, each being about one and one-half times as long as the second segment. The lateral margins of the third, fourth, fifth, sixth and seventh segments are distinctly cleft and the postlateral angles of the seventh segment are decidedly produced posteriorly. Epimera dorsally distinct on the last four segments, extending the posterior half of the lateral margins.

The gnathopods are slender, in the normal position curving over the mouthparts, not extending beyond the anterior margin of the head. The hand is chubby, the thumb being thick and bluntly pointed and the finger slender and decidedly curved, the tip being quite pointed and the inner margin finely serrate. The second, third, fourth, and fifth pairs of legs are similar in structure, being relatively weak and graduatingly decreasing in size posteriorly. The last three joints of each leg are flattened, blade-shaped, with the inner margins densely set with long spines, the terminal joint being tipped with three distinct spines with lesser spines interspersed. Epipodytes are present, they spring from the basal joint of the leg and are directed obliquely posteriorly, the distal ends reaching almost to the median ventral line. Each epipodyte is shaped like a long slender blade, terminating in a subtriangulate point, the three posterior epipodytes are narrower.

Abdomen: All six segments are distinct, the first, second and third are narrow, subequal, the fourth and fifth are wider, subequal, having the postlateral angles posteriorly produced. The telson is shield-shaped, having the posterior margin bluntly rounded. The uropoda arise from the ventral surface of the telson; the first joint is rudimentary, the second is a squarish, flat blade, bearing a few fine hairs along the margin. Three pairs of pleopoda are present and have the branches well-developed.

The holotype was collected at Laguna Beach, California, by Dr. William A. Hilton, who donated it to the collections of the United States National Museum.

Order: ISOPODA.

Superfamily: CYMOITHOIDEA.

Family: ANTHURIDAE.

Genus: **Edanthura,** new.

First five segments of abdomen distinct in both sexes. Flagella of both pairs of antennae rudimentary in both sexes. Mouthparts well-developed, with articulation distinctly different from that of the other genera of this family.

Type: *Edanthura linearis,* new species from Laguna Beach, California.

Edanthura linearis, new species.

Body narrow, subcylindric, linear, surface smooth, color light yellow.

Head rectagular, longer than wide with frontal margin with a distinct median point; anterolateral angles decidedly produced terminating in a point that reaches almost to the distal end of the peduncle of the first antennae. Eyes distinct, elliptical, set obliquely in the anterolateral angles of the head. The first antennae consist of a peduncle and rudimentary flagellum. The second antennae are similar with a slight difference in size. Mouthparts well-developed, unique.

Thorax: The first six segments are squarish, the first, second and third being about equal, the fourth, fifth and sixth being about equal, each of the latter being slightly longer than any of the former, the seventh segment is about one-half as long as the first. The first and second segments are narrower posteriorly with the line of segmentation emphasized. Legs: the first pair are geniculate, relatively short, stout, subchelate, having the first joint long, produced outward like a shoulder, the second resemble a stout forearm, the third is quite short, the fourth, fifth and sixth taper and terminate in a curved pointed dactyl. Four pairs of marsupial plates are present, they are very thin, transparent, squarish with the free edges very slightly rounded at the corners.

Abdomen: This consists of six distinct segments and is slightly longer than the last two thoracic segments taken together; the first segment is hidden dorsally by the seventh thoracic segment being distinguishable only laterally and ventrally; the second and third segments are narrow, similar and subequal; the fourth segment is similar but slightly wider than the preceding segment; the fifth segment resembles the fourth, the telson is as long as the outer uropoda and is V-shaped and fringed with hairs. Uropoda: The superior branch of the uropoda overarch the telson, but do not quite meet in the dorsal center. they are somewhat convex and are directed obliquely sidewise, combining with the inferior uropoda and other features of the telson in creating a fanlike aspect. There is a distinctly cleft incision on the extreme posterior margin, which gives the superior uropod a decidedly bilobed aspect; the inferior branch of the uropod is as long as the telson, relatively narrow basally, widening distally, the posterior margin being straight; the first joint terminates about the posterior margin of the superior uropod. The uropoda and telson are heavily fringed with long fine hairs. The pleopoda are slender and heavily fringed with fine hairs.

This species was collected at Laguna Beach, California, by Dr. William Hilton, who with characteristic generosity donated it to the collections of the United States National Museum.

Superfamily: Sphaerominae.

Genus: Exosphaeroma.

Exosphaeroma aphrodita, new species.

Animal exquisitely sculptured and ornamented, iridescent pearly, fairy-like in its ethereal beauty.

Head strongly convex, anterior margin rounded and ornamented by a

prominent median tubercle on each side of which is a lesser elongate tubercle; along the posterior margin there is a row of five, similar, subequal elongate tubercles. Eyes prominent, elliptical, composite, occupying the postlateral angle of the head. The first antennae have the two peduncular joints enlarged, stout, subequal, and a flagellum of four short joints which taken together are about as long as the second peduncular joint. The first antennae extend about to the anterior margin of the first thoracic segment. The second antennae are as long or a trifle longer than the first antennae. The mouth parts are typical *Exosphaeroma;* the second third and fourth articles of the palp of the maxillipeds are very decided produced.

Thorax: The first segment is longer than the head and bears a transverse row consisting of five similar, equal, hemispherical tubercles along the anterior margin, evenly spaced, each one in line with the elongate tubercles of the head; there is also a transverse row of seven similar hemispherical tubercles along the posterior margin of this segment; the second, third and fourth segments are similar and subequal, each bearing a transverse row of seven similar hemispherical tubercles placed in line with the posterior row of tubercles of the first segment and situated along the posterior margins of the respective segments; the fifth and sixth segments are slightly longer than the preceding ones, subequal, each ornamented with a row of seven hemispherical tubercles placed as on the preceding segments; the seventh segment is longer in the median area and has the posterior margin produced to a prominent median tooth giving the segment a triangulate effect; on either side of this median tooth separated by a small recurvate space is a small tooth which in turn is separated by a wider recurvate space from another tooth intermediate in size. The epimera are well developed, closely appressed to the segments, and having the dorsal surface decidedly concave forming a groove, the epimera of the fifth and sixth segments have the outer marginal edge decidedly curled over and inward; the sixth epimera are decidedly produced posteriorly. The legs are ambulatory, similar and subequal.

Abdomen: This consists of two closely fused segments; the first segment resembles the seventh thoracic segment having the posterior margin produced to a median tooth and with two lesser teeth on each side as on the seventh segment. The telson is produced triangulately with the apex slightly rounded. It is elevated rooflike in the median dorsal line and has the sides sloping and terraced; there are four small dentitions in the anterior region forming a V-like design; posterior to these are eight smaller dentitions forming a wider V; succeeding this is a prominent line of suture roughly paralleling the lateral margins of the segment; there is a second shorter, less distinct line of suture close to the lateral margin. These suture lines unite in a tridentate pattern near the apex of the telson. Pleopoda one, two and three bear no stylet, are similar, subequal and heavily fringed with hairs. Pleopoda four and five have subequal, ovate, fleshy branches with transverse ridges. Pleopoda are identical in both sexes. The uropoda arise at the base of the telson and are closely appressed thereto; they are very much expanded, being more than twice as wide distally as basally; the inner branch has the distal margin bluntly rounded, the outer branch produced to

a slightly triangulate apex and is slightly cleft or channeled on each side midway between the apex and the lateral margins. The outer lateral margin of the outer branch of the uropoda is strongly bent upward and curved over inward upon the dorsal surface.

The type and additional material were collected at La Jolla, California, and are in the collections of the United States National Museum. This species is at once distinguished from all described Sphaerominae by its exquisite sculpturing and ornamentation. Out of many thousands of specimens of Isopoda which I have examined, this species is probably the most beautiful.

DYNAMENELLA Hansen 1905.

Dynamenella conica, new species.

Body oval, convex, surface coarsely granular, ground color yellowish dusted with black. Head about twice as wide as long, with frontal contour relatively straight, heavily keeled, below which the margin is narrowly produced with the frontal edge marked by a narrow, median truncate point, on either side of which is a U-shaped incision, followed by a straight area that extends to the anterior part of the eye. The first antennae have a peduncle of three stout, subequal articles and a flagellum of three slender articles, distally tipped with a few hairs; it extends almost to the anterior margin of the third thoracic segment. The second antennae have a peduncle of five, slender, subequal articles and a flagellum of nine fine rings, each bearing an almost tuft of hairs, and extending to the anterior margin of the fourth thoracic segment. The second, third and fourth articles of the palp of the maxillipeds are produced inwardly into lobes. The mandible has a palp of three articles.

The first segment of the thorax is about 1½ times as long as any of the following segments which are subequal. The first segment has the lateral margins heavily ridged; the epimera occur on the second to seventh segments inclusive and have the outer angles rounded. The legs are normal; the first three pairs are directed anteriorly, the last four are directed posteriorly. The distal three joints of each leg are somewhat sparsely and irregularly set with fine short hairs.

The abdomen is composed of two segments; the penultimate segment does not show lines of fusion; it has the median area roundly produced, with a strong ridged carination along the median posterior margin, on either side of which is an acute incision forming a point, thence strongly arcuate with the extreme postlateral angle produced to a rounded point, resembling the epimera of the seventh thoracic segment. The telson is strongly convex, triangulate, with the postlateral margins infolding, funnel-like around a narrow sub-elliptical aperture, which is incomplete on the ventral side; the entire posterior margin is heavily carinated, the aperture margin being finely crenulate also. The dorsal surface is ornamented by a pair of strong ridges that extend almost to the anterior end of the funnel like aperture. These ridges are separated by a deep groove-like depression and each is followed by a row consisting of three convex tubercles, the central tubercle being minutely larger and equidistant from the other two, the three forming

a line equal in length and depth to the above cited ridges, from which they are separated by a deep groove-like depression equal to the median depression. These rows of three tubercles are followed by a less distinct row consisting of two small indistinct tubercles the anterior one being near the base of the uropoda, the posterior being on a line with the middle tubercle of the adjacent row. The uropoda consist of a brief, swollen peduncle and two similar subequal, subovate branches which extend slightly beyond the posterior margin of the telson. The pleopoda are normal.

Both sexes of this species are known. They are very similar, differing only in that the second pleopoda of the male bears a stylet, and the brush-like tufts of setae on the flagellum of the antennae of the male are more pronounced, while the tubercles on the abdomen of the female are weaker and sometimes relatively inconspicuous but always distinct.

The present species is the fourth representative of this genus to be reported from the West Coast of North America; incidentally it may be noted that Monterey Bay, California, the type locality of the three previously described species, is also the first locality from which the present species is recorded. In June, 1905, Dr. J. E. Benedict, of the United States National Museum secured two specimens at Pacific Grove, Monterey Bay, Cat. No. 50413, U. S. N. M., but owing to their imperfect condition I have selected as type a specimen from the material secured by the United States Bureau of Fisheries steamer *Albatross* during the biological explorations of San Francisco Bay, 1912. The type comes from Red Rock, middle San Francisco Bay, Aug. 3, 1912, Cat. No. 50414, U. S. N. M. Additional material secured by the same cruise is in the collection of the United States National Museum as follows: Cat. No. 50415, Key Route Pier, Aug. 3, 1912, 1 specimen; Cat. No. 50416, Sausalito Ferry building, on pile, 1 sp.; Cat. No. 50417, Bonita Point, between tidemarks, Aug. 1, 1912, 1 specimen.

Dynamenella conica is at once distinguished from the other members of the genus by the rows of tubercles on the telson.

Sphaerominae Eubranchiatae.

Clianella, new genus.

First antennae with basal articles swollen, sculptured, dovetailing with the sculptured, carinated frontal margin of the head. Basal joint of antennulae normal, not expanded in a free plate. Without processes on thorax. Abdomen with apex bisected by a deep channel which widens at the anterior end into a crescent surrounding an overhanging blunt tooth. The postlateral wall of the telson is produced to a greater depth below the uropoda than above and is broadly thickened and rounded and distinctly excavated. The uropoda are subsimilar, extending beyond the telson which they entirely surround except in the median area, where their inner margins prolong the channel; the anterolateral margin of the outer blade slightly surrounding the inner blade. The pleopoda one, and pleopoda two, each bear an appendix masculina. The endopoda of pleopods three is one jointed.

Genotype.—*Clianella elegans,* collected at La Jolla, Calif.

Clianella elegans, new species.

Body rather broadly elongate, ovate, moderately vaulted.

The head is nearly twice as wide as long, is wider posteriorly and has the frontal margin produced in a rimlike carination which is sculptured frontally to dovetail with the antennae. The eyes are very large, round, occupying the entire anterolateral areas. The superior antennae arise beside the clypeus, have the first joint elongate, swollen, sculptured, the second joint also swollen and sculptured but not quite half as long as the first joint, the third joint is about as long as the second, but much slenderer, and a flagellum of about fourteen subequal rings, which reach about midway the first thoracic segment. The inferior antennae has the first, second and third joints short, subequal, the fourth joint twice as long as the third, the fifth joint slightly longer than the fourth and a flagellum of sixteen subequal rings each of which bears a small brush of setae on the anterior distal margin. The second antennae reaches not quite to the posterior margin of the third thoracic segment.

The second, third and fourth articles of the palp of the maxillipeds are produced into lobes.

The first thoracic segment is about as long in the median area as the head and has the anterolateral areas decidedly convex and the anterolateral angles produced closely around the ocular lobes. The second to seventh segments inclusive are subequal. The epimera are completely fused with the respective segments. The seventh thoracic segment bears a median transverse row of closely spaced granulations.

The first abdominal segment is approximately one and one-half times as wide in the median area as the seventh thoracic segment. It has the lateral area produced a trifle beyond the thoracic marginal line and curiously thickened ventrally. A vague minute line in the anterior area just inside the lateral angulation of the seventh thoracic segment indicates coalesced segments, this line vanishes in the median lateral region but reappears indistinctly in the central region. A second, pronounced line indicating coalescence occurs on the posterior lateral region and follows the curved posterior margin of the first abdominal segment and vanishes rather abruptly. Two rows of alternately spaced, somewhat larger granulations transverse this segment. The terminal segment is subtriangulate with the anterior two-thirds moderately convex and divided into lobes by a moderate median longitudinal depression. The apex is bisected by a deep channel which widens at the anterior end into a crescent which surrounds an overhanging blunt, round, toothlike projection. The incision is quite deep, being nearly one-third as long as the telson. The margins of the channel are finely crenulate. The postlateral third of the telson is a sloping border definitely, closely appressed to the uropoda and slightly ridged at this point, viewed ventrally this postlateral wall of the telson is produced to a greater depth below the uropoda than above; this produced part has the outer wall convex, widening and thickening toward the base of the uropod, ridged along the extreme ventral margin and thence the internal wall is slightly rounded and excavated to form the pleopod cavity. The first and second pairs of pleopoda each bear an appendix masculina. The

third pleopoda have the exopod one-jointed, the fourth pleopoda have a leaf-like exopod and an endopod marked by heavy transverse folds, the fifth pleopoda have a leaf-like exopod and the endopod more heavily marked by transverse folds than that of the fourth endopod. The uropoda are subsimilar, arise at the base of the teson and are closely appressed thereto, they are larger, very much expanded, being one and one-half times as wide distally as basally, broadly rounded distally with the margin finely crenulate. They extend beyond the telson a distance approximately equal to two-fifths the length of the sinus, but their respective inner margins continue the marginal wall of the sinus, thus accentuating the channel. The outer branch viewed ventrally is decidedly convex, its anterior lateral margin slightly over-arching the inner blade.

Six specimens were collected from the debris from bunches of mussels along the outer ledge of rocks north of Scripps Institution for Biological Research, La Jolla, California, Oct. 23, 1915. The type, Cat. No. 50421, U. S. N. M., and two paratypes are in the collections of the U. S. National Museum; three additional paratypes are in the collections of the Scripps Institution for Biological Research. Another representative of the same species was collected at Point White, San Pedro, California, May 18, 1919, by Mr. E. P. Chace and donated to the U. S. National Museum, Cat. No. 50422.

Superfamily: IDOTHEOIDEA.

Erichsonella pseudoculata, new species.

Body rectilinear, about three and a half times as long as wide. Head wider than long, with frontal margin produced to a depressed blunt triangular median rostrum between the antennal foramina and with the anterlateral angles produced hornlike, somewhat flaring; the median lateral margin is roundly excavate and the postlateral angle is occupied by the small spherical eyes; the median dorsal surface of the head is convex and produced anteriorly into two conical, forward-projecting, hornlike tubercles which extend beyond the median frontal margin of the head. The first antennae are short reaching only to the distal end of the second joint of the second antennae and have the basal joint entirely and the second joint almost entirely hidden, the third joint is very swollen and has its distal margin produced resembling the rostral joint; the fourth and fifth joints are slenderer, subequal, wider distally and the flagellum is clavate but bearing 7 or 8 indistinct minute markings of coalescence, and a fringe of hairs on the distal margin. The second antennae are very conspicuous, being nearly half as long as the body and decidedly geniculate, the first article is quite inconspicuous, the second article is quite broad, widening anteriorly and having the distal margin recurvate like flower petals, the third article is about as long as the second, but is flattened, the fourth is twice as long as the third, the fifth is about as long as the third, all have the distal margin recurvate and produced into points; the flagellum is clavate, about as long as the fourth joint of the peduncle and has a fringe of fine hairs on the distal end.

Thorax: The first thoracic segment is somewhat shorter in the median

area than any of the following and has the median anterior margin slightly bilobate and the anterolateral angles decidedly acutely produced and projecting with the apex notched and the entire process shining black, giving the appearance of huge triangulate eyes. The median dorsal line is produced into two ridgelike tubercles placed one behind the other. The second, third, fourth, fifth and sixth thoracic segments are about equal, the seventh segment is slightly shorter than those preceding; each has the median dorsal line ridged and a single tubercle on the median posterior margin. The epimeral plates are very small, bilobate, scarcely visible dorsally on the first segment, but are distinct on the second to seventh segments inclusive. Those of the second, third and fourth segments are small, triangulate, and placed under and occupy part of the anterior half of the margin of the segment, the fifth epimeron is slightly wider and situated a little more posteriorly, the sixth and seventh epimera are quite large, occupying the entire posterior half of the margin of their respective segments and being longer and directed backward, whereas the other epimera are quite short and are directed straight outwards. The legs are all ambulatory, similar and subequal and have the dactyli biunguiculate.

The abdomen is vaulted, shield-shaped, and is composed of a single segment but bears a decided lateral incision and single distinct, incomplete suture line indicating the fused first segment; this part is quite narrow in the lateral region but has the central portion strongly ridged and gently produced, being nearly five times as long in the median dorsal line as in the lateral line; three slight but distinct tubercles along the median ridge indicate the areas of the completely fused second, third, fourth and fifth segments; the telson is typically shield-shaped with the central area vaulted and the suggestion of a median line extending clear to the apex of the posterior end; the posterior margin is produced into a median point which is strong and acute; extending decidedly beyond the lateral angles which are almost absolute right angles. The uropoda have the apical joints triangulate, about one-fifth as long as the peduncular joint, and each uropod bears two distinct nodules along the line of union of the two joints; the peduncular joint has the free lateral margin heavily grooved. The species may be at once distinguished from all the American *Erichsonellas* by its huge and curious false eyes; also by the presence of a lateral incision on the abdomen.

The type, a unique specimen, Cat. No. 50420 U. S. N. M., comes from San Pedro, California, and was collected by Mr. E. P. Chace. It is interesting to note that this is the first *Erichsonella* reported from the West Coast of North America, the three other American members of this genus being from the East Coast.

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DESCRIPTIONS OF TWO NEW RODENTS OF THE GENUS PHENACOMYS.

BY A. BRAZIER HOWELL.

In the course of a study of the microtine genus *Phenacomys*, based largely on specimens in the Biological Survey Collection, U. S. Department of Agriculture, it has been found necessary to recognize two additional races heretofore undescribed. These may be known as follows:

Phenacomys intermedius levis, subsp. nov.

Alberta Phenacomys.

Type from Saint Mary's Lake, Teton County, Montana. Male adult; No. 72,405, U. S. National Museum (Biological Survey Collection); collected by A. H. Howell, May 23, 1895; original No. 13.

Diagnosis.—Smallest race of this genus, being somewhat smaller than *P. i. intermedius* but indistinguishable from certain skins of the latter in color. The skull of *levis* is much smaller, with rostrum, which although relatively shorter, is more robust. The bullae are proportionately larger and the incisive foramina smaller.

Measurements.—Average of eight adult topotypes (collectors' figures): Total length, 138; tail, 34; foot, 17.6. Average of seven adult skulls of topotypes: condylobasilar length, 22.5; nasals, 7.2; interorbital breadth, 3.6; zygomatic breadth, 14; lambdoidal width, 11; incisive foramina, 4.5; maxillary toothrow, 5.8; height, 8.4.

Geographic distribution.—The eastern slope of the Rocky Mountains at least from central Alberta south to Teton County, Montana.

Remarks.—This race may be easily told from its neighbors by its small size. The animals from the neighborhood of Smoky River, central Alberta, are not quite typical, but are much closer to *levis* than to any other form.

This race seems to be confined to the easternmost part of the Rocky Mountain slopes in the range indicated, for it evidently does not penetrate for any distance into British Columbia, and is not found in western nor southern Montana.

Phenacomys intermedius celsus, subsp. nov.

Sierran Phenacomys.

Type from Muir Meadow at 9300 feet, Tuolumne Meadows, Yosemite National Park, California. Male adult; No. 109,103, U. S. National Museum (Biological Survey Collection); collected by J. H. Gaut, August 13, 1901; original No. 250.

Diagnosis.—A race slightly smaller and very much paler than *Phenacomys intermedius olympicus,* to which it is most closely related. Skull with larger braincase, stouter though no longer rostrum, and practically no indication of interorbital ridging. The incisive foramina are much smaller and the molars very much heavier. The skins are quite comparable with the paler specimens of *P. i. intermedius,* but skulls of typical *celsus* may be told at a glance by their very much larger size, heavier rostra and larger bullae.

Measurements.—Average of five adults from the Yosemite Park (collectors' figures): Total length, 148; tail, 39; foot, 18. Average of three adult skulls from the same region: condylobasilar length, 24.1; nasals, 7.8; interorbital breadth, 4; zygomatic breadth, 15.8; lambdoidal width, 11.9; incisive foramina, 4.3; maxillary toothrow, 6.2; height, 9.4.

Geographic distribution.—So far as known, the Sierra Nevada of California from the Yosemite Park north to the vicinity of Lake Tahoe.

Remarks.—This race, although considered closest in relationship to *P. i. olympicus* is readily distinguishable, by both external and cranial characters. Furthermore, the two races are separated by a quite different animal which ranges into the mountains of southern Oregon and northern California and whose affinities are clearly with *P. i. intermedius* of the Great Basin and Rocky Mountains.

Individuals from the vicinity of Lake Tahoe are not typical of *celsus,* but are nearer this than to anything else now recognized.

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A NEW POCKET MOUSE FROM LOWER CALIFORNIA.

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

Among the specimens of mammals collected on our overland expedition through Lower California in 1905–06 is a series of pocket mice of the genus *Perognathus*, from Magdalena Island. These specimens reveal distinctive characters, and form the basis for the new subspecies described below.

Perognathus penicillatus albulus, subsp. nov.
Pale Pocket Mouse.

Type from Magdalena Island, Lower California, Mexico. No. 146864, ♂ adult, U. S. National Museum (Biological Survey Collection), collected by E. W. Nelson and E. A. Goldman, December 3, 1906. Original number 18733.

General characters.—A small and unusually light-colored form, most closely allied to *Perognathus penicillatus arenarius*, but upperparts decidedly paler, the buffy element much less obscured by dusky hairs. Similar to *P. p. ammophilus*, but considerably smaller with distinctive cranial characters.

Color.—*Type:* Upperparts in general near light buff (Ridgway, 1912), palest on cheeks, shoulders, sides, and outer surface of hind limbs, finely and rather inconspicuously mixed or lined with brownish black on top of head and over back; underparts, fore limbs, and hind feet white; tail light brownish above, whitish below.

Skull.—Closely resembling that of *P. p. arenarius*, but averaging smaller, less massive. Similar to that of *P. p. ammophilus*, but decidedly smaller with relatively weaker zygomatic arches.

Measurements.—*Type:* Greatest length, 155; tail vertebrae, 83; hind foot, 22. Average and extremes of nine adults, including type, from type locality: 156 (147–164); 86 (79–98); 23.2 (21–23). *Skull* (type): Greatest length, 22.8; mastoid width, 12; zygomatic width, 11.2; interorbital constriction, 6.1; nasals, 8.7; interparietal, 7 x 3.4; maxillary toothrow, 3.4.

Remarks.—The pallid coloration of this pocket mouse appears to be associated with that of the shifting sand dunes it inhabits. It appears to

be restricted to Magdalena Island, but is evidently very closely allied to the darker form which occurs on the adjacent mainland. In color it closely resembles *P. p. ammophilus* of Santa Margarita Island, but is readily distinguished by smaller size, and the cranial characters pointed out.

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

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PROCEEDINGS
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FURTHER NOTES ON NAMES OF EMESINAE AND OTHER RHYNCHOTA.

BY W. L. McATEE AND J. R. MALLOCH.

Five names for genera of Heteroptera proposed by Johann Friedrich Wolff in 1811 have been overlooked by compilers of the great zoological nomenclators as Agassiz, Scudder, Sherborn, and Waterhouse. We are indebted to Dr. E. Bergroth for reference to the work in which these names occur, namely, Icones Cimicum Descriptionibus illustratae, Fasc. V, Erlangen, 1811. It is due to Dr. Bergroth that we note his opinion that these names are *nomina nuda*, but as they are acceptable under the International Code of Nomenclature, the A. O. U. Code and the Entomological Code, works which guide the great majority of American taxonomists, we are unable to concur in Dr. Bergroth's view.

On page IV of the introduction of the work cited, Wolff reviews the increase in the number of heteropterous genera since the publication of his first fascicle in 1800. The activities of Fabricius in this respect are especially noted and Wolff goes on to say that he accepts the new Fabrician genera and names some others himself. He then gives in each case the new name, a German vernacular name, and the number of the species to which the name is applied. These numbers refer to full specific descriptions and to figures on colored plates which are numbered to correspond throughout the work. The names with accompanying citations are:

No. 161. *Orius*, Waldwanze. page IV
169. *Thyreocoris* (previously by Schranck in Fauna Boica) Schildwanze. " "
187. *Coryna*, Keulenwanze. " "
192. 193. *Aellopus*, Schnellwanze. " "
197. *Empicoris*, Mückenwanze. " "
200. *Himacerus*, Peitschenwanze. " "

Of these generic names *Orius* and *Himacerus* appear not to have been used by any other authors. Whether *Coryna* has been used elsewhere is in question while each of the others has been employed by one or more systematists. Except in the case of *Thyreocoris*, Wolff's names have priority. Since Wolff mentioned but one species in connection with each genus (except *Aellopus*) he established genotypes and upon the identity of these depends the application of his names.

The species cited and their equivalents in current catalogs are:

No. 161. *Salda nigra* Wolff = *Triphleps nigra* Wolff.
169. *Tetyra lateralis* Fabricius = *Thyreocoris lateralis* Fabricius.
187. *Corizus sidae* Fabricius = *Corizus sidae* Fabricius.
192. *Lygaeus aterrimus* Fabricius = *Microtoma atrata* Goeze.
193. *Lygaeus rolandri* Linnaeus = *Calyptonotus rolandri* Linnaeus.
197. *Gerris vagabundus* Linnaeus = *Ploiariola vagabunda* Linnaeus.
200. *Reduvius apterus* Fabricius = *Nabis apterus* Fabricius.

Thus seven genera are affected by the acceptance of Wolff's names, the result in each case being briefly summarized below:

Orius Wolff 1811 preoccupies *Triphleps* Fieber 1860 but by chance the genotype remains the same.

Thyreocoris is avowedly used by Wolff in the sense of Schranck, Fauna Boica, 1801, but as Wolff cites only one species, he therefore designates the genotype, which is *lateralis* Fabricius, instead of *scarabaeoides* Linnaeus as now accepted.

Coryna Wolff 1811 preoccupies the genus *Corizus* Fallen 1814 and the subgenus *Niesthrea* Spinola 1837 to which the species *sidae* is currently assigned. This species becomes the genotype instead of *hyoscyami* Linnaeus as given in present-day catalogs. These statements are made with knowledge of Agassiz's entry to the effect that there is a *Coryna* Gärtner in Pallas, Elenchus Zoophytorum, etc., 1766. Sherborn reports inability to locate this name and we also have inspected the work cited in vain. Should such an early *Coryna* be found valid the changes here suggested will not be necessary.

Aellopus Wolff 1811 is earlier than any identical name in nomenclators, the earliest of which is by Koch 1843 an Arachnid name, the successor of which we do not attempt to trace. Since Wolff cited two species for this genus we select the first as genotype; as it is the same as the genotype of *Microtoma* Laporte 1832, this action substitutes *Aellopus* for that name. The combination *Calyptonotus rolandri* is left undisturbed.

Empicoris Wolff 1811 preoccupies *Empicoris* Hahn 1834, a genus of Pentatomidae for which the next available name according to Kirkaldy's catalogue is *Dinocoris* Burmeister, 1835. The genotype being *Gerris vagabunda* Linnaeus, *Empicoris* becomes the name for the Emesinae known as *Ploiariola* Reuter 1888 (=*Ploiariodes* White, 1881).

Himacerus Wolff 1811 while a unique name in nomenclature does not preoccupy a genus in Heteroptera since its genotype is the same as that of *Nabis* Latreille 1802; it does, however, replace the subgeneric name *Aptus* Stal 1873.

In relation to our previous nomenclatorial paper (Proc. Biol. Soc. Wash., Vol. 35, p. 95, Aug. 30, 1922) it must be pointed out that *Empicoris* is to be substituted for *Ploiariodes* in every case. We take the opportunity also of correcting an error in that article; the wrong varietal name was cited as the prior equivalent of *Ploiariodes canadensis* Parshley. In nomenclature as modified by the present paper the latter name equals *Empicoris vagabunda* var. *vagabunda* Linnaeus.

Tridemula described as a new genus by Horvath (Miscellanea Hemipterologica XV. Ann. Mus. Nac. Hung. 12, 1914, pp. 654–646) we would rank as a subgenus of *Empicoris*. Before seeing Horvath's paper we had submitted for printing a manuscript containing a subgeneric name for the same segregate based on *Ploiariodes calamine* Kirkaldy (A Catalogue of the Hemiptera of Fiji; Proc. Linn. Soc. N. S. W., vol. 33, p. 372, 1908, of which we have seen a specimen, apparently the type (Bueno collection). The name of Horvath's genotype, *pilosa* being preoccupied in *Empicoris* by *pilosa* Fieber 1861 we propose as a substitute for it the specific name **horvathi.**

Hadrocranella Horvath (op. Horv. cit., pp. 647–648) seems to be a distinct genus, and parallel to the preceding case we had decided to name it on the basis of *Ploiariodes medusa* Kirkaldy (op. Kirk. cit., p. 373, Pl. IV, fig. 12). The description, and figure of the hemelytron of this species indicate that it is strictly congeneric with Horvath's genotype (*imbellis*) from New Guinea.

Calphurnia Distant, Oriental Rhynchota Heteroptera (Ann. Mag. Nat. Hist. Ser. 8, III, 1909, pp. 502–503) if correctly identified by Horvath (op. cit. p. 649) is a synonym of *Emesopsis* Uhler 1893; certainly Horvath's species (*pacalis* from Formosa) belongs to that genus.

Orthunga bivittata Uhler (Proc. U. S. Nat. Mus. 19, p. 272, 1896) the type of which we have seen (U. S. National Museum) is a synonym of *Myiophanes tipulina* Reuter.

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PROCEEDINGS
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TWO DIPLOPOD IMMIGRANTS TAKEN AT HONOLULU.

BY RALPH V. CHAMBERLIN.

Among diplopods taken at quarantine in Honolulu by inspectors of the Federal Horticultural Board were representatives of the two new polydesmoid genera described below.

Desmoxytes, gen. nov.

A leptodesmid genus resembling in size and general form of body the South American Trichomorpha, but with antennae and legs very long.

Third joint of antennae longest, the sixth shorter than the fifth.

Keels of second segment on same level as the others. All keels elevated, and with their posterior angles strongly and acutely produced and not at all decreasing on caudal segments. Each metazonite with a transverse sulcus, in front of which is a series of setigerous tubercles and behind which, along the caudal margin, is a series of large, conical, caudally projecting tubercles. Setae borne on caudal margin and on lateral teeth of keels.

Repugnatorial pores on segments V, VII, IX, X, XII, XIII, and XV-XIX.

Anal tergite triangular, with three transverse rows of setigerous tubercles.

Legs long, without tarsal pads or other processes.

Sternites unarmed excepting for a median process between legs of fifth segment of the male.

Telopodite of gonopod long, the femoral division separated by greater thickness, clothing of setae, and a notch or constriction. Coxal hook present.

Genotype.—Desmoxytes coniger, sp. nov.

Desmoxytes coniger, sp. nov.

The general color of the dorsum and the pleural region is chocolate brown, the venter being pale yellow or whitish. The head is almost black, with the clypeal region pale. The keels are light, like the venter. The antennae are dark, like the head, but the legs are pale, more or less darkened distally.

Vertex of head crossed by a deep sulcus, with a few straight, erect setae on each side of it.

The collum is semicircular, with the lateral caudal angles acutely produced backward. A series of small setigerous tubercles along anterior margin. Four larger tubercles along posterior margin, and two obsolete ones in a transverse line near middle. No lateral teeth on keels.

Second tergite with an anterior row of four tubercles and a posterior row of four larger, of which the lateral are larger than the median ones. Posterior angles of keels more strongly and acutely produced, the lateral margin with a setigerous tooth near anterior corner and a smaller denticulation farther caudad. In subsequent segments the tubercles are similar, the conical ones on the caudal border first increasing and then decreasing in going toward caudal end of body, those on the eighteenth and nineteenth segments being much reduced. Pore on lateral margin just behind the second tooth, which is more developed on the poriferous segments.

Last dorsal plate triangular, with two setiferous tubercles at caudal end and three transverse rows of setiferous tubercles across dorsal surface, the tubercles small and four in number in each series.

Telopodite of male gonopod cleft at the free end into three rather short, principal divisions, or prongs. Of these the innermost is lamelliform, curved downward and then forward, and bears three teeth at end. The middle prong is simple and slender. The outer prong is slender and evenly curved, with concavity above; it is acutely pointed, and is the semeniferous branch.

Length, 18 mm.; width, 2 mm.

Holotype.—M. C. Z., 5,208 (♂).

Locality.—Taken at Honolulu, Hawaii, in soil about plants from Buitenzorg, Java, December 10, 1922, by E. M. Ehrhorn. Three adult males, an adult female, and many immature specimens.

Chinosoma, gen. nov.

A strongylosomoid form in which the keels are very narrow, almost obliterated, the poriferous ones much thicker than the others. Second keel obviously below level of the first and third.

Prozonite separated from metazonite by a deep constriction. Metazonite crossed by a distinct transverse sulcus. Surface of segments smooth.

Repugnatorial pores on segments V, VII, IX, X, XII, XIII, and XV-XIX.

Pleural keels present on second and third segments, but weak.

First leg of male not thickened and not with any distinct processes.

The fifth sternite of male with the usual median process, or lamella.

In the gonopods of male the usual coxal hook is present. The femur distinctly set off. Telopodite deeply subdivided nearly to base. Semeniferous branch a long, smooth blade from a segment distinctly set off adjacent to femur. The main branch broad and lamelliform, distally twisted, and forming a groove in which lies the apical part of the semeniferous branch.

Genotype.—Chinosoma hodites, sp. nov.

Chinosoma hodites, sp. nov.

Body with a dark chocolate brown longitudinal stripe on each side of dorsum just above keels, and a second one on the side just below the keels, leaving a broad middorsal stripe and a narrower one at level of keels of a yellow color, the lower part of sides and the venter being also yellow. Legs whitish. Head and antennae chocolate brown.

Vertigial sulcus of head distinct down to level of antennal sockets. Clypeal region with sparse setae. Second article of antennae longest, the third, fourth, and fifth subequal, the sixth a little longer than these.

Dorsum smooth and shiny. Constriction between prozonite and metazonite of segments deep, and the transverse sulcus of the latter distinct between the keels. The keels are narrow, convex from end to end as seen from above, with no trace of angulation behind, or of teeth. Narrowed cauda of last dorsal plate extending widely beyond valves, truncated end.

In the telopodite of the male gonopods the femur is distinctly set off, and in the part distad of the femur a segment at base is also sharply set off and gives rise to the semeniferous blade from its inner side. The distal portion of telopodite is broader and is membranous, distally twisted, and having at the end three points, of which the one at the distal internal corner is longer and more finger-like.

Length, 19 mm.; width, 1.6 mm.

Holotype.—M. C. Z., 5,210 (♂).

Locality.—Taken at Honolulu in soil about cactus plant in baggage from China, October 7, 1921. One adult male and three immature specimens.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

OCCASIONAL NOTES ON OLD WORLD FERNS,—I.[1]

BY WILLIAM R. MAXON.

Among the collections of ferns received for identification at the National Herbarium there are occasional lots of Old World specimens, among which are noted a few that are of more than ordinary interest. Except when a generic or group revision seemed to require extended treatment, these have usually not been dealt with, the writer's studies having been confined almost wholly to tropical American species. In future, however, minor notes relating to Old World ferns—such as the transfer of species to their proper genus, the occasional description of others as new, the restoration of valid species from synonymy, notable extensions of range for little known species, and inevitable changes of name—will be brought together under the title above. There will be included, also, the publication of new or transferred names made necessary by the rearrangement of material in the Herbarium, especially in a few groups in which the generic nomenclature followed is at variance with that employed in Christensen's *Index Filicum*.

OPHIOGLOSSACEAE.

Ophioglossum angustatum Maxon, nom. nov.

Ophioglossum japonicum Prantl, Ber. Deutsch. Bot. Ges. **1**: 353. 1883; Jahrb. Bot. Gart. Berlin **3**: 327. *pl. 8, f. 29*. 1884. Not *Ophioglossum japonicum* Thunb. 1784, which is *Lygodium japonicum* (Thunb.) Swartz, 1801.

Founded on two collections from Japan, and since discovered in Central China. A recent specimen received at the National Herbarium is from Peitaiho, growing with *Ibidium* sp. in a low situation in sand flats, *Cowdry* 274.

The assignment of a new name is necessary, even under the Vienna Code.

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

SCHIZAEACEAE.

Lophidium dichotomum (L.) Maxon.

Acrostichum dichotomum L. Sp. Pl. 1068. 1753.

Schizaea dichotoma J. E. Sm. Mem. Acad. Turin **5**: 422. 1793.

Schizaea cristata Willd. Sp. Pl. **5**: 88. 1810.

In describing the North American Schizaeaceae several years ago[1] the writer restored Richard's genus *Lophidium* (1792), a small group of species that had been reduced to subgeneric rank under *Schizaea* J. E. Sm. (1793). This paleotropic species was there omitted, since only American members of the genus were treated.

POLYPODIACEAE.

Dryopteris transversaria (Brack.) Maxon.

Nephrodium transversarium Brack. in Wilkes, U. S. Expl. Exped. **16**: 187. 1854.

The type of this species, in the U. S. National Herbarium, consists of two sheets, representing a nearly complete frond from Tutuila, Samoan Islands, collected by the Wilkes Expedition. Two additional collections are at hand from Upolu, viz. *C. G. Lloyd* 34 and *Safford* 19. In Christensen's Index Filicum this species is referred doubtfully to *D. pennigera* (Forst.) C. Chr. It bears no very close resemblance to that widely distributed plant, however, though listed by Luerssen among the numerous synonyms of *Aspidium pennigerum.*

Dryopteris setigera (Blume) Kuntze, Rev. Gen. Pl. **2**: 813. 1891.

Cheilanthes setigera Blume, Enum. Pl. Jav. 138. 1828.

Lastrea setigera Bedd. Ferns Br. Ind. Correct. II. 1870. Not *L. setigera* Moore, 1858.

Nephrodium setigerum Baker in Hook. & Baker, Syn. Fil. 284, in part. 1867. Not *N. setigerum* Presl, 1825.

Aspidium uliginosum Kunze, Linnaea **20**: 6. 1847.

Polypodium tenericaule Wall.; Hook. Journ. Bot. Kew Misc. **9**: 353, in part. 1857.

Nephrodium tenericaule Hook. Sp. Fil. **4**: 142, in part. 1862.

Polypodium nemorale Brack. in Wilkes, U. S. Expl. Exped. **16**: 16. 1854.

In a recent large collection of Tahiti ferns by Setchell and Parks there were three specimens belonging to the group of *Dryopteris setigera.* One of these (no. 277) was found to represent *D. setigera* in its strict sense and two (nos. 19 and 237) to belong to the collective species known recently as *D. ornata* (Wall.) C. Chr. The taxonomic history of the group is too involved to be discussed profitably in great detail; yet the main results, including the restoration of a well-marked species founded on Philippine material by Presl, should be recorded.

Dryopteris setigera is here regarded in its usual sense as applying to plants (first described from Java) with smooth shining rachises throughout, these neither muricate nor scaly, and a tuft of lustrous, dark brown, short-ciliate

[1] N. Amer. Fl. **16**: 31–52. 1909.

scales at the base of the stipe. No scales, however reduced, occur upon the rachises or costae. The hairy covering of the pinnules and segments beneath consists of the long, spreading, white hairs common to the group. The indusium is minute and is usually evanescent, either by early shrivelling or by falling away altogether; it is commonly beset with capitate glands at the margin and with few to many fragile white cilia. The indusial characters are variable and difficult to make out, owing largely to age of the specimens; but the distinction of smooth, non-scaly rachises is readily observed at all stages, and plants agreeing thus and in other general characters are at hand from a wide area, as follows:

Java, *Buysman* 73, 175; *Palmer & Bryant* 1325. Sumatra, *Winkler* (Rosenstock 86); *Schild.* British North Borneo, *Topping* 1762. Palawan, *Bermejos* (Bur. Sci. 282). Mindanao, *DeVore & Hoover* 360. Batanes Islands, *Fenix* (Bur. Sci. 3649). Negros, *Elmer* 9893. Luzon, *Cuming* 1; *Merrill* 2266; *Topping* 636, 698, 890, 959. Norfolk Island, *Metcalfe.* Sunday Island, *Cheeseman.* Kakeah Island, *Wright.* Samoan Islands, *McMullin* 29; *Wilkes Exped.* 27 (type of *Polypodium nemorale*). Tahiti, *Setchell & Parks* 277. Oahu, *Hapeman* 6. Formosa, *Nakahara* 51. Japan, *Savatier* 2579. China, *Bailey* 2, 6, 9; *Faber* 680. Ceylon, *Ferguson* 134. India, Pulnies, alt. 1,590 meters, *Levinge.* Assam, *Mann.* Sikkim, *Thomson.* Malay Peninsula, *Norris.* Brazil, *Lüderwaldt* 1862; *Rose & Russell* 19618, 21277; *Haerchen* (Rosenstock 205). Florida, escaped near Oviedo, *A. A. Eaton.*

Thus delimited, *D. setigera* includes *Polypodium nemorale* Brack., of which the Samoan type specimen is at hand; *Aspidium uliginosum* Kunze, described from plants raised from spores received from Java; and a part of the specimens listed by Hooker in describing *Polypodium tenericaule* Wall.[1] and again cited by him under *Nephrodium tenericaule* Hook.

In distinction from *D. setigera* there is a large series of specimens in which the rachises, or at least the secondary and tertiary ones, are at first erinaceo-paleaceous and at all stages are distinctly tuberculate or muricate. These are found to pertain to two well-marked species, *D. ornata* and *D. leucolepis*, which have been greatly confused.[2]

Dryopteris ornata (Wall.) C. Chr. Ind. Fil. 281. 1905.

Polypodium ornatum Wall.; Hook. Journ. Bot. Kew Misc. **9**: 354. 1857.
Nephrodium tenericaule Hook. Sp. Fil. **4**: 142, in part. 1862.

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[1] *Polypodium tenericaule* is actually founded on a specimen from China, collected by Alexander. Through the courtesy of the Director of the Royal Gardens, Kew, it has been possible to examine a portion of this, as also of a Wallich specimen from the "mountains of Sylhet," cited by Hooker. Both are minutely indusiate and pertain undoubtedly to *D. setigera*, of which *P. tenericaule* thus becomes a synonym. The Philippine plants cited by Hooker are discussed hereafter, under *D. leucolepis*.

[2] Another name to be considered in this connection is *Cheilanthes stenophylla* Kunze (Bot. Zeit. **6**: 212. 1848), founded on *Zollinger* 2675, from Java. This is cited as a synonym of *D. setigera* by Christensen, a disposition which from the description of the rough subaculeate rachis is obviously incorrect. Several details, especially the coriaceous texture, indicate that it is not *D. leucolepis*, and it may not even be a species of *Dryopteris*. Kunze regarded it as allied to *Cheilanthes pallida* Blume, which is now referred to *Hypolepis tenuifolia*.

Though included in Wallich's list (1828) as a *nomen nudum*, *Polypodium ornatum* appears to have been actually described first by Hooker, in 1857, Wallich's no. 327, from Nepal, being the first specimen cited. It was later described and illustrated by Beddome.[1] The descriptions agree, and special attention should be called to the character of *muricate or aculeolate* rachises, stated by both. This at once sets the species apart from *D. setigera*. Beddome's plate is excellent. But in 1862 Hooker merged *P. tenericaule* and *P. ornatum* with the Philippine plant described by Presl as *Lastrea leucolepis*, assigning to this aggregate the name *Nephrodium tenericaule;* his description actually includes three species, *D. leucolepis*, *D. ornata*, and *D. setigera*[2], but his illustration (*pl. 269*) represents *D. ornata* or *D. leucolepis*, probably the latter.

Of *D. ornata* four specimens are at hand, three collected in Sikkim, at 600 to 1,500 meters elevation by Sir Joseph Hooker, distributed as *Polypodium ornatum;* the fourth from the Khasi Hills, Assam, alt. 1,200 meters, August, 1885 (*G. Mann*, collector), distributed as *Phegopteris ornata.*

From *D. leucolepis* this species differs not only in its horizontally spreading pinnae, pinnules, and segments, but in the complete suppression of indusia and in the nearly or quite non-ciliate scales of the secondary rachises, costae, and costules. The scale character is discussed under the next species.

Dryopteris leucolepis (Presl) Maxon.

Lastrea leucolepis Presl, Epim. Bot. 39. 1851.

Polypodium tenericaule Wall.; Hook. Journ. Bot. Kew Misc. **9**: 353, in part. 1857.

Nephrodium tenericaule Hook. Sp. Fil. **4**: 142, in part. 1862.

Polypodium pallidum Brack. in Wilkes, U. S. Expl. Exped. **16**: 18. 1854.

In describing for the first time (1857) *Polypodium tenericaule*, listed by Wallich as a *nomen nudum*, Hooker based his description on a Chinese plant collected by Alexander, now called *D. setigera* (at that time not known to him through specimens under its original name, *Cheilanthes setigera*). Strangely enough, he included also many very different specimens with muricate rachises. Thus, of Cuming's Philippine plants he cites nos. 1, 75, 114, 212, 355, and 412. All but one of these are in the U. S. National Herbarium. No. 1 is clearly *D. setigera*; nos. 75, 114, 355, and 412 are the plant described by Presl as *Lastrea leucolepis*, founded on no. 114 (the only number cited), with muricate rachises bearing minute, linear, true scales nearly throughout. It is very improbable that all these numbers were mixed in the sets distributed, yet Hooker's failure to note the actual distinctions is otherwise hard to explain. The ample Philippine material at hand indicates a plant much stouter in every way than *D. setigera*, the dimensions being similar to those of *D. ornata*. The rhizome scales are not

[1] Ferns Southern India 56. *pl. 171.* 1863–65.

[2] *Dryopteris setigera* was taken up by Hooker as *Hypolepis setigera* (Sp. Fil. **2**: 62. 1852), the description being merely a quoted translation of Blume's diagnosis of *Cheilanthes setigera*. Specimens bearing this name were evidently not available to him and none were cited.

bright brown (as in *D. setigera*), but dirty-white or dull flesh-colored, and similar scales extend upward along the main rachis and even to the minor rachises, all the scales being pale, narrow, and very copiously long-ciliate. In this last character of strikingly long-ciliate scales, as in the presence of small indusia and in the somewhat oblique, narrower, and spaced pinnules, *D. leucolepis* differs constantly from *D. ornata*. The long patent hairs of the under surface are much more numerous, and the plant is more freely hairy above, also. The indusium of *D. leucolepis* is fairly well developed, and though membraneous, and rather completely obscured by the numerous sporangia, is usually evident even at maturity, upon careful dissection; it is provided with numerous long-stalked, capitate, marginal glands, and is without cilia.

The following specimens of *D. leucolepis* are in the National Herbarium: Luzon, *Cuming* 75, 114, 355, 412; *Loher* 1130; *Williams* 558 (5 sheets); *Topping* 171, 178, 441, 757, 964; *Foxworthy* (Bur. Sci. 2580); *Mangubat* (Bur. Sci. 1355). Mindanao, *Copeland* 611; *Williams* 2280. Negros, *Elmer* 9889, 9941. Java, *Buysman* 47, in part. Ternate Island, *Curtis* (2 sheets). Tahiti, *Wilkes Exped.* 32 (type of *Polypodium pallidum* Brack.); *Anderson* in 1852; *Setchell & Parks* 19, 237.

Of these numbers, *Cuming* 75 and 412 were cited by John Smith[1] as *Polypodium trichodes* Reinw., a *nomen nudum*; but *Cuming* 1, also so cited by him, is *D. setigera*, as above stated. Another Luzon plant (*Topping* 171) was mistakenly cited by Christ[2] as *D. flaccida* (Blume) Kuntze, a much smaller species, which wholly lacks scales on the rachises.

Egenolfia sinensis (Baker) Maxon.

Acrostichum sinense Baker, Kew Bull. **1906:** 14. 1906.

Polybotrya sinensis C. Chr. Ind. Fil. Suppl. 57. 1913.

Founded upon *Henry* 12494, from Szemao, Yunnan, of which two specimens are at hand. It is not related closely to *Polybotrya*, but falls readily under *Egenolfia*, being nearest an Assam species that is included in the complex of *E. appendiculata*.

Tectaria gaudichaudii (Mett.) Maxon.

Aspidium sinuatum Gaud. Freyc. Voy. Bot. 343. 1827. Not *A. sinuatum* Labill. 1824.

Aspidium gaudichaudii Mett.; Kuhn, Linnaea **36:** 123. 1869.

The manuscript name *Aspidium gaudichaudii* Mett. was definitely published by Kuhn in the Reliquiae Mettenianae, as above indicated, in comparison with a new species from Tahiti, *Aspidium tenuifolium* Mett. It is primarily a change of name for *A. sinuatum* Gaud., Gaudichaud having wrongly listed Hawaiian plants as *A. sinuatum* Labill., a species of New Caledonia. Under *A. gaudichaudii* Mett. are cited the Hawaiian collections of Brackenridge and of Andersson and, additionally, a single specimen from India. So far as the writer has examined material, *A. gaudichaudii* is confined to the Hawaiian Islands, although Mettenius[3] later cited it from

[1] Journ. Bot. Hook. **3:** 394. 1841.

[2] Philippine Journ. Sci. C. Bot. **2:** 210. 1907.

[3] Novara Exped. Bot. **1:** 219. 1870.

Tahiti. The Hawaiian material at hand was collected by Brackenridge, Copeland, Lichtenthaler, Baldwin, Bartsch (56, 66, 76), and Safford (914, 915, 916).

Tectaria gaudichaudii has usually been listed, under one genus name or another, as *cicutaria* or *apiifolia*. *Tectaria cicutaria* (L.) Copel. and *T. apiifolia* (Schkuhr) Copel. are, however, confined to the West Indies, and offer only a superficial resemblance to the Hawaiian plant under discussion.

Tectaria tenuifolia (Mett.) Maxon.

Aspidium tenuifolium Mett.; Kuhn, Linnaea **36:** 122. 1869.

Described from Tahiti and compared by Mettenius and Kuhn with *Aspidium apiifolium* Schkuhr and *A. gaudichaudii* Mett., that is to say, *Tectaria apiifolia* and *T. gaudichaudii*. From description it appears to be well founded.

Tectaria setchellii Maxon, sp. nov.

Fronds several, recurved-ascending, 70 to 105 cm. long; rhizome woody, decumbent, densely paleaceous at the end, the scales tufted, 10 to 18 mm. long, lance-acicular, hair-pointed, pale brown, membranous, distantly and obscurely fibrillose-denticulate; stipes as long as the blades, dull cinnamon-brown from a darker, lightly crinite base, deeply sulcate on all sides; blades 35 to 50 cm. long, 20 to 45 cm. broad, deltoid-ovate to broadly ovate-oblong, acuminate, once pinnate, the basal and sometimes the second pair of pinnae fully pinnate at base; pinnae 2 to 5 pairs, spreading, the basal pair largest, 15 to 25 cm. long, 10 to 18 cm. broad, deltoid, long-acuminate, inequilateral, petiolate (up to 3 cm.), the basal pair of pinnules petiolate (up to 1 cm.), pinnately lobed or lacerate, the other pinnules or lobes (1 to 3 in number) broadly joined, oblique, subfalcate, sinuate, long-acuminate, often caudate; second pair of pinnae much smaller, sometimes with a pair of free basal pinnules, but usually only pinnately cleft or lobed; upper pinnae lance-attenuate, sinuately lobed to subentire, the uppermost semiadnate to adnate, the apex itself pinnately lobed; midveins elevated; ultimate veins prominulous, the areoles irregularly polygonal, variable in size, the larger ones with included veins; sori usually few, irregularly disposed, round or oblong, the receptacles large; indusia and paraphyses wanting. Leaf tissue membrano-herbaceous, translucent, dull green, paler beneath, glabrous.

Type in the U. S. National Herbarium, nos. 1,051,426 and 1,051,427, a single frond collected beyond Blunt's Point, Tutuila Island, on cliff, July 15, 1920, by W. A. Setchell (no. 360). Other material referable to this species is as follows:

Tutuila: Near village of Niuili, at base of cliff, June 15, 1920, *Setchell* 119. Near Pago Pago, March, 1914, *Stearns;* April, 1915, *McMullin*. Observatory Point, in rich moist soil, May 6, 1914, *McMullin* 27.

Upolu: Precise locality and collector's name not stated, the specimen collected in January, 1885; distributed as "*Bathmium grande* Rchb."

Tectaria setchellii belongs to the subgenus *Arcypteris*, though having little in common with *T. irregularis* (Presl) Copeland, which is the typical

species of that small group, marked by exindusiate sori. Habitally and in its venation it strongly suggests the Polynesian *T. latifolia* (Forst.) Copeland, described by Kunze as *Aspidium forsteri* and redescribed under the latter name by Mettenius. From *T. latifolia* it differs in its fuscous-stramineous or dull cinnamomeous stipes, rachises, and midveins, its fewer pinnules (only the basal ones of the first one or two pairs of pinnae being free), and its non-indusiate and non-paraphysate sori, these large and not infrequently borne two or three together. *T. latifolia* is distinguished by its polished ebeneous vascular parts, its regularly crenate, numerous free pinnules, and its strongly pulvinate-paraphysate sori, to which the minute indusia usually remain attached. Notwithstanding these pronounced differences it is not improbable that some of the material reported from Upolu by Luerssen, Christ, and Rechinger as *Aspidium latifolium* pertains to this species.

In the foregoing it is assumed, perhaps wrongly, that the plant described by Kunze as *Aspidium forsteri* is the same as the original of *Polypodium latifolium* Forst. This is disputed by Presl, who refers Forster's plant to *Phymatodes*. The complicated taxonomic history of this group is discussed at some length by Fournier,[1] following his description of *Bathmium seemanni*, a new species from New Caledonia and Fiji, which is listed by Christensen as a doubtful synonym of *Aspidium latifolium* (*Tectaria latifolia*).

Tectaria stearnsii Maxon, sp. nov.

Fronds several, 70 to 110 cm. long, ascending; rhizome woody, decumbent, densely paleaceous, the scales linear-attenuate, up to 2 cm. long, brown, firm, lustrous, deciduously glandular-ciliate and beset with a few distant, mainly retrorse, linear teeth; stipe a little shorter than the blade, up to 6 mm. thick, dark brown, lustrous, deeply channeled on the anterior face, paleaceous at base, clothed with short spreading septate hairs, these extending to the rachises throughout; blades deltoid-ovate to deltoid-oblong, acuminate, 50 to 80 cm. long; 30 to 60 cm. broad, subtripinnate at base, bipinnate above; main pinnae 7 to 9 pairs, slightly oblique, the basal pair largest, petiolate (1.5 to 2.5 cm.), deltoid, inequilateral, basiscopic, 20 to 30 cm. long, 16 to 25 cm. broad, with 10 or more pairs of pinnules, the basal pair of these petiolate, ovate-oblong, fully pinnate at base, deeply and obliquely pinnatifid beyond, the segments (9 to 14 pairs) broadly joined by an increasing wing, obliquely crenate or crenately lobed; pinnules in general oblong or linear-oblong, acuminate, deeply and obliquely pinnatifid, the segments oblong, rounded at the apex or distally acutish, broadly joined, the proximal basal ones usually reduced, catadromous, usually adnate to the secondary rachis or decurrent; costae densely glandular-puberulent above with septate hairs, a few similar but longer hairs borne on the leaf tissue of the upper surface, along the costules beneath, and upon the margins, especially in the sinuses; leaf tissue membranous; venation prominulous, a single row of elongate areoles borne along the costae of the pinnules and an incomplete row along the costules of the segments; excur-

[1] Ann. Sci. Nat. V. Bot. **18**: 301. 1873.

rent veinlets mostly free; included veinlets none; sori 3 to 7 pairs per segment, nearly medial, dorsal or terminal on the unconnected vein-branches, or terminal on short spurs from the areoles, small, non-indusiate; paraphyses wanting; receptacle small.

Type in the U. S. National Herbarium, nos. 654231 and 654232, comprising a nearly complete frond collected at Fagalu, Tutuila, in rich moist soil, May 10, 1914, by D. J. McMullin (no. 30). Other material at hand is as follows:

Tutuila: Fagasa Trail, June 24, 1920, *Setchell* 227. Trail from Ana to Aafono, June 24, 1920, *Setchell* 208. "Lower level," June, 1920, *Setchell* 40. Near Pago Pago, March, 1914, *Stearns* (4 sheets); April 30, 1914, *McMullin* 11 (2 sheets). Without special locality, *Wilkes Exped.* (as *Sagenia varia* Presl?).

Upolu: Fagaloa Bay, in forest, February 28, 1888, *Safford* 22 (927).

The present species, which appears to be not uncommon in the Samoan Islands, is nearest related to **Tectaria kanakorum** (Fourn.) Maxon,[1] of New Caledonia, a somewhat smaller plant which differs in its dull pale brown stipes and rachises (these densely hairy and bearing numerous linear brown scales), coarser lobation, more hairy under surfaces, and conspicuously indusiate sori. The name is given in honor of Captain Clark D. Stearns, formerly Commandant of the American Naval Station of Tutuila and Governor of American Samoa, through whose personal interest several lots of ferns were sent to the U. S. National Herbarium from Tutuila in 1914 and 1915.

Tectaria stearnsii is one of the forms hitherto included by writers on Samoan ferns under *Aspidium membranifolium* (Presl) Kunze and *Aspidium dissectum* (Forst). Thus, Luerssen,[2] in listing as *A. membranifolium* ten Samoan specimens collected mainly by Graeffe, assumed a species of very wide distribution (Madagascar, the East Indies, Ceylon, the Philippine Islands, and a large part of Oceanica) and included therein plants ranging in venation from free to strongly areolate. This concept is erroneous in several respects, certainly so in its treatment of the Samoan elements.

In the first place, *Nephrodium membranifolium* Presl[3] was described and figured upon a free-veined indusiate plant from Luzon, with which ample Luzon material at hand agrees perfectly (*e. g. Cuming* 249; *Copeland* 1994, 1994a; *Bur. Sci.* 1311, 3655; *Topping* 615, 616, 617, 626, 641, 652, 669, 960, 976, 995). It is regarded by Copeland[4] as synonymous with *Dryopteris dissecta* (Forst.) Kuntze, a disposition which is followed by Christensen and is probably correct. This material is all free-veined, and in most respects is quite unlike Samoan material with either free or anastomosing veins.

Subsequently Christ[5] listed a free-veined Samoan specimen as *Aspidium dissectum,* adding a note upon the "nearly related *Aspidium membrani-*

[1] *Bathmium kanakorum* Fourn. Ann. Sci. Nat. V. Bot. **18**: 301. 1873.
[2] Fil. Graeff. 183. 1874.
[3] Rel. Haenk. **1**: 36. *pl. 5, f. 3.* 1825.
[4] Philippine Journ. Sci. C. Bot. **2**: 418. 1907.
[5] Bot. Jahrb. Engler **23**: 353. 1897.

folium, distinguished by its sinuously joined veins," but citing no Samoan specimen of the latter. He thus followed Beddome in wrongly fixing upon a plant with *Pleocnemia* venation as representing Presl's species. The specimen which he listed as *Aspidium dissectum* is probably like the free-veined element of Luerssen's "*membranifolium.*"

There is at hand a single Graeffe specimen from Upolu, received as *A. membranifolium*. This bears little resemblance to *D. dissecta* (*Aspidium membranifolium*) of the Philippines, except in its free venation. In cutting, it is almost identical with *Tectaria stearnsii;* but it is persistently though minutely indusiate, has the vascular parts more densely and closely puberulent, and differs in other particulars, aside from having wholly free venation. It appears to be a perfect connecting-link between *Dryopteris* and *Tectaria*. Whether it should be taken up as a new species of *Dryopteris*, or as a new species of *Tectaria*, or a free-veined variety of *Tectaria stearnsii* is not clear from the incomplete material available. At any rate, the settlement of this point does not affect the status of *Tectaria stearnsii* as a valid species—the common, typical plant of Samoa, with areolate venation. This has never before been described under a name of its own.

The Wilkes Expedition specimen above cited was discussed briefly by Brackenridge, and listed by Hooker doubtfully under *Polypodium cumingianum* (Presl) Hook., which is *Tectaria irregularis* (Presl) Copeland. It has no relationship with that species, however.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW GYMNOCORONIS FROM MEXICO.

BY S. F. BLAKE.

The following new species of *Gymnocoronis* has been found in the recent examination of material in the National Herbarium.

Gymnocoronis sessilis Blake, sp. nov.

Herb 40 cm. high and more, glabrous throughout, dark green, the lower part not seen; stem stoutish, hollow, striatulate; internodes 9 to 11 cm. long; leaves opposite, sessile, lanceolate, 8 to 9 cm. long, 1.5 to 2.2 cm. wide, attenuate or acuminate, cuneate or the upper subamplexicaul at base, obscurely serrulate, apparently somewhat fleshy, the costa prominulous beneath, the two pairs of rather weak lateral nerves arising well above the base, the secondaries few; uppermost pair of leaves (subtending the inflorescence) abruptly smaller, 3 to 4 cm. long; peduncles 3, terminal and in the axils of the uppermost pair of leaves, 5 to 6 cm. long, with small leafy bracts toward apex or nearly naked, each bearing a cymose panicle of about 8 heads; pedicels 0.5 to 2 cm. long, naked or 1-bracteate; heads discoid, about 8 mm. high and thick, about 60-flowered; involucre 2-seriate, equal, 4 to 5 mm. high, the phyllaries linear-oblong or the outer somewhat obovate, subherbaceous, obtuse, erect, obscurely ciliolate, 3-nerved, 1 to 1.4 mm. wide; receptacles rounded, weakly alveolate, the margins of the alveolae bearing subsessile glands; corollas glabrous, 3.4 mm. long (tube 1 mm. long, enlarged at base, throat funnelform, 2 mm., teeth 4 or 5, deltoid, obtuse or acutish, 0.4 mm. long); achenes oblong-prismatic, 3 mm. long, slightly curved, 5-ribbed, densely glandular-papillose between the ribs, epappose; anther appendages short, membranous, retuse; styles branches elongate, clavellate; style surrounded at base by a persistent 5-lobed nectary.

Type in the U. S. National Herbarium, no. 939611, collected in the suburbs of San Juan Bautista, Tabasco, Mexico, April 13, 1889, by J. N. Rovirosa (no. 456).

The genus *Gymnocoronis* has hitherto consisted of two species, *G. attenuata* DC., a somewhat variable plant of which two forms are recognized, and *G. latifolia* Hook. & Arn. From the former *G. sessilis* differs in being entirely glabrous, in its strictly sessile leaves, obtuse phyllaries, and glabrous corolla. The latter, described from Jalisco and known to me only

from description, is said to have the leaves ovate, serrate, "vastly longer" than those of *G. attenuata*, two inches or more wide and decurrent on the petiole, the phyllaries oblong and acute, and the heads much larger than in *G. attenuata*.

Gymnocoronis attenuata DC. is represented in the National Herbarium by only two sheets, one of which was collected by Otto Kuntze at Santa Cruz, Bolivia, in 1892. The other, collected by Gerald McCarthy (no. 29) in "locis navalibus," eastern North Carolina, September, 1888, provides what is apparently the first record for this plant in the United States. It was doubtless a chance introduction, which has not persisted. The closely related genus *Adenostemma*, however, contains at least one species, *A. viscosum* Forst., of a pronounced weedy character.

Gymnocoronis attenuata DC. (Prodr. 5: 106. 1836) was first described by D. Don (ex Hook. & Arn.; Hook. Comp. Bot. Mag. 1: 238. 1835) as *Alomia spilanthoides*. In 1838 (Prodr. 7: 266) De Candolle described *Gymnocoronis spilanthoides*, citing "*Alomia spilanthoides* Wight et Arn. in litt.! 1836" as a synonym. All these names apply to the same species. The use of the name *Gymnocoronis spilanthoides* (D. Don) DC., as by Chodat (Bull. Herb. Boiss. II. 3: 703. 1903) and inferentially by Baker in the Flora Brasiliensis, does not seem permissible under the Rochester Code of Nomenclature, since the description of *G. spilanthoides* by De Candolle is accompanied not by a reference to Don's published name but by a reference to the manuscript "*Alomia spilanthoides* Wight et Arn." The publication of *G. spilanthoides* by De Candolle in this way of course prevents, under the Rochester Code, the use of the subsequent homonymous combination based on the published name of Don.

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NEW OR NOTEWORTHY SPECIES OF PLANTS FROM UTAH AND NEVADA.

BY IVAR TIDESTROM.

In the preparation of a flora of the above mentioned states forms have come to light which appear to be new to botany. They are described herewith:

Eriogonum rubricaule, sp. nov.

Planta annua caule 10–20 cm. alto, rubro, basin versus glanduloso supra vix inflato; foliis radicalibus, longe-petiolatis, lamina reniformi vel cordato-ovata, ciliata, pubescente, subtus rubescente; pedunculo scapiformi, 2–3–chotomo, pedicellis gracilibus, involucris late campanulatis, glabris, glaucis, dentatis; perianthiis flavis glabris. Ab *E. subreniformi* differt foliis hirsutulis vel pubescentibus non tomentosis.

Type in the U. S. National Herbarium, no. 717866, collected on dry rocky hillsides near Lahontan, Churchill County, Nevada, May 21, 1916, by F. B. Headley.

Eriogonum commixtum Greene in herb.

Planta annua, caule 10–30 cm. alto, floccoso vel tomentoso; foliis radicalibus, petiolatis, orbiculatis, tomentosis; pedunculis 2–3–chotomis; involucris campanulatis plerumque sessilibus; perianthiis glandulosis. Ab *E. denso* differt statura altiori perianthioque glanduloso.

Type in the U. S. National Herbarium, no. 419558, collected in Eagle Valley, Ormsby County, Nevada, altitude 1,446 meters, July 31, 1902, by C. F. Baker (no. 1402).

Eriogonum eximium sp. nov.

Planta perennis caulibus caespitoso-ramosis; foliis confertis, petiolatis, subrotundatis utrinque albo-tomentosis, laminae *margine ferruginoso*; involucris ad apicem pedunculi globoso-capitatis, tomentosis, turbinatis, angulosis, 5–6 mm. longis, lobatis; perianthiis ochroleucis, glabris, laciniis inferioribus obovatis. *E. ovalifolio* affine differt foliorum margine ferruginoso.

Type in the U. S. National Herbarium, no. 509910, collected on mountain west of Franktown, Washoe County, Nevada, altitude 1,830 meters, August 16, 1912, by A. A. Heller (no. 10649).

Eriogonum sericoleucum Greene in herb.

Plantula caespitosa sericeo-tomentosa; foliis lineari-oblanceolatis vel oblanceolatis, 5–15 mm. longis; floribus ad apicem pedunculi capitatis; involucro lobato; perianthio stipitato, sericeo, flavo. Ab *E. sphaerocephalo* differt habitu scaposo et inflorescentia capitata.

Type in the U. S. National Herbarium, no. 419261, collected in King's Canyon, Ormsby County, Nevada, altitude 1,700–2,000 meters, June 4, 1902, by C. F. Baker (no. 984).

Arabis nevadensis, sp. nov.

Planta plus minusque caespitosa, glabra, 10–20 cm. alta; foliis radicalibus lineari-oblanceolatis, caulinis oblongis, auriculatis, parvis; petalis purpureis, 5–6 mm. longis; siliquis patentibus, 3 cm. longis, 2–3 mm. latis. Ab *A. divaricarpa* differt petalis siliquisque brevioribus.

Type in the U. S. National Herbarium, no. 767071, collected in the spruce belt, Charleston Mountains, Nevada, altitude 3,000 meters, August 5, 1913, by A. A. Heller (no. 11077).

Arabis pinetorum, sp. nov.

Planta caespitosa, hirsutula, 20–30 cm. alta; foliis inferioribus oblanceolatis, 2–3 cm. longis, caulinis linearibus, auriculatis; sepalis hirsutulis; petalis roseis, 5–6 mm. longis; siliquis 3–3.5 cm. longis, 1 mm. latis. Ab *A. caduca* differt siliquis angustioribus.

Type in the U. S. National Herbarium, no. 1,115,569, collected in coniferous forests about Lake Tahoe at Glendale, Nevada, altitude 1,890 meters, July 7, 1919, by Ivar Tidestrom (no. 10387).

Cleomella stenosperma Coville, sp. nov.

Cleomella longipes S. Wats. in King, Geol. Expl. 40th Par. 5:33. 1871. Not *C. longipes* Torr. 1852.

Planta 15–30 cm. alta, glabra, ramosa; foliolis lineari-oblongis, 10–20 mm. longis, mucronulatis; sepalis ovatis, acutis, parvulis; petalis spathulatis, 5 mm. longis, flavis; staminibus quam petala duplo longioribus; siliculis in calyce longe stipitatis rhombeo-ovoideis, 3–4 mm. latis; seminibus pyriformibus maculatis.

Cleomellae longipedi affinis quae differt foliolis latioribus siliculis majoribus et seminibus lati obovatis.

Type in the U. S. National Herbarium, no. 6616, collected at Hot Springs of Grass Valley, foot of Havallah range, Nevada, June, 1868, by Sereno Watson.

Amelanchier nitens, sp. nov.

Frutex glabra, ramorum cortice griseo ramulorum castaneo; foliis breviter petiolatis ellipticis, obtusiusculis, 1–3 cm. longis, apicem versus denticu-

latis, mucronatis; ovario laciniisque calycis glabris; petalis?; stylis 2–3, plus minusve coalitis; pomis maturis aureis.

Type in the U. S. National Herbarium, no. 1,115,567, collected in the piñon belt near Wilson's ranch, base of Charleston Mountains, southern Nevada, May 27, 1919, by Ivar Tidestrom (no. 9653).

Peteria nevadensis, sp. nov.

Peteriae thompsonae affinis sed humilior. Foliolis ellipticis numerosis remotis subtus strigosis supra glabris; racemis 10–12 cm. longis; calyce piloso glanduloso, 10–12 mm. longo, lobis linearibus tubum superantibus; corolla ochroleuca, 15 mm. longa; legumine immaturo patente, 5–6 cm. longo, 3–4 mm. lato, glabro. *Peteria thompsonae* differt statura robustiore, floribus majoribus, lobisque calycis latioribus.

Type in the U. S. National Herbarium, no. 1,115,568, collected in the Covillea and artemisia belts, on mesa near Las Vegas, Nevada, April 23, 1919, by Ivar Tidestrom (no. 9083).

Oxalis amplifolia (Trel.) n. comb.

Oxalis divergens amplifolia Trel. in A. Gray, Syn. Fl. 1: 368. 1897.
Ionoxalis amplifolia Rose, Contr. U. S. Nat. Herb. 10: 110. 1906.

Oxalis grayi (Rose) n. comb.

Ionoxalis grayi Rose, Contr. U. S. Nat. Herb. 10: 110. 1906.

Oxalis neomexicana Dayton, nom. nov.

Ionoxalis monticola Small, N. Amer. Fl. 25: 42. 1907. Not *Oxalis monticola* Arechavaleta, Anal. Mus. Nac. Montevid. iii (Fl. Urug. i): 231. 1901.

Dodecatheon watsoni, sp. nov.

Dodecatheon media (alpine form) S. Wats. in King, Geol. Expl. 40th Par. 5: 214. 1871.

Plantula glabra; foliis paucis parvis; lobis calycis tubum aequantibus; corolla 6 mm. longa, lobis acutis; filamentis partim coalitis.

Type in the U. S. National Herbarium, no. 1,110,863, collected in the East Humboldt Mountains, Nevada, altitude 1,500 meters, 1869, by Sereno Watson (no. 756).

Frasera induta, sp. nov.

Planta perennis, 20–30 cm. alta, glandulosa, puberulenta; foliis linearioblanceolatis undulatis, *albomarginatis;* floribus paniculatis; sepalis lanceolatis acuminatis; corolla aurantiaca vel flava purpureo-maculata; capsula immatura. *Fraserae albomarginatae* affinis sed dense puberulenta.

Type in the U. S. National Herbarium, no. 345,083, collected in rocky places of the piñon and yellow pine belts, Charleston Mountains, Nevada, 1898, by C. A. Purpus (no. 6083).

Senecio malmstenii Blake, sp. nov.

Herbaceus perennis simplex 13 cm. altus, axillis sparse pilosis exceptis glaberrimus; parte caulis inferiore (subterranea?) flexuosa purpurascente

defoliata, parte superiore (4 cm. longa) ca. 7-foliata; foliorum inferiorum et mediorum lamina orbiculari vel obovato-orbiculari 2.3–3.3 cm. longa 2.2–2.6 cm. lata integra vel sinuato-dentata dentibus ca. 5 obtusissimis depressis apice late rotundata basi rotundata vel cuneata coriacea triplinervia vel subpinnatinervia, petiolo 1–2 cm. longo supra vel ubique anguste marginato; axillis interdum folium parvum gerentibus; foliis superioribus minoribus obovatis 1.5–2.5 cm. longis basi bilobatis vel utroque latere 4–dentatis; capitulis 2 terminalibus discoideis campanulato-subglobosis 9 mm. altis et latis, in pedicellis glabris erectis 2.2–2.5 cm. longis; involucri 8 mm. alti phyllariis ca. 13 linearibus obtuse acuminatis apice ciliatis aliter glaberrimis, calyculo subnullo; corollis disci flavis glabris 6 mm. longis; acheniis submaturis glabris ca. 8–costatis 2.5 mm. longis, pappo copioso 5 mm. longo.

Type in the U. S. National Herbarium, no. 1,115,570, collected in dry rocky soil in the juniper association, Little Podunk Creek, Kane County, Utah, altitude 2,680 meters, August 30, 1916, by H. E. Malmsten (no. 131).

In its short, flexuous, purple-tinged stem and thick leaves this species suggests *S. soldanella* A. Gray and *S. porteri* Greene, but it is at once distinguished by its much smaller heads. One of the upper axils of the single specimen examined bears a small undeveloped head.

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PROCEEDINGS

OF THE

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SOME SNAKES FROM NORTHWESTERN PERU.[1]

BY EMMETT REID DUNN.

The snakes which form the subject of this paper were collected by Mr. G. K. Noble while a member of the Harvard School of Tropical Medicine expedition to Northwestern Peru in 1916. I am indebted to Dr. Thomas Barbour for the opportunity of reporting upon this material, which is preserved in the Museum of Comparative Zoology.

The localities concerned are: Chongollapi, at the edge of the coastal desert in the province of Piura; Huancabamba, on the western range of the Andes, at the border of Piura and Cajamarca; Tabacónas, a little valley between the ranges of the cordillera in the northern part of Cajamarca and in the only strip of rain forest met with during the expedition; Perico and Bellavista in the low, broad and arid valleys of the Chinchipe and Marañon rivers. The specimens labeled Chongollapi were purchased from a Chinese restaurant keeper and may have come from further inland. Most of the material came from Perico and from Bellavista.

The collection contains 17 species. Most of these need no discussion, but there are two extremely interesting rediscoveries, and one apparently undescribed species.

Perhaps the most important find is three specimens of a small snake of the family *Typhlopidae*. These correspond almost exactly with the description and figure of *Anomalepis mexicana* Jan (Icon. Gen., 1, pl. V, VI, f. 1, 1861). The type in the Milan Museum was said to have come from Mexico. These three specimens from Perico are apparently the only others ever recorded. Teeth are present on the maxilla and absent from the dentary, so that Jan's statement of its relationship to *Typhlops* was correct. Garman (Mem. Mus. Comp. Zool., VIII, 3, 1883) stated on page 2 that *Anomalepis* had teeth in the lower jaw and referred the genus to the

[1]Contribution from the Department of Zoology, Smith College.

Stenostominae. On page 4 in the diagnosis of the genus he stated that the teeth were in the upper jaw. This mistake of Garman's was followed by Boulenger, who referred the genus to the *Glauconiidae* in his Catalogue of Snakes. Neither Garman nor Boulenger ever examined the animal, and Boulenger's action, aside from following Garman, was occasioned by doubt whether Jan examined the dentition of the type, and by the fact that *Anomalepis* has enlarged preanal shields, thus differing from *Typhlops* and resembling *Leptotyphlops*. There is now no doubt about the correct assignment of this remarkably primitive genus to the *Typhlopidae*. Its nearest ally is *Helminthopis*, although this is much closer to *Typhlops* than to *Anomalepis*. This snake has actually all the normal head shields of a Colubrid save for the fusion of the internasals with the prefrontals, and the breaking up of the parietals into small scales. There are three upper labials, a loreal, two preoculars, a supraocular, and three postoculars. The scale rows are 26 in two specimens and 24 in one. The type had 22 scale rows, a difference which does not seem very significant. The diameter is contained in the total length from 27 to 44 times. The lengths are 150, 155 and 175 mm.

The following species do not require detailed consideration:

Leptotyphlops albifrons (Wagler). Bellavista 6.
Constrictor constrictor (Linnaeus). Perico 1.
Spilotes pullatus dichrous (Peters). Chongollapi 1; Perico 1.
Drymobius boddaerti (Sentzen). Chongollapi 1; Bellavista 1; Huancabamba 3.
Liophis taeniurus (Tschudi). Huancabamba 1.
Clelia cloelia (Daudin). Perico 3.
Clelia bitorquata (Günther). Perico 2; Bellavista 7.
Leptodeira annulata (Linnaeus). Perico 5; Bellavista 12.
Tantilla melanocephala (Linnaeus). Perico 1.
Oxybelis acuminatus (Wied). Bellavista 3.
Micrurus corallinus (Wied). Perico 5; Bellavista 1.
Bothrops atrox (Linnaeus). Perico 1.

Clelia fitzeringi (Tschudi) is a rare species, and it is unfortunate that the one specimen (which lacks the loreal plate) should have come from Chongollapi and hence be of none too certain provenance.

The three remaining forms belong to the so-called family *Amblycephalidae*. I am in accord with Cope regarding the American genera placed by Boulenger in this group, and I believe that they are allied to *Tropidodipsas* and *Petalognathus* rather than to the Asiatic genera with which Boulenger associates them.

One of these species is a *Sibynomorphus* which was taken in the rain forest at Tabacónas. It has much in common with four species described from Peru. These are: *Leptognathus peruana* Boettger (Cat. Rept. Mus. Senckenbergianum, 2, p. 128, 1898), from Cuzco; *Leptognathus boettgeri* Werner (Abh. Mus. Dresden, 9, 2, p. 11, 1901), from Chanchomayo; *Leptognathus schunkii* Boulenger (Ann. Mag. Nat. Hist., 1, p. 115, 1908) from Chanchomayo; and *Leptognathus latifasciatus* Boulenger (Ann. Mag.

Nat. Hist., 8, 12, p. 72, 1913), from the upper Marañon. I give comparisons of the scale counts of these with the present specimen.

	Ventrals	*Caudals*	*Labials*	*Labials entering eye*	*Oculars*
Present specimen	182	90	9	4, 5, 6	1–2
Latifasciatus	191	106	9	4, 5, 6	1–2
Boettgeri	195	90	9	4, 5, 6, 7	1–2
Schunkii	177–188	90–102	8–9	3, 4, 5 or 4, 5, 6	1–2, 3
Peruana	180	79	8	3, 4, 5	0–2

Peruana and *latifasciatus* agree well in described color with the Tabacónas animal, while *boettgeri* and *schunkii* differ. The closest anatomical agreement is then with *latifasciatus*, and as this is from the nearest locality of the four I call the Tabacónas specimen *Sibynomorphus latifasciatus*, although I am rather sceptical regarding the validity of all four of these forms.

The next two species belong to the genus *Pseudopareas*, which is allied to *Sibynomorphus* but has a cylindrical body, a more normal head shape, smaller eyes, and less enlarged vertebral scale row. Thus it approaches *Tropidodipsas* but may be told from it by the peculiar chin plates which are as in *Sibynomorphus*.

Eight specimens from Huancabamba apparently represent the type of the genus. This was described by Jan (Icon. Gen., 37, pl. VI, f. e. 1870) as *Leptognathus vagus*, from a specimen in the Milan Museum said to come from Hong Kong. The ventrals of the present series range from 146–157; caudals, male 62–66, female 53–57; oculars 1–2 (one specimen has two preoculars); upper labials 7–8 (seven in two specimens); 4th and 5th labials entering eye (one specimen with seven labials has 3d and 4th entering eye); temporals 1–2 in five, 2–3 in one and 1, 2–2 in two. The belly is spotted but the under side of the tail is immaculate. The three females have much less ventral spotting than the five males. Jan's figure of the type shows 51 subcaudals, spotting on the under side of the tail, and spotting on the belly much heavier than any of our females. The type, judging by the number of caudals, was a female. I am not inclined to stress these differences. The largest is 412 mm. long, tail 100 mm.

Twenty-seven specimens from Bellavista represent a species closely allied to the preceding but quite distinct. It may be called *Pseudopareas vagrans*. It differs in color, in longer tail with more subcaudals, in usually having temporals 2–3, in a tendency to have two preoculars, and in a tendency to have more than 8 labials. It is a larger snake, the type being 560 mm. in total length, tail 133.

The type, a female, M. C. Z. No. 17284, may be described as follows: eye moderate, diameter about equal to distance to lip, less than distance

to nostril; rostral broader than deep, well visible from above; internasals about one-third as long as prefrontals; frontal longer than broad, shorter than distance from tip of snout, shorter than parietals; loreal as long as deep; two preoculars; two postoculars; temporals 1–2; upper labials 8 on one side, fourth and fifth entering eye, 10 on the other side, fourth, fifth, and sixth entering eye; one pair of lower labials in contact behind mental; three pairs of squarish chin shields, the first pair longer than broad; fifteen scale rows, vertebral barely enlarged; 156 ventrals, anal single; 74 subcaudals; pale brown, anteriorly with five darker crossbands which become broken posteriorly into three rows of indistinct spots; symmetrical brown markings on head; belly yellow, with squarish brown spots on the ends of most of the ventrals.

The upper labials are 8 in 1 case, 8–9 in two cases, 9 in two, 9–10 in one, and 8–10 in one. The temporals of the first row are 1 in two cases,1–2 in three cases, 2 in eighteen, 2–3 in one, and 3 in two. The second row of temporals are 2 in six cases, 2–3 in four, and 3 in seventeen. The preoculars are 1 in fourteen cases, 1–2 in four, and 2 in nine. The postoculars are 1–2 in one case, 2 in twenty-five, and 3 in one. Another female has ventrals 160, caudals 76. Two males have caudals 82 and 89. The ventrals range in number from 142–165. One specimen has a divided anal. The subcaudals vary from 73–89.

The hemipenis of *Pseudopareas*, as determined on *P. vagus*, is undivided, the sulcus is forked. The proximal portion has small hooks, the distal portion is covered with calyces. There seems to be an ill-defined edge to the calyculate portion, so that the hemipenis is somewhat "capitate."

The maxillary dentition is about 12 equal teeth.

The species of *Pseudopareas* seem to be four. They are, in addition to the two just discussed, *Leptognathus atypicus* Cope (Proc. Acad. Philadelphia, 1874, p. 65) from the Andes of Peru, and *Tropidodipsas spilogaster* Griffin (Mem. Carnegie Mus., 1915, p. 197) from Province Sara, Bolivia, 350 M. alt.

They may be distinguished as follows:

No preoculars

6 upper labials.....*Pseudopareas atypicus* (Cope).

7 upper labials.....*Pseudopareas spilogaster* (Griffin).

Preoculars present

Subcaudals 51–66.....*Pseudopareas vagus* (Jan).

Subcaudals 73–89.....*Pseudopareas vagrans* Dunn.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW CRYPTODESMOID MILLIPED FROM SANTO DOMINGO.

BY RALPH V. CHAMBERLIN.

The specimen representing the new genus and species described below was taken in soil about a palm plant from Puerto Plata, D. R., at Philadelphia on 9 August, 1923, by U. S. quarantine inspector, Max Kisliuk, Jr. It was sent to me for identification by E. R. Sasscer of the Federal Horticultural Board.

Dominicodesmus, gen. nov.

Body slender, the keels being very narrow and the dorsum strongly convex much as in the allied genus *Guianonus*.

Collum extending over head and nearly concealing it when viewed from above. Margin crenate, the border divided into ten corresponding lobes by radial sulci. Median area strongly convex, granular.

The metatergites evenly tuberculate, the tubercles forming three principal transverse rows.

Keels fundamentally with three lateral marginal lobes, but the poriferous keels appear bilobed because of the enlargement of the second and the abortion of the third of these lobes. Pores borne at end of the second lobe or process, which is conspicuous, distally truncate, on segments V, VII, IX, X, XII, XIII, and XV.

Posterior marginal tubercles of penult segment projecting prominently caudad beyond angles of keels, the median pair largest, extending over the base of but not concealing the caudal segment.

Genotype.—D. geophilus sp. nov.

In general form resembling *Guianonus*, a genus occurring in Guiana, but readily distinguished by the pore-formula, the form of the posterior segments, etc.

Dominicodesmus geophilus, sp. nov.

Body in the type, a not fully mature specimen, consisting of the head and nineteen segments. General color above brown, paler beneath.

Head granular across vertex. Antennae of moderate length, apically pointed.

Anterior rim of collum narrow, the marginal areas round, the posterior lobe on each side larger than the others.

Second tergite wider than collum and than the following tergites.

A single lobe on posterior side of keels.

On the caudal segments the posterior angles of the keels are not produced caudad beyond the tubercles of the intervening caudal margin. This margin on the seventeenth and eighteenth segments bowed convexly with the median tubercles extending conspicuously beyond the level of the keels.

The cauda short, distally truncate and setose. Across base of cauda a series of four tubercles which are setigerous and of which the two median ones are largest; two reduced setigerous tubercles with setae on each side in front of this series. Anal valves narrowly margined. Anal scale with a pair of setigerous tubercles on caudal margin.

Length, about 4 mm.

Holotype.—M. C. Z. 5, 215.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

AN ALGERIAN JULID IN AMERICA.

BY RALPH V. CHAMBERLIN.

In previous communications in these Proceedings (1921, 34, pp. 81–84, and 1922, 35, pp. 7–10), the author indicated that all members of the family Julidae in its restricted sense heretofore known to occur in North America are identical with common European species which are still often brought over in soil about imported plants. In material recently sent to me for identification by Mr. G. W. Goldsmith and said by him to be common in the hothouses at Colorado Springs, Col., were males and females of a species distinct from any previously recorded from this country as well as from any known in Europe. Thinking it undoubtedly an imported form, however, I sent specimens of it to Dr. Brolemann of France for his opinion. He recognized them as representing an Algerian species which he had himself described in 1897 from a single male specimen under the name *Julus africanus*. The species had not been subsequently found in Africa or elsewhere. This species, which should be added to the list of Julidae occurring in North America as given in my previous papers above cited, now stands as follows:

Diploiulus africanus (Brolemann).

1897. *Julus* (*Anaploiulus*) *africanus*. Brolemann, Ann. Sci. Nat., ser. 8, 4, p. 271, figs. 39–41.

The following key, based upon superficial characters, will aid in separating the species of Julidae now known to be more or less established in North America.

1. Last dorsal plate prolonged in a process extending well beyond the anal valves.....*Ophyiulus pilosus* (Newport).
—. Last dorsal plate not thus prolonged.....2.
2. Vertex of head with two setigerous foveolae; a double band of white or yellowish color along dorsum.....*Brachyiulus pusillus* (Leach).

—. Vertex of head lacking setigerous foveolae; no double light band along dorsum.....3.

3. Repugnatorial pore closely embraced by suture, lying in front of level of latter; length 22–40 mm.

Diploiulus londinensis coeruleocinctus (Wood).

—. Repugnatorial pore free from suture and lying clearly behind it; smaller forms.

4. Metazonite convex and bulging, its striae deep, complete, and close-set; ocelli convex and sharply defined; length up to 23 mm.

Diploiulus africanus (Brolemann).

—. Metazonite not convex, nearly on a level with the prozonite, its striae well separated and less deep; ocelli flat and poorly defined, often more or less confluent; length 10–16 mm.

Diploiulus luscus (Meinert).

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTION OF A NEW PYCNONOTUS FROM CHINA.

BY J. H. RILEY.[1]

The late Charles M. Hoy, shortly before his death, transmitted to the U. S. National Museum a general collection, containing a few birds taken at or near Yochow, Hunan. In the lot there is a small bulbul that differs considerably from any of the descriptions that I have been able to consult. I take pleasure in naming it after its discoverer:

Pycnonotus hoyi, sp. nov.

Type, sub-adult female, U. S. National Museum, No. 279,442, Yochow, Hunan Province, China, June 13, 1923. Collected by Charles M. Hoy (original No. 1075).

Pileum light grayish olive; back buffy citrine, slightly fulvous on the rump; wing-coverts like the back; remiges chaetura drab, edged outwardly with pyrite yellow, except on the two outer primaries; tail chaetura drab, the feathers edged outwardly with pyrite yellow, the middle-pair showing a yellowish sheen in certain lights; cheeks a little lighter than the pileum and the ear-coverts grayish-white posteriorly; below white, the chest crossed by a pale smoke gray band; the breast and belly with almost obsolete streaks of napthalene yellow, slightly more pronounced on the under tail-coverts; under wing-coverts white; remiges below deep mouse gray, whitish on the inner webs basally. Wing, 76; tail, 66; culmen, 13; tarsus, 21; middle-toe, 14 mm.

Remarks.—This species is of about the same size and build as *Pycnonotus erythropthalmus,* but quite different in color.

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

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW SPECIES OF GRASSES FROM SOUTH AMERICA.

BY A. S. HITCHCOCK.

In a recent collection of grasses made by Macbride and Featherstone in Peru, the following new species were found. Parts of the types are in the U. S. National Herbarium. A new species collected by Lützelburg in Brazil is also included, the type in the U. S. National Herbarium.

Bromus villosissimus Hitchc. sp. nov.

A cespitose dwarf perennial with very villous lemmas. Culms glabrous or puberulent, 5 to 12 cm. tall; sheaths pubescent or glabrate; ligule a very short membrane; blades flat or more or less folded or involute, pubescent on both surfaces, 1 to 5 cm. long, 1 to 2 mm. wide; panicle ovoid, 1 to 2 cm. long, consisting of a few contiguous, short-pedicelled spikelets; spikelets mostly 3 to 5-flowered, tawny or tinged with purple, about 1 cm. long; glumes somewhat unequal, rather thin, sparsely villous, acute, 3-nerved, the first 1 cm. long, the second broader and a little longer; lemmas densely villous with spreading or ascending hairs 2 to 3 mm. long, 7-nerved, about 8 mm. long, the apex 2-lobed, the teeth broad and short, the midnerve extending into a scabrous awn 1 to 2 mm. long; palea acute, a little shorter than the lemma, villous-ciliate on the keels.

Type in the herbarium of the Field Museum of Natural History, No. 517,382, collected in loose soil of alpine basin slopes, at about 4700 meters, Casapalca, Peru, May 21, 1922, by Macbride and Featherstone (No. 854).

The only other specimen seen was collected between Casa Caucha and Culea, Peru, by the Wilkes U. S. Exploring Expedition (U. S. Nat. Herb. 1,009,615).

Lamprothyrsus peruvianus Hitchc. sp. nov.

Plant perennial; culms erect, stout, glabrous, a meter or more in height; sheaths glabrous, papery, the basal ones not seen, the cauline apparently 3, the uppermost inclosing the base of the panicle, all separating from the culm along the upper part and inrolled, glabrous on both margins and more or less hyaline; ligule a dense row of hairs about 2 mm. long; blades (only the 3 cauline seen) loosely involute, narrower than the sheath at

base, firm, glabrous beneath on the lower part, very scabrous toward the tip, scaberulous on the upper surface, 40 to 60 cm. long (the uppermost about 20 cm.), about 4 mm. wide at base when flat, gradually narrowed to a fine point; panicle dense, 30 to 50 cm. long, 5 to 8 cm. wide, purplish, the axis mostly hidden by the overlapping branches, terete and glabrous below, angled and scabrous above, the branches appressed or ascending, fascicled, the longer ones naked at base, the shorter ones spikelet-bearing to base, the branches and branchlets more or less hispidulous at base, the ultimate branchlets rather slender, the lateral pedicels appressed, 1 to 2 mm. long; spikelets (only the pistillate seen) mostly 4 to 6-flowered, about 1.5 cm. long (excluding awns), the uppermost floret much reduced; glumes narrow, hyaline, 1-nerved, gradually acuminate, a distinct internode between the two, the first about 8 mm. long, the second about 10 mm. long; rachilla readily disarticulating between the florets, the joints about 1 mm. long, long-pilose, the joint below the lower floret about as long as the others; lemma rounded on the back, about 7-nerved, rather sparsely villous all over, the hairs ascending, about 3 mm. long, the tip 3-lobed, the lateral teeth extending into long very slender awns (total length about 9 mm.), the midnerve flat below, somewhat curved outward, extending into a slender flat awn about 2 cm. long, the length of lemma to base of awn about 4 mm.; palea narrow, 2-keeled, scabrous-ciliate on the keels, about as long as the lemma; stamens wanting; ovary 1.5 mm. long; stigmas 1 mm. long, plumose nearly to base; caryopsis 2.5 mm. long, acute at base.

Type in the herbarium of the Field Museum of Natural History, No. 517,715, collected on a shrubby slope, at about 3000 meters altitude, Yunahuanca, Peru, June 16–22, 1922, by Macbride and Featherstone (No. 1205).

The only other specimen seen is from Torontoy, Urubamba Valley, Peru, at an altitude of 2400 meters, June 10, 1915, *Cook & Gilbert* No. 1189, said to be called nihuaichu.

This species differs from *L. hieronymi* (Kuntze) Pilger in the more dense purplish panicle and the longer glumes and lemmas. The glumes of the former are 5 to 7 mm. long, and the lemmas, to the base of the awn, 2.5 to 3 mm. The awns are white and flexuous, while in *L. peruvianus* they are purple and nearly straight. Some of the florets of the type specimen of *L. peruviana* are attacked by insects, forming small galls.

Lamprothyrsus hieronymi and its four varieties are from Argentina and Bolivia. Mandon's No. 1360 from Sorata, Bolivia, and a specimen from Province Jujuy, Argentina, collected in 1916, by S. W. Damon, are this species. The last two and also Fiebrig's No. 2099 (type of *L. hieronymi tincta* Pilger) are pistillate. The type of *L. hieronymi* (*Triraphis hieronymi* Kuntze) is staminate.

Stipa featherstonei Hitchc. sp. nov.

Culms cespitose, erect, glabrous, 2-noded, 20 to 30 cm. tall; sheaths, slightly roughened; ligule on the culm leaves 2 to 3 mm. long, obtuse, firm; blades capillary, involute, glabrous, 5 to 15 cm. long; panicle elliptic, 3 to 4 cm. long, purple, rather compactly few-flowered, the axis, branches

and pedicels glabrous; glumes subequal, broad, abruptly acuminate, glabrous, obscurely 5-nerved, about 7 mm. long; lemma about 4.5 mm. long, the callus rather blunt, 1 mm. long, densely hispidulous with fuscous hairs, the body oblong, somewhat over 1 mm. wide, dark brown, villous all over with brown hairs, scarcely narrowed at summit; awn twice geniculate, twisted below, the first segment rather densely short-villous, 1 to 3 mm. long, the second segment 3 to 4 mm. long, the third about 1 cm. long.

Type in the herbarium of the Field Museum of Natural History, No. 517,331 (in part), collected on upland slope, about 4500 meters altitude, Rio Blanco, Peru, May 8 to 19, 1922, by Macbride and Featherstone (No. 803a). No other specimen has been seen.

The type is mounted with plants of *Stipa hans-meyeri* Pilg.

Stipa macbridei Hitchc. sp. nov.

Culms loosely tufted, spreading at the tough and woody base, several-noded, glabrous, branching at the lower nodes, 60 to 80 cm. tall; sheaths glabrous, minutely pubescent at the throat; ligule very short, the sheaths extending into a short auricle on each side; blades flat or loosely involute, glabrous, 5 to 10 cm. long, about 1 mm. wide; panicle narrow, loose, 10 to 20 cm. long, the branches slender, rather remote, few at each node, the lower as much as 8 cm. long; glumes subequal, acuminate, hyaline, 3-nerved, glabrous, 5 to 6 mm. long; lemma 5 mm. long, the callus densely pubescent, 0.5 mm. long, the body pale, villous all over, gradually narrowed toward the summit, the crown wanting; awn twice geniculate and twisted below, puberulent, 3 to 4 cm. long.

Type in the herbarium of the Field Museum of Natural History, No. 516,986, collected on disintegrating rock slopes, at about 2500 meters altitude, Matucana, Peru, April 12 to May 3, 1922, by Macbride and Featherstone (No. 452). The only other specimen seen was collected on rocky ledge, northwestern exposure, at about 2600 meters, Uspachaca, Peru, June 23, 1922, by Macbride and Featherstone (No. 1317).

Chloris luetzelburgii Hitchc. sp. nov.

Plant annual; culms erect or somewhat spreading at base, terete, glabrous, 50 to 60 cm. tall; sheaths puberulent, ciliate on the margin, somewhat villous at the throat, somewhat keeled but not conspicuously compressed; ligule a short ciliate membrane; blades flat or loosely involute, puberulent on both surfaces, 10 to 20 cm. long, 1 to 3 mm. wide; spikes several, mostly 4 to 6, slender, ascending or appressed, 3 or 4 at the end of the culm and 1 to 3 about 2 cm. below, sometimes another below these, puberulent at the base, 7 to 10 cm. long; spikelets with 1 perfect floret and 1 or 2 rudiments, appressed along the scabrous, angled axis, somewhat distant, the pedicels less than 1 mm. long; glumes pale, narrowly lanceolate, acuminate, 1-nerved, scabrous on the keels, the first about 4 mm., the second about 5 mm. long; first lemma narrow, terete below, hispidulous on the callus, glabrous above, nerveless, rounded on the back, ciliate on

the margins of the upper third or half, 5 to 6 mm. long, the apex slightly 2-lobed, the lobes rounded, the awn from between the lobes, straight, scabrous, about 6 mm. long; the palea a little longer than the lemma, acute; second floret similar to the first but only 3 to 4 mm. long, the axis internode a little more than 1 mm. long, the awn usually shorter; third floret only about 1.5 mm. long, the awn 3 to 5 mm. long.

Type in the U. S. National Herbarium, No. 1,127,373, collected in the Serra do Borborema, State of Parahyba do Norte, Brazil, April, by Lützelburg (No. 12451).

Other specimens examined are:

Brazil: Joazeiro, *Dorsett & Popenoe* 411b. Without locality, but presumably Rio de Janeiro, *Capanema* 5469. Fernando do Noronha, *Ridley, Lea & Ramage* in 1887.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

NEW MOLLUSKAN NAMES.

In the Proceedings of the Malacological Society of London, vol. 15, parts 2 and 3, December, 1922, p. 112, Dr. Francis A. Schilder in an article entitled "Contributions to the knowledge of the genera Cypraea and Trivia" calls attention to the fact that *Cypraea dalli* Aldrich (Nautilus, vol. 7, p. 98, pl. 4, f. 2, 2a, Jan., 1894) is preoccupied by *Cypraea dalli* Cossmann (Essais de Pal., 5me livr., p. 169, pl. 9, f. 6, 7, Dec., 1893) and *Cypraea smithi* Aldrich (Geol. Surv. Ala. Bull. 1, p. 33, pl. 5, f. 3, 1886) is preoccupied by *Cypraea smithi* Sowerby (Proc. Zool. Soc. London, p. 638, t. 56, f. 8, 1881).

For these I desire to substitute *Cypraea* **healeyi** Aldrich new name for *Cypraea dalli* Aldrich and *Cypraea* **eosmithi** Aldrich new name for *Cypraea smithi* Aldrich.

—*Truman H. Aldrich.*

STENOMORPH, A NEW TERM IN TAXONOMY.

In the study of shipworms I have found that larval forms of various species seem to show no selective powers as far as the size of the wood to which they attach themselves is concerned. It therefore happens that we find the same species growing in timbers sufficiently large to enable it to attain full size, which in different species varies from six inches to three and a half feet in length, and from a few millimeters to almost an inch in diameter; or the larval forms of the same species may attach themselves to a piece of lath or a twig and completely honeycomb this, just as they do the larger piece of timber, reaching sexual maturity in this state. Forms under such conditions are dwarfed and while they have the structural features of the larger species, these are all reduced correspondingly in size. To such forms, distinct names have been given by some authors who did not understand the true inwardnesss of the situation. For such diminutive forms produced by their cramped habitat I wish now to propose the term *STENOMORPH.*

Specimens coming under this designation will probably be found in all species of shipworms as well as other boring and nestling mollusks and probably other groups of organisms.

It is more than likely that specimens grown in the small 2 x 4″ test blocks, placed in various waters of our country by the Committee on Marine Piling Investigations of the National Research Council will produce stenomorphs of the various species.

—*Paul Bartsch.*

NEW BOTANICAL NAMES.

The following new names for American plants have been found necessary in the course of recent work.

Cordia megalantha Blake.

Cordia macrantha Blake, Contr. U. S. Nat. Herb. **24**: 19. 1922. Not *C. macrantha* Chod. Bull. Soc. Bot. Genève II. **12**: 215. 1921.

Pseuderanthemum adenocarpum Blake.

Eranthemum adenocarpum Blake, Contr. Gray Herb. n. ser. 52: 98. 1917.

The genus *Eranthemum* L. was based on a single species, *E. capense*, which is considered to be referable to the genus usually called *Daedalacanthus*. Radlkofer, who is followed by Lindau in Engler & Prantl's Pflanzenfamilien, has taken up the name *Eranthemum* in this sense, and given the name *Pseuderanthemum* to the *Eranthemum* of authors, not of Linnaeus.

Pseuderanthemum tetrasepalum Blake.

Eranthemum tetrasepalum Blake, Contr. Gray Herb. n. ser. 52: 99. 1917.

—*S. F. Blake.*

A NOTE ON THE FOOD HABITS OF THE SHARP-TAILED GROUSE (PEDIOECETES P. CAMPESTRIS).

During the latter part of July, 1921, I was encamped on the south shore of Devil's Lake, North Dakota, in an indention, locally known as Mission Bay. As Devil's Lake has for the last ten years been slowly drying up it is now surrounded by wide alkaline mud flats or (in the higher areas) heavy growths of weeds, among which cockle-bur and rosin-weed are conspicuous. Back of this area on the south, there is a well wooded section, composed mainly of oaks, box elder, and aspen, with wild plum, choke cherry, and June berry. Raspberry, wild rose, and poison ivy also are abundant.

In this excellent cover the Prairie Sharp-tailed Grouse was fairly common, and, as it will be noted from the above partial list of plants, there was an abundance of choice, natural food. Occasional specimens were taken, most of which were in such an advanced state of moult as to be practically worthless for preservation. It was noted, however, that the berries of the June berry (*Amelanchier* sp.), together with grasshoppers, usually composed the major portion of the contents of their crops. I was therefore greatly surprised when on July 26 I flushed a hen with five half-grown young from a patch of rosin-weed (*Silphium laciniatum*). The hen and two of the young were secured and upon examination of their crops, I found that while the omnipresent June berries and grasshoppers had been taken to the extent of about 70 per cent of the total, the remaining 30 per cent of the contents of the crops of all three birds, was the buds and flowers of the rosin-weed. This plant attained a luxuriant growth at this point, so much so that after passing through it my leather boots were covered with the pitchy exudations. The seeds of this weed are known to be consumed by several species of birds, but this is the first time that I have ever known of any animal eating the resinous buds and flowers.

—*Frederick C. Lincoln.*

GROTEINAE A NEW SUBFAMILY.

When I raised Labena and allies to family rank, Ent. News, **31** (16), 1920, I made no provision for the genus *Grotea* for which I now create the subfamily Groteinae. In my "Families and Subfamilies of Ichneumon-flies," Proc. Biol. Soc. Washington, **31**, 1918, Groteinae will replace Labeninae on page 73 and on page 71 Labenidae should be inserted between Trigonalidae and Ichneumonidae.

—*Henry L. Viereck.*

CHLORONERPES SWAINSON VERSUS PICULUS SPIX.

Ornithologists have apparently quite lost sight of the generic name *Piculus* so far as current use is concerned. However, it seems necessary to revive it as a generic designation for some group of the woodpeckers that its author included. It was originally instituted by Spix in his great work on South American birds (Avium Species Novae Brasiliam, I, 1824, p. [vii] = Index, p. [3]), to include six species, in the following fashion:

"Piculus Macrocephalus	[Pagina]	60	[Tabula]	53.2
guttatus	"	61	"	53.1
Rubrifrons M. F.	"	61	"	55
Icterocephalus M. F. . . .	"	62	"	54
Maculifrons	"	62	"	56.1
Ruficeps M. F.	"	63	"	56.1.2"

These with their modern equivalents are as follows:

Piculus macrocephalus Spix = *Chloronerpes chrysochloros braziliensis* (Swainson).
Piculus guttatus Spix = *Chrysoptilus punctigulus guttatus* (Spix).
Piculus rubrifrons Spix = *Tripsurus rubrifrons* (Spix).
Piculus icterocephalus (Latham) = *Chloronerpes flavigulus* (Boddaert).
Piculus maculifrons Spix = *Veniliornis maculifrons* (Spix).
Piculus ruficeps Spix = *Veniliornis ruficeps ruficeps* (Spix).

It will thus be seen that the generic name *Piculus* must replace either *Chloronerpes* Swainson, *Chrysoptilus* Swainson, *Tripsurus* Swainson, or *Veniliornis* Bonaparte, all of which it antedates by many years; since *Piculus* Geoffroy 1832, *Piculus* Hodgson 1841, and *Piculus* Brehm 1842, are all of later date, all refer to entirely different groups, and are thus virtually different generic names. In order definitely to settle the question, we hereby designate as the type of *Piculus* Spix the first species listed, which is *Piculus macrocephalus* Spix. This, as above shown, will therefore make necessary the use of the generic name *Piculus* for the group hitherto known as *Chloronerpes*, and the various forms of this genus should now stand as follows:

Piculus simplex simplex (Salvin).
Piculus simplex allophylus (Bangs).
Piculus callopterus (Lawrence).
Piculus chrysochloros chrysochloros (Vieillot).
Piculus chrysochloros braziliensis (Swainson).

Piculus chrysochloros aurosus (Nelson).
Piculus paraensis (Snethlage).
Piculus xanthochlorus (Sclater and Salvin).
Piculus capistratus (Malherbe).
Piculus erythropis (Vieillot).
Piculus leucolaemus (Malherbe).
Piculus litae (Rothschild).
Piculus flavigulus flavigulus (Boddaert).
Piculus flavigulus magnus (Cherrie and Reichenberger).
Piculus aurulentus (Temminck).
Piculus chrysogaster (Berlepsch and Stolzmann).
Piculus rubiginosus rubiginosus (Swainson).
Piculus rubiginosus gularis (Hargitt).
Piculus rubiginosus coloratus (Chapman).
Piculus rubiginosus rubripileus (Salvadori and Festa).
Piculus rubiginosus trinitatis (Ridgway).
Piculus rubiginosus tobagensis (Ridgway).
Piculus rubiginosus yucatanensis (Cabot).
Piculus rubiginosus canipileus (d'Orbigny).
Piculus rubiginosus uropygialis (Cabanis).
Piculus rubiginosus meridensis (Ridgway).
Piculus rubiginosus buenavistae (Chapman).
Piculus rubiginosus alleni (Bangs).
Piculus rubiginosus tucumanus (Cabanis).
Piculus aeruginosus (Malherbe).
Piculus auricularis (Salvin and Godman).

—*Harry C. Oberholser.*

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