

AUSTRALASIAN ANTARCTIC EXPEDITION

1911-1914.

UNDER THE LEADERSHIP OF SIR DOUGLAS MAWSON, D.Sc., B.E.

SCIENTIFIC REPORTS.

SERIES C.—ZOOLOGY AND BOTANY.

VOL. III. PART I.

FISHES

BY

EDGAR R. WAITE, F.L.S.,

DIRECTOR, SOUTH AUSTRALIAN MUSEUM.

With Five Plates, Two Maps, One Chart, and Sixteen Figures in the Text.

PRICE EIGHT SHILLINGS AND SIXPENCE.
TO SUBSCRIBERS: SEVEN SHILLINGS.

Printed by R. E. E. Rogers, Government Printer, North Terrace, Adelaide, South Australia.

ISSUED JUNE 30th, 1916.

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AUSTRALASIAN ANTARCTIC EXPEDITION.

SCIENTIFIC REPORTS.

PREFATORY NOTE.

Thanks to the Premier (the Hon. Crawford Vaughan) and the Government of South Australia, acting through the Government Printer (Mr. R. E. E. Rogers), the printing of the Scientific Reports of the Expedition has commenced with this part. Further contributions will appear in succession, approximately in the order in which they are received.

The completed work will be a large one, and several years will elapse before all is published. The plan of publication is to divide the subject-matter into the following main divisions:—

NARRATIVE.

SERIES A.—Geography, Physiology, Glaciology, Oceanography, Geology.

SERIES B.—Meteorology, Journal of Auroræ, Wireless Journal, Tides, Magnetics

SERIES C.—Zoology, Botany.

Each Series will comprise a number of volumes, and each volume one or more parts. The subject-matter has been distributed provisionally among as many volumes as seem likely to be required. No attempt will be made to complete a volume before commencing the publication of its successor.

Professor W. A. Haswell, who organised the programme of the Biological Section of the Expedition, has already made arrangements for the working out of most of the Groups collected. Fortunately, also, Professor Haswell has undertaken the work of supervising and editing Series C of these reports.

DOUGLAS MAWSON.

UNIVERSITY, ADELAIDE.

EDITORIAL PREFACE TO THE "C" SERIES OF REPORTS.

In accordance with Dr. Mawson's request, conveyed by wireless from Adelie Land, I undertook, in May, 1913, the superintendence of the biological collections of the Expedition and the task of arranging for the working out of the results. The greater part of the collections came to hand at the end of the same month, and, in order that they might be sorted into groups, were placed in charge of Mr. John G. Hunter, B.Sc., who had been with the Expedition at the main base as Biologist, had collected a large proportion of the material obtained there, and had supervised the deep-sea trawling work of the "Aurora" in antarctic seas. A year later, in July, 1914, the collections of Invertebrata made by Mr. Harold Hamilton, at Macquarie Island, were received. The two sub-antarctic cruises of the "Aurora," with Mr. Edgar R. Waite as Biologist of the first, and Prof. T. T. Flynn of the second, also contributed to the sum total of the collections to be disposed of.

The negotiations for the distribution of the various groups of animals and plants comprised in the collections were favoured by the visit paid to Australia in 1914 by a number of leading biologists on the occasion of the meeting of the British Association, and, with some disappointments, led, on the whole, to very gratifying results. It had been the wish of Dr. Mawson and of the Antarctic Committee that—the Expedition being essentially an Australasian undertaking—the working out of the results should be entrusted as much as possible to Australasian investigators. This has been kept in mind throughout in disposing of the biological collections; but there were a number of groups in which the assistance of specialists outside Australia and New Zealand was essential for adequate treatment, and to those biologists in Britain and elsewhere who have generously consented to report on such groups—often large and important—the Expedition is under a great obligation.

To Mr. R. Etheridge, Curator of the Australian Museum, and his Staff, I have been indebted for much valuable assistance, especially in connection with the custody, conservation, and distribution of the larger specimens.

W. A. HASWELL.

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CONTENTS.

| GENERAL— | PAGE. |
|--------------------------------------------------|---------|
| Literature | 5 |
| Stomach Contents | 5 |
| Parasites | 6 |
| Illustrations | 6 |
| Division of Southern Areas, with Chart | 7 |
| Fishes of the Glacial Ooze | 9 |
| SYSTEMATIC— | |
| 1. Antarctica | 10 |
| 2. Macquarie Island and the Subantarctic | 45 |
| 3. Australasia | 74 |
| 4. Addendum | 81 |
| EXPLANATION OF PLATES, ETC. | 83 |
| INDEX | 85 |
| PLATES | I.-V. |
| MAPS | I., II. |

THE FISHES.

By EDGAR R. WAITE, F.L.S., Director South Australian Museum.

[*Contribution from the South Australian and Canterbury Museums**].

(Plates I.-V., Text Figures 1-16, and Maps I., II.)

LITERATURE.

Writers on Antarctic fishes have usually supplied a bibliography of the subject in the several works which have been published. The latest, entered below, is by Mr. C. Tate Regan, and he therein enumerates the principal memoirs dealing with Antarctic and Subantarctic fishes. This and one additional reference may be thus recorded.

1914.—Hussakof, L. Notes on a small collection of fishes from Patagonia and Tierra del Fuego, Bull. Amer. Mus. Nat. Hist. xxxiii., pp. 85-94 (Feb. 13).

† 1914.—Regan, C. T. Fishes of the British Antarctic ("Terra Nova") Expedition, 1910, pp. 1-54, pls. i.-xiii. (June 27).

The descriptions of most of the species enumerated in the following pages were prepared before the paper by Prof. Roule on the Fishes of the Deuxieme Expédition antarctique Française ("Pourquoi Pas?") and that of Mr. Regan, cited above, reached Australia, a circumstance which will explain the appearance of certain re-descriptions.

STOMACH CONTENTS.

The general stomach contents of the fishes dealt with were forwarded to Prof. Haswell, of Sydney, and he, in conjunction with Mr. Thomas Whitelegge, identified such material as was in suitable condition; the more or less digested crustaceans were submitted to Dr. Chilton, of Christchurch, while remains of annelids, etc., were similarly sent to Prof. Benham, of Dunedin, but I anticipate that little can be said of the invertebrates, which were for the most part in unsatisfactory condition; notes already

* Portion of the paper was prepared by the author during the time he was Curator of the Canterbury Museum, Christchurch, New Zealand.

† See Addendum, p. 81.

supplied to me are included under the fishes concerned. Some of the fish remains recovered from the stomachs were in a state permitting identification, and these likewise are recorded.

PARASITES.

The fishes of the genus *Notothenia* are unfavorably known to all who have visited our Subantarctic lands on account of the parasites which infest the flesh, while revulsion is occasioned to some by the mere sight or handling of the fish, due to presence of external parasites.

During the course of a visit paid to the Antipodes Islands in February, 1907, many specimens of *N. colbecki* were caught with hand lines from the steamer, and of these I wrote—"Some of them had fluke-like parasites which glided over their scales, while the muscles were infested with white round worms, so that none of the party was anxious to sample the edible properties of their catches." Of *N. microlepidota* the late Captain Hutton* wrote—"Most of the fish at the Auckland Islands are attacked by parasites in a most remarkable way; in some cases the whole of the lateral muscles being full of a round worm about an inch in length. So bad are they that nothing but sheer necessity would induce anyone to eat fish at these islands."

Mr. Ainsworth has feelingly described the presence of parasitic worms in *N. macrocephala* at Macquarie Island, and as the party were at one period very short of food, there was little choice but to eat fish, infested though it was. Mr. Ainsworth's words are quoted on page 69 of this paper. The scientific account of the parasites will appear in the special report devoted to this subject.

ILLUSTRATIONS.

While I have prepared the drawings from which the plates are reproduced, my assistant, Mr. Herbert M. Hale, made the line drawings which appear in the text and on Plate V. The blocks were made by Messrs. Porter & Barnett, of Adelaide. To them and to the Government Printer (Mr. R. E. E. Rogers) my thanks are tendered for the careful manner in which the reproductions have been made.

Mr. P. E. Correll, one of the photographers with the expedition in Antarctica, took a number of colour photographs of fishes, but they cannot unfortunately be utilised in this paper. Sir Douglas Mawson hopes to reproduce some of them in the Zoological logs of the expedition.

A coloured plate of fishes appeared in the "Home of the Blizzard," and photographs of the three species therein reproduced are identified in the present paper as portraying *Doloidraco longedorsalis*, *Aconichthys harrissoni*, and *Dacodraco hunteri*.

* Hutton, Trans. N.Z. Inst., xi., 1879. p. 340.

DIVISION OF SOUTHERN AREAS.

In 1912 the late Sir Clements R. Markham * proposed to divide the Antarctic Region into four Quadrants; each having the Pole as its apex and the Antarctic Circle as its arc. They were thus defined and named :—

90° E. to 180°—The Victoria Quadrant.

180° to 90° W.—The Ross Quadrant.

90° W. to 0°—The Weddell Quadrant.

0° to 90° E.—The Enderby Quadrant.

In 1914 Mr. C. Tate Regan † delimited the Southern Area into three Zones, namely, the South Temperate Zone, comprising the latitude up to the mean annual surface isotherm of 12° C. ; the Subantarctic Zone to the isotherm of 6° C. ; and the Antarctic Zone. He further divided each Zone into Districts, namely, the Glacial District marking the limit of pack ice, the Kerguelen, Magellan, and Antipodes Districts named according to the position of the main land masses.

These three latter Districts roughly correspond to the areas outside the respective Quadrants as defined by Markham ; but dealing with land masses only, they do not include the whole of the areas herein sought to be embraced.

As it may be convenient, therefore, to designate these extended Quadrants they may be named as follows :—

Australian Zonal Quadrant—An extension of the Victoria Quadrant.

Pacific Zonal Quadrant—An extension of the Ross Quadrant.

American Zonal Quadrant—An extension of the Weddell Quadrant.

African Zonal Quadrant—An extension of the Enderby Quadrant.

The accompanying chart shows the respective areas of the Antarctic and Extended Quadrants together with the Zones and Districts above enumerated.

* Markham, Geogr. Journ. xxxix., 1912, p. 575 and chart.

† Regan, Brit. Antarct. Exped. ("Terra Nova"), 1910, i, 1914, p. 25 and chart.

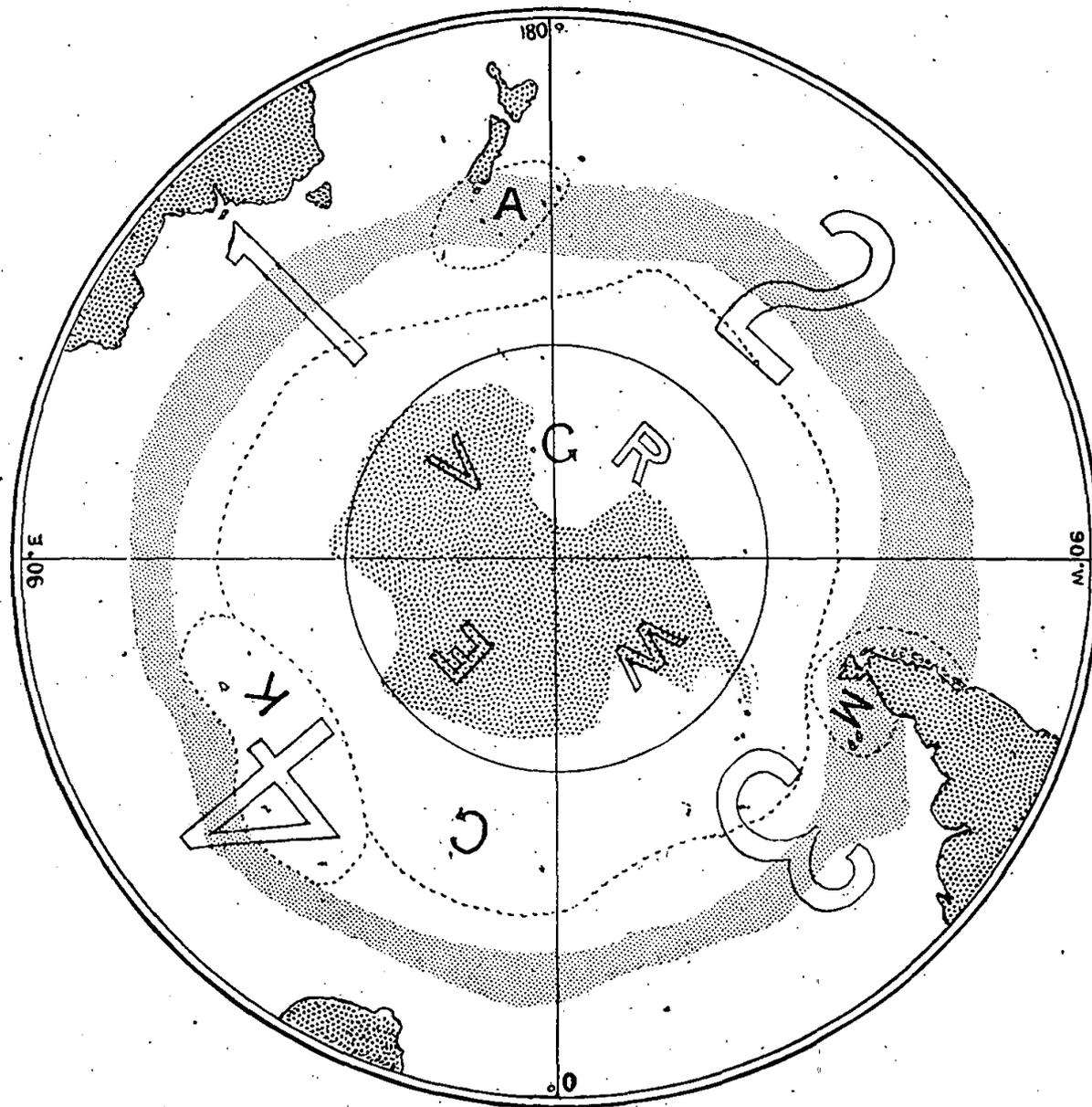


CHART OF ANTARCTIC, SUBANTARCTIC, AND SOUTH TEMPERATE REGIONS.

(Adapted from those published by Sir Clements R. Markham and Mr. C. Tate Regan.)

| | | |
|-----------------|-----------------------------------------|-------------------------------|
| QUADRANTS | V. Victoria Quadrant. | 1. Australian Zonal Quadrant. |
| | R. Ross Quadrant. | 2. Pacific Zonal Quadrant. |
| | W. Weddell Quadrant. | 3. American Zonal Quadrant. |
| | E. Enderby Quadrant. | 4. African Zonal Quadrant. |
| ZONES | Outer white area.—South Temperate Zone. | |
| | Shaded area.—Subantarctic Zone. | |
| | Inner white area.—Antarctic Zone. | |
| DISTRICTS | A. Antipodes District. | |
| | M. Magellan District. | |
| | K. Kerguelen District. | |
| | G. Glacial District. | |
| LAND MASSES .. | In heavy shading. | |

FISHES OF THE GLACIAL OOZE.

Anyone familiar with glaciers eroding land surfaces will be aware of the enormous amount of fine sticky mud that occurs in the ice, especially noticeable in the terminal faces, where the ice is frequently so obscured with mud that the axe alone reveals its true nature. In glaciers of low latitude, as in those of New Zealand, the mud is discharged into the water resulting from the melting ice, and the stream flowing from the glacier is characteristically muddy. Where a glacier flows directly into the sea the contained mud is deposited from its under surface and terminal face, and, in the absence of strong currents, would be confined to the area beneath the floating ice; as however, considerable movement of the water takes place, the finer mud is carried to considerable distances.

A glance at the following list of dredging and trawling stations will show that out of 13 effective stations where the nature of the bottom is indicated, nine recorded ooze. With the exception of the hauls made at the Main Base in Commonwealth Bay, all appear to have been made within the sphere of influence of glacial mud, and this was apparently so certainly looked for in the dredge that at Stations VII. and XII. the words "No ooze" appear in the list supplied by the collectors.

The records are insufficient to enable one to draw very definite conclusions as to the habitat of the fishes obtained, but we may notice that correlated with the absence of ooze, we miss the soft-bodied *Paraliparis* and the eel-like *Austrolycichthys* and *Lycotichthys*, which, progressing by sinuous motions through the mud, have, in common with some eels and other fishes of similar habit, suffered a diminution in their fins. The ventrals, or pelvics, appear to be lost first, and those of the two genera mentioned are reduced almost to vanishing point. Progression being performed mainly by the motions of the hinder portion of the body the functions of the tail have been largely increased by a coalescence of the dorsal and anal rays with those of the caudal, so that a powerful swimming organ has thereby resulted.

The two species of *Chalinura*, taken at Stations V. and VI., were obtained off the exposed edge of the pack ice, in very deep water, among rocks apparently jutting up through the ooze. Apart from those mentioned all the constituents of the Antarctic collection are Notothenioid fishes, and were taken both among ooze and on rocky bottom; the largest haul, as regards number of species, was made at Station VII., where 11 different species were taken; "no ooze."

The fishes taken on the expedition, or rather series of expeditions, may be considered under three geographical headings, namely:—

1. Antarctica.
2. Macquarie Island and the Subantarctic.
3. Australasia.

1. ANTARCTICA.

Fishes were taken by means of traps at the Main Base, Adelie Land, under Sir Douglas Mawson, by Mr. J. G. Hunter and Dr. A. L. McLean; and at the Western Base, Queen Mary Land, under Mr. Frank Wild, by the late Mr. C. T. Harrison. During the summer cruise of 1913-14, good use was made of the Agassiz trawl, and 12 stations were plotted, in the neighbourhood of the sea ice, as shown on the accompanying map. A few fishes also were obtained by means of tow nets, and others were taken from the stomachs of seals and fishes. The following is a complete list of the fishes taken by the expedition in Antarctica:—

- Atopichthys* sp.
Chalinura ferrieri Regan
Chalinura whitsoni Regan
Lycodichthys antarcticus Pappenheim
Austrolycichthys brachycephalus Pappenheim
Trematomus newnesi Boulenger
Trematomus nicolai Boulenger
Trematomus bernacchii Boulenger
Trematomus hansonii Boulenger
Trematomus loennbergii Regan
Trematomus pennellii Regan
Trematomus centronotus Regan
Trematomus scotti Boulenger
Trematomus eulepidotus Regan
Pleuragramma antarcticum Boulenger
Notothenia coriiceps Richardson
Artedidraco shackletoni Waite
Dolloidraco longedorsalis Roule
Pogonophryne scotti Regan
Bathhydraco nudiceps sp. nov.
Gerlachea australis Dollo
Aconichthys harrissoni gen. et sp. nov.
Cygnodraco mawsoni gen. et sp. nov.
Prionodraco evansii Regan
Dacodraco hunteri gen. et sp. nov.
Pagetopsis macropterus Boulenger
Cryodraco antarcticus Dollo
Chionodraco kathleenae Regan
Paraliparis wildi sp. nov.

DETAILS OF THE SEVERAL STATIONS TOGETHER WITH THE FISHES TAKEN THEREAT.

| Station. | Date. | Position. | Depths in Fathoms. | Temp. C. | Bottom. | Fishes. |
|-----------------|---------------|------------------------------------------------------------------------------------|--------------------|----------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Main Base | 1912-14 | Commonwealth Bay, Adelie Land. Lat. 67° S., Long. 142° 36' E. | 2½-5 | — | Rocky, with red and brown algæ attached to rocks. (Dredges and fish traps) | <i>Trematomus bernacchii</i> <i>Notothenia coriiceps</i> |
| Western Base... | 1912-13 | Off Shackleton Ice-shelf, Queen Mary Land. Lat. 66° 18' S., Long. 94° 58' E. | 210-270 | — | Ooze (Fish trap) | <i>Lycodichthys antarcticus</i> <i>Austrolycichthys brachycephalus</i> <i>Trematomus loennbergii</i> <i>Prionodraco evansii</i> |
| I. | Dec. 22, 1913 | Commonwealth Bay, Adelie Land. Lat. 66° 50' S., Long. 142° 6' E. | 350-400 | -1.85° | Ooze | <i>Trematomus bernacchii</i> <i>Trematomus centronotus</i> |
| II. | Dec. 28, 1913 | Lat. 66° 55' S., Long. 145° 21' E. | 288-300 | -1.8° | Ooze, with diatoms | <i>Trematomus loennbergii</i> |
| III. | Dec. 31, 1913 | Lat. 66° 32' S., Long. 141° 39' E. | 157 | -1.62° | Ooze | <i>Trematomus bernacchii</i> <i>Pagetopsis macropterus</i> |
| IV. | Jan. 2, 1914 | Lat. 65° 48' S., Long. 137° 32' E. | 230 | -1.4° | Ooze | No fishes |
| V. | Jan. 6, 1914 | Lat. 64° 34' S., Long. 127° 17' E. | 1,700 | -0.3° | Thick ooze and rocks | <i>Chalinura ferrieri</i> |
| VI. | Jan. 14, 1914 | Lat. 63° 13½' S. Long. 101° 42' E. | 870 | -0.2° | Ooze and rocks | <i>Chalinura whitsoni</i> |
| VII. | Jan. 21, 1914 | Off Drygalski Island. Lat. 65° 42' S., Long. 92° 10' E. | 60 | — | Red algæ, few small rocks, no ooze | <i>Trematomus newnesi</i> <i>Trematomus bernacchii</i> <i>Trematomus pennellii</i> <i>Trematomus scotti</i> <i>Trematomus eulepidotus</i> <i>Artedidraco shackletoni</i> <i>Pogonophryne scotti</i> <i>Cygnodraco marsoni</i> <i>Prionodraco evansii</i> <i>Cryodraco antarcticus</i> <i>Chionodraco kathleenæ</i> |

DETAILS OF THE SEVERAL STATIONS TOGETHER WITH THE FISHES TAKEN THEREAT—*continued.*

12

| Station. | Date. | Position. | Depths in Fathoms. | Temp. C. | Bottom. | Fishes. |
|-------------|---------------|----------------------------------------------------------------|--------------------|----------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VII.A | Jan. 22, 1914 | Lat. 66° 28½' S., Long. 92° 42' E. | 350 | — | (Fish trap) | <i>Trematomus hansonii</i> <i>Trematomus loennbergii</i> |
| VIII. | Jan. 27, 1914 | Lat. 66° 8' S., Long. 94° 17' E. | 10 | — | (Tow net) | <i>Pleuragramma antarcticum</i> |
| IX. | Jan. 28, 1914 | Off Shackleton Ice-shelf. Lat. 65° 20' S., Long. 95° 27' E. | 240 | —1.38° | Ooze | <i>Trematomus loennbergii</i> <i>Trematomus scotti</i> <i>Bathyraco nudiceps</i> <i>Aconichthys harrissoni</i> <i>Prionodraco evansii</i> |
| X. | Jan. 29, 1914 | Off Shackleton Ice-shelf. Lat. 65° 6' S., Long. 96° 13' E. | 325 | —1.65° | Ooze | <i>Austrolycichthys brachycephalus</i> <i>Trematomus loennbergii</i> <i>Dolloidraco longedorsalis</i> <i>Bathyraco nudiceps</i> <i>Aconichthys harrissoni</i> <i>Chionodraco kathleenæ</i> <i>Paraliparis wildi</i> |
| X.A | Jan. 30, 1914 | Lat. 65° 0' S., Long. 96° 5' E. | 350 | — | (Fish trap) | <i>Trematomus loennbergii</i> |
| XI. | Jan. 31, 1914 | Off Shackleton Ice-shelf. Lat. 64° 44' S., Long. 97° 28' E. | 358 | — | Ooze | <i>Trematomus nicolai</i> <i>Trematomus scotti</i> <i>Dolloidraco longedorsalis</i> <i>Gerlachea australis</i> <i>Dacodraco hunteri</i> <i>Pagetopsis macropterus</i> |
| XII..... | Jan. 31, 1914 | Off Shackleton Ice-shelf. Lat. 64° 32' S., Long. 97° 20' E. | 110 | — | Small rocks, no ooze, animal life abundant | <i>Trematomus centronotus</i> <i>Trematomus scotti</i> <i>Trematomus eulepidotus</i> <i>Aconichthys harrissoni</i> |

AUSTRALASIAN ANTARCTIC EXPEDITION.

ATOPICHTHYS GARMAN, 1899.

ATOPICHTHYS *sp.*

A larval fish, apparently an eel, 9.5mm. in length, was obtained on January 21st, 1914, at a depth of 20 fathoms, off Drygalski Island.

FAMILY MACROURIDÆ.

CHALINURA GOODE AND BEAN, 1883.

CHALINURA FERRIERI *Regan.*

Chalinura ferrieri Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 236, pl. ii., fig. 1.

(Text fig. 1.)

A single example taken at Station V., Lat. 64° 34' S., Long: 127° 17' E., at 1,700 fathoms, the temperature being -0.3 C.

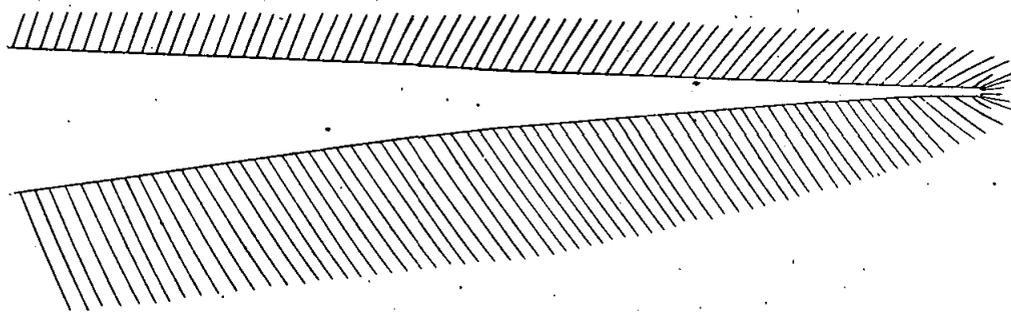


Fig. 1.—*Chalinura ferrieri*.

Hinder part of body. Natural size.

This is evidently a deep water form, the type having been taken in 1,410 fathoms. Our specimen measures 250mm. in length, and is, therefore, slightly larger than the type. It agrees quite well with the description, but the phrase "Dorsal ii. 9; distance from second dorsal a little more than three-quarters the length of head" is rather misleading; the measurement was evidently taken from the origin of the first dorsal, the intradorsal space being half the length of the head, as in our specimen and as in Mr. Regan's figure. It is also evident that the rays on the hinder part of the body of the type were much abraded, for there is little or no diminution of their length as figured; they are at least 8mm. long, possibly at the end of the tail also, which has been slightly damaged. The accompanying figure shows the condition existing in our specimen.

CHALINURA WHITSONI *Regan*.

Chalinura whitsoni Regan, Trans. Roy. Soc. Edin., xlix., 1913, p. 236, pl. ii., fig. 2.

Two specimens taken at Station VI., Lat. 63° 13' S., Long. 101° 42' E. the depth being 870 fathoms and the temperature -0.2 C.

The larger example measures 525mm. and the smaller 332mm. in total length; the former differs from the smaller example and from the type in having the intradorsal space equal to one-third the length of the head, otherwise no differences are detected. The two specimens were measured by Mr. J. G. Hunter on board the "Aurora," and his figures are here appended:—

| | A | B |
|--------------------------------|--------|--------|
| Total length | 572 | 337 |
| Length of head | 115 | 71 |
| Depth of body | 103 | 55 |
| Interorbital space | 29 | 16 |
| Diameter of eye | 36 | 23 |
| Length of snout | 31 | 21 |
| Snout to origin of dorsal..... | 134 | 80 |
| Colour of eyes | Golden | Golden |
| Weight | 31oz. | 19½oz. |

Stomach Contents.—The stomach contained two prawns, apparently of the genus *Penceus*.

FAMILY ZOARCIDÆ.

LYCODICHTHYS PAPPENHEIM, 1911.

LYCODICHTHYS ANTARCTICUS *Pappenheim*.

Lycodichthys antarcticus Pappenheim, Sitzungsber. Ges. naturf. Freunde Berlin, viii., 1911, p. 383, and Deutsche Südpolar Exped. 1901-3, xiii. Fische 1912, p. 180, pl. ix., fig. 6; pl. x., fig. 4.

A fine series of this species was obtained of various sizes, the largest being 190mm. in length. The marbled colouration is well shown in Pappenheim's figure (ix. fig. 6).

All the specimens were collected by Mr. Harrison at the Western Base, Queen Mary Land, Lat. 66° 18' S., Long. 94° 58' E., by means of traps, in 270 fathoms, on a bottom of ooze, the formation of which is referred to under the note on page 9.

Stomach Contents.—The stomachs and intestines of these fishes were crowded with the remains of Amphipods which Prof. Haswell identifies as species of *Amaryllis*.

The types taken by the "Gauss" Expedition were obtained at Kaiser Wilhelm Land, which adjoins Queen Mary Land, the conditions of which are probably similar, judging from the similarity of its fish fauna, the following species are known to be common to the two localities:—

- Pleuragramma antarcticum.*
Pagetopsis macropterus.
Cryodraco antarcticus.
Lycodichthys antarcticus.
Austrolycichthys brachycephalus.

AUSTROLYCICHTHYS REGAN, 1913.

AUSTROLYCICHTHYS BRACHYCEPHALUS *Pappenheim.*

Lycodes brachycephalus Pappenheim, Deutsche Südpolar Exped. 1901-3, xiii., Fische 1912, p. 179, pl. x., fig. 3.

Austrolycichthys brachycephalus Regan, Trans. Roy. Soc. Edin. xlix. 1913, p. 244, fig. 2.

(Plate I., fig. 1, and Text figs. 2 and 2A.)

B. vi. ; D. 90 ; A. 70 ; V. i. ; P. 16 ; C. 10 ; Vert. 29 + 68 = 97.

Length of head, 6.4 ; depth of body, 7.1 in the length ; diameter of eye, 5.4 ; of orbit, 3.3 ; length of snout, 3.4 ; and interorbital space, 2.9 in the head.

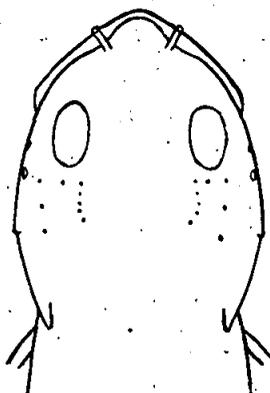


Fig. 2.—*Austrolycichthys brachycephalus.*

Upper view of head. Natural size.

Head subcircular, as deep as broad, flattened below ; eye sublateral in the anterior half of the head ; the nostril lies in a long tube, nearer to the lips than to the eye ; mouth large, subterminal, the upper jaw the longer, the lips are reflexed, the lower ones especially ; they do not cross the symphysis but form a long lobe-like projection on

each side; the maxilla extends to below the anterior third of the eye; gill-opening an oblique slit in front of, and of equal depth with, the base of the pectoral; gills four; the gill-rakers are in the form of small hooks, 12 in number on the first arch; body rounded in front and extremely compressed behind.

Teeth.—The teeth are short and stout and of uniform character throughout; those in the upper jaw form three series, the anterior of which consists of two teeth, placed close together; the second series forms an arch not extending backwards to the angle of the mouth; the third series is short and formed of two lines which do not quite meet; the lower teeth are triserial in front and uniserial at the sides; the vomerine teeth form a triangle with the apex forward, they are seven in number and set in three

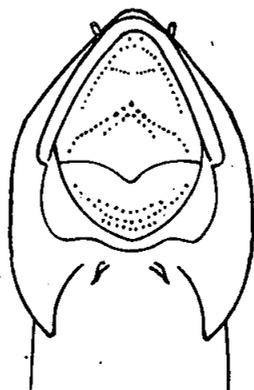


Fig. 2A.—*Austrolycichthys brachycephalus*.

Arrangement of teeth. Natural size.

rows, containing one, two, and four teeth respectively; the palatine teeth are arranged in two rows, an outer series extending as far as the middle of the eye and a smaller inner series confined to the anterior portion of the palatine bones. The complete condition is illustrated in the figure, no teeth on the tongue, the pharyngeal teeth form oval patches, two in the upper and one in the lower jaw.

Fins.—The dorsal originates at a point behind the snout, one-fourth the total length, and the anal arises a little nearer the head than the end of the tail; both fins are low and confluent with the caudal; the longest rays are about twice the diameter of the eye. The pectoral is rounded and comparatively large, being two-thirds as long as the head. The ventrals lie in advance of the base of the pectorals; the distance between them equals the diameter of the eye; they are very short—two-thirds of an eye-diameter in length.

Scales and Pores.—Apart from the head, the space in front of the dorsal fin, and a narrow strip in the middle of the belly, the body is covered with closely set minute scales, which appear as light-coloured dots on the skin. The pores are confined to the head, where they form two series—one widely bordering the lower half of the eye and the other extending along the lower jaw backwards and along the border of the preopercle;

five minute pores form a line behind the upper part of the eye, and a short line of five imperforate scales above the pectoral take the position normally occupied by a lateral line. There are a few other pores on the head, but they are extremely minute.

Colours.—The general hue is brown, with minute and closely set white spots due to the presence of imbedded scales; lips, space round the eyes, outer half of the vertical fins, and the ventrals white; lining of body cavity black.

Stomach Contents.—Crustaceans. Identified by Prof. Haswell as Amphipods, probably of the genus *Amaryllis*.

Reproduction.—The females are full of spawn; the ova, apparently ripe, being of large size, 5mm. in diameter, and of ruby colour.

Length.—267mm.

Locality, etc.—The specimen described was taken at Station X., Lat. 65° 6' S., Long. 96° 13' E., off Shackleton Ice-shelf, at a depth of 320 fathoms, the temperature being -1.65 C. A single specimen only of this species was taken at this station, but others were secured off the Western Base (Lat. 66° 18' S., Long. 94° 58' E.) by means of fish traps, the depth being 270 fathoms.

Remarks.—The specimens vary considerably in size. The smallest exhibit very striking markings, the whole upper surface from the snout to the end of the tail being dark purplish brown sharply defined from the lower parts, which are of cream colour; the line of demarcation cuts the middle of the eye, but the dark hue surrounds the orbit; the body along the base of the anal fin is likewise of dark colour, which unites with the dorsal band on the caudal, leaving the tip of the latter white; the edges of the vertical fins are white as in the adult.

The dorsal and anal fins in our specimens, as ascertained by dissection, originate further back than in those previously figured. A more forward insertion is a character of younger examples.

NOTE.—The only specimens of the species previously known were the originals taken by the German South Polar Expedition at the winter quarters of the "Gauss" in 385 metres (= 210 fathoms). Kaiser Wilhelm Land and Queen Mary Land adjoin, and as the Australasian Expedition's examples were obtained in Davis Sea, the two localities are comparatively near to each other, though our specimens were taken in deeper water.

FAMILY NOTOTHENIIDÆ.

TREMATOMUS BOULENGER, 1902.

TREMATOMUS NEWNESI *Boulenger*.

Trematomus newnesi Boulenger, Rep. "Southern Cross" Pisces, 1902, p. 177, pl. xi.
Regan, Trans. Roy. Soc. Edin. xlix. 1913, p. 259.

Notothenia cyancobrancha Vaillant, Expéd. Antarct. Française, Poiss. 1906, p. 26.

Notothenia microlepidota Vaillant, *loc. cit.*, p. 35.

Notothenia hodgsoni Boulenger, Nat. Antarct. Exped. ii. Fish, 1907, p. 2, pl. i., fig. 2.

One specimen, 185mm. in length, was obtained at Station VII., Lat. 65° 42' S., Long. 92° 10' E., off Drygalski Island, in 60 fathoms; and the remains of a second specimen, apparently of this species, were removed from the stomach of a Weddell Seal off Adelie Land, November 3rd, 1912.

TREMATOMUS NICOLAI *Boulenger*.

Notothenia nicolai Boulenger, Rep. "Southern Cross" Pisces, 1902, p. 184, pl. xv.
Roule, Deux. Expéd. Antarct. Française Poiss. 1913, p. 5.

Trematomus nicolai Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 260.

Two small specimens, associated with this species, were taken at Station XI., Lat. 64° 44' S., Long. 97° 28' E., off Shackleton Ice-shelf, in 358 fathoms. The naked upper surface of the head and scaly cheeks and opercles, together with the narrow interorbital space, are characters of this species. The specimens agree with Roule's example from Peterman Island in having five spines in the dorsal fin, but otherwise do not appear to differ from the type, excepting, perhaps, in the absence of tubules in the lower lateral line. The specimens are evidently young and are somewhat abraded. Attention is drawn to the fact that they were obtained at great relative depth; the types were taken in 4 to 8 fathoms in the neighbourhood of Cape Adair, while that caught by the "Pourquoi-pas?" was secured at a depth of 1 metre only, and, as above mentioned, the examples now recorded were taken in 358 fathoms. The specimens are equal in size and measure 115mm. in total length.

This species bids well to be of circumpolar distribution, being known from the Weddell Quadrant and the two extremes of the Victoria Quadrant, within the Antarctic Zone.

TREMATOMUS BERNACCHII *Boulenger.*

Trematomus bernacchii Boulenger, Rep. "Southern Cross," Pisces, 1902, p. 181, pl. xiv. Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 262.

Notothenia elegans Vaillant, Expéd. Antarct. Française, Poiss, 1906, p. 28.

Eighteen specimens were preserved, taken as follows:—One at Station I., Lat. 66° 50' S., Long. 142° 6' E., in Commonwealth Bay, at a depth of 354 to 400 fathoms, the temperature being -1.85 C.; one at Station III., Lat. 66° 32' S., Long. 141° 39' E., near Commonwealth Bay, in 157 fathoms, at a temperature of -1.62 C.; four at the Main Base, Lat. 67° 0' S., Long. 142° 36' E., taken in Commonwealth Bay by means of the fish trap, at a depth of 2½ to 5 fathoms; and 12 at Station VII., Lat. 65° 42' S., Long. 92° 10' E., off Drygalski Island, in 60 fathoms.

The genus *Trematomus* was diagnosed by Boulenger as distinct from *Notothenia* on the position of the scapular foramen; in the latter it lies between the scapular and the coracoid, while in *Trematomus* it constitutes a perforation in the former bone. The value of this character was challenged by Pappenheim, who illustrated considerable variations in different species, and also believed that while some examples of *Notothenia lepidorhinus* Papp. conform to the scapular requirements of the genus, others have the foramen pierced as in *Trematomus*. He concludes that while the perforation of the scapular may hold good for *Trematomus*, the scapular coracoid foramen is invalid as a definite character for *Notothenia*. There is much to be said against the employment of such characters for diagnostic purposes, but it cannot be argued that any other really satisfactory determinative character has so far been offered in substitution. The value of Pappenheim's deductions was largely discounted by Regan's supposition that the specimen with the perforate hypercoracoid was not *Notothenia lepidorhinus* but really *Trematomus hansonii*. More recently Regan transferred the former species, that upon which Pappenheim made the observations above recorded, to *Trematomus*, apparently admitting the validity of the species but presuming faulty dissection. The latter author placed the species originally described as *Trematomus hansonii* and *T. bernacchii* under *Notothenia*, but Regan reinstated them, and if the character of the scapular fenestra is to be allowed as valid for *Trematomus* there is no question as to the inclusion of these two species, the condition being verified by examination of material now in hand.

TREMATOMUS HANSONII *Boulenger.*

Trematomus hansonii Boulenger, Rep. "Southern Cross," Pisces, 1902, p. 180, pl. xiii. Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 262; and Brit. Antarct. Exped. i. 1914, p. 3, pl. i., fig. 2.

Trematomus hansonii subsp. *georgianus* Lönnberg, Swedish South Polar Exped. Fishes, 1905, p. 25, pl. v., fig. 17.

Notothenia sima Vaillant, Expéd. Antarct. Française, Poiss, 1906, p. 23.

The only two specimens preserved were taken in the fish trap, January 22nd, 1914, in Lat. 66° 28½' S., Long. 92° 42' E., off Queen Mary Land, in 250 fathoms.

This species may be identified as distinct from *T. loennbergii* by the greater number of rays in the dorsal and anal fins, those of our two specimens being within the range assigned by Mr. Regan. The general colour is olive green with the darker markings usual in the species of this genus.

Stomach Contents.—Remains of Cephalopods were found in the stomach, the beak of one specimen being included.

Reproduction.—The ova are small, .9mm. in diameter, and white in colour.

TREMATOMUS LOENNBERGII *Regan.*

Trematomus loennbergii Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 263, pl. viii., fig. 4; and Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1914, p. 3.

Eleven examples were obtained on six occasions as follows:—Three at Station II., Lat. 66° 55' S., Long. 145° 21' E., in 288–300 fathoms, at a temperature of –1.8 C.; two at Station IX., Lat. 65° 20' S., Long. 95° 27' E., off Shackleton Ice-shelf, in 240 fathoms, the temperature being –1.38 C.; two at Station X., Lat. 65° 6' S., Long. 96° 13' E., off Shackleton Ice-shelf, depth 325 fathoms, temperature –1.65 C.; one taken in the fish trap on January 30th, 1914, Lat. 65° S., Long. 96° 5' E., in 350 fathoms; one off Shackleton Ice-shelf, also taken in the fish trap, in 270 fathoms, obtained by Mr. Harrison; two on January 22nd, 1914, in Lat. 66° 28½' S., Long. 92° 42' E., in 250 fathoms.

All specimens are distinctly reddish in colour, a character which enables one to easily separate them from *T. hansonii*, which is greenish in colour and the nearest ally of the species. Of more permanent value is the lower lateral line, which has 13–15 well developed tubules. *T. hansonii* may have double this number of pores, but tubules are scarcely, if at all, developed. Our largest example is 291mm. in length.

Stomach Contents.—The contents of the stomachs are digested fish and Crustaceans, determined by Mr. Whitelegge as remains of Isopods and Schizopods.

Reproduction.—The ova are yellow in colour and 1.3mm. in diameter.

TREMATOMUS PENNELLII *Regan.*

Trematomus pennellii Regan, Ann. Mag. Nat. Hist. (8) xiii., 1914, p. 12; and Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1914, p. 4, pl. iii., fig. 2.

Ten specimens taken at Station VII., Lat. 65° 42' S., Long. 92° 10' E., off Drygalski Island, in 60 fathoms. The largest example measures 180mm. in length, and the variation in the vertical fin rays is—

D. iv.-v. 32-35; A. 29-31.

Otherwise the specimens quite agree with the description of the types.

TREMATOMUS CENTRONOTUS *Regan*.

Trematomus centronotus Regan, Ann. Mag. Nat. Hist. (8), xiii., 1914, p. 12; and Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1914, p. 4, pl. iii., fig. 1.

Four examples were obtained at Station I., Lat. 66° 50' S., Long. 142° 6' E., at Commonwealth Bay, at a depth of 350-400 fathoms, bottom temperature being -1.85 C.

One specimen was taken at Station XII., Lat. 64° 32' S., Long. 97° 20' E., the depth being 110 fathoms.

Remains of two specimens of this genus, and probably of this species, were taken from the stomach of a Weddell Seal on September 3rd, 1912, but the locality was not furnished.

The largest specimen measures 210mm. in length, equal to the size of the type; the radial formulæ of all come within the limits assigned, excepting that one example with five dorsal spines has 36 rays. Mr. Regan has defined this species as distinct from *T. pennellii* on account of its pungent spines. It may be that it inhabits deeper water, its known range extending from 100 to 400 fathoms, while *T. pennellii* has been obtained between 45 and 60 fathoms.

TREMATOMUS SCOTTI *Boulenger*.

Notothenia scotti Boulenger, Nat. Antarct. Exped. ii. Fish, 1907, p. 2, pl. i., fig. 1. Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 271.

Trematomus scotti Regan, Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1914, p. 4, pl. iv., fig. 2.

This striking and handsome species was taken on four occasions as follows:— One at Station VII., Lat. 65° 42' S., Long. 92° 10' E., off Drygalski Island, in 60 fathoms; one at Station IX., Lat. 65° 20' S., Long. 95° 27' E., off Shackleton Ice-shelf, in 240 fathoms, temperature -1.38 C.; three at Station XI., Lat. 64° 44' S., Long. 97° 28' E., off Shackleton Ice-shelf, in 358 fathoms; ten young specimens at Station XII., Lat. 64° 32' S., Long. 97° 20' E., off Shackleton Ice-shelf, in 110 fathoms.

The short tubular portion of the upper lateral line extending a little beyond the end of the pectoral readily distinguishes this species from *T. lepidorhinus* and *T. eulepidotus*, which are its nearest allies.

Stomach Contents.—Mr. Whitelegge has determined the stomach contents from one example as remains of *Nebalia* (Crustaceans); another specimen yielded the arm of a Crinoid.

TREMATOMUS EULEPIDOTUS *Regan*.

Trematomus eulepidotus Regan, Ann. Mag. Nat. Hist. (8), xiii. 1914, p. 12; and Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1914, p. 5, pl. iv., fig. 3.

Four specimens were taken at Station VII., Lat. 65° 42' S., Long. 92° 10' E., off Drygalski Island, in 60 fathoms; and one was secured at Station XII., Lat. 64° 32' S., Long. 97° 20' E., off Shackleton Ice-shelf, in 110 fathoms.

Some little variation in the radial formulæ, as furnished by Mr. Regan, may be noted, two specimens exhibiting the following:—

(a) D. vii. 35; A. 32

(b) D. vi. 35; A. 32.

The two largest specimens measure 174mm. and 168mm. in length respectively.

Stomach Contents.—The material sent to Mr. Whitelegge has been identified as the remains of Schizopods.

PLEURAGRAMMA BOULENGER, 1902.

PLEURAGRAMMA ANTARCTICUM *Boulenger*.

Pleuragramma antarcticum Boulenger, Rep. "Southern Cross," 1902, p. 187, pl. xviii. Vaillant, Expéd. Antarct. Française, 1906, p. 48. Pappenheim, Deutsche Südpolar Exped. 1901-3, xiii. Fische, 1912, p. 164, figs. 1, 2. Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 264.

Half a hundred small specimens were taken in the tow net at a depth of 10 fathoms in Lat. 66° 8' S., Long. 94° 17' E., on January 27th, 1914.

The specimens are of uniform size, about 70mm. in length. They are, therefore, younger than the type and are of more elongate proportion; they do not exhibit the straight back as figured by Boulenger, but otherwise agree quite well with the description of the species.

NOTOTHENIA RICHARDSON, 1844.

NOTOTHENIA CORLICEPS *Richardson*.

Notothenia corliceps Richardson, Voy. "Ereb" and "Terr," Fish, 1844, p. 5, pl. iii. Günther, Cat. Fish. Brit. Mus. ii., 1860, p. 261. Vaillant, Expéd. Antarct. Française, Poiss. 1906, p. 24. Pappenheim, Deutsche Südpolar Exped. 1901-3, xiii., Fische, 1912, p. 170, pl. ix., fig. 2. Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 276. Hussakof, Bull. Amer. Mus. Nat. Hist. xxxiii. 1914, p. 88.

(For description of Macquarie Island specimen see p. 64, pl. v., fig. 3.)

Many specimens were secured at the main base, Commonwealth Bay, Adelie Land, in two to five fathoms.

The collectors appear to have been impressed with the bright tints of this species, a note of the life colours of four small examples being attached to the specimens as below—

- (a) Light crimson, ventrally crimson, shaded through pale orange to yellow, dorsally crimson mixed with light brown.
- (b) Deep crimson with dark-brown mid line passing through orange to bright yellow ventrally.
- (c) Reddish brown passing through greenish yellow to yellow ventrally and becoming deep brown dorsally.
- (d) Dark reddish brown becoming deep chocolate brown towards the back and through orange to yellow below.

Stomach Contents.—The stomachs of many of the specimens were examined and the food ascertained to be algae (probably swallowed with the invertebrates), crustaceans and fishes. The latter are exclusively Notothenias, but are too far digested to be specifically determined.

ARTEDIDRACO LÖNNBERG, 1905.

ARTEDIDRACO SHACKLETONI *Waite*.

Artedidraco shackletoni Waite, Brit. Antarct. Exped. 1907-9 ("Nimrod"), ii. 1911, p. 15, pl. ii. Regan, Brit. Antaret. Exped. 1910 ("Terra Nova"), i. 1914, p. 8.

The single specimen was taken on January 21st, 1914, at Station VII., off Drygalski Island, Lat. 65° 42' S., Long. 92° 10' E., in 60 fathoms. The first dorsal fin is damaged, but otherwise the fish agrees well with the type; the length of the barbel and the height of the soft dorsal being proportionately the same in both specimens. The original example had the appearance of being bleached, with indications of dark markings on the anterior part of the back and the outer caudal rays. The recent specimen shows the same disposition of colour, but much more intensified. There are three dark-brown bars on the back, the last of which is placed near the termination of the upper lateral line and extends downwards to one-third the depth of the body; the belly and underside of the hinder portion of the body are spotted with brown, and there are indications of spots on all the fins, but those on the ventrals are confined to the proximal half.

In his synopsis of this genus Regan places *A. skottsbergi* Lönnberg as the nearest ally of *A. shackletoni*; the latter differs essentially in the high soft dorsal, the anterior and hinder rays being less than half the height of the middle ones, in the shorter pectoral, which does not reach the origin of the anal, and in the longer maxilla, which extends to below the middle of the eye. The species was originally known from one locality only in the Victoria Quadrant, the type being obtained on the "Nimrod" Expedition at Cape Royds in McMurdo Sound, in 30 to 80 fathoms. Two examples were secured

on the "Terra Nova" Expedition, at the entrance to the Sound, in 160 to 207 fathoms. The specimen taken on the "Aurora" Expedition, at a depth of 60 fathoms, extends the known distribution of the species to the other extremity of the quadrant in somewhat lower latitude.

The five described species of *Artedidraco* are as follows:—

- A. mirus* Lönnberg, 1905, Weddell Quadrant.
- A. skottsbergi* Lönnberg, 1905, Weddell and Victoria Quadrants.
- A. shackletoni* Waite, 1911, Victoria Quadrant.
- A. lonbergi* Roule, 1913, Weddell and Victoria Quadrants.
- A. orianæ* Regan, 1914, Victoria Quadrant.

DOLLOIDRACO ROULE, 1913.

DOLLOIDRACO LONGEDORSALIS *Roule*.

Dolloidraco longedorsalis Roule, Deux. Expéd. Antarct. Française, Poiss. 1913, p. 16, pl. iv., figs. 1-3. (*D. longidorsalis* Regan.)

(Plate I., fig. 2, and Text fig. 3.)

Five specimens were taken at Station X., Lat. 65° 6' S., Long. 96° 13' E., and two at Station XI., Lat. 64° 44' S., Long. 97° 27' E., both off Shackleton Ice-shelf, at a depth of 325 and 358 fathoms respectively, the temperature reading at Station X. being -1.65 C.

The specimens vary somewhat in size, the largest being 137mm. in total length, or larger than the type, and the smallest 100mm. The longest example differs from all the rest by having the first dorsal of greater height, equal to its distance behind the

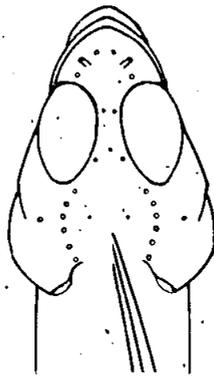


Fig. 3. *Dolloidraco longedorsalis*.

Upper view of head. Natural size.

snout. The relative length of the rays does not accord with the type, the second being the longest and the third the shortest; the fin also is higher than in Roule's specimens. The barbel bears a large terminal knob formed of digitate processes, which recall the

condition of a crinoid root. The smallest specimens agree in having the first dorsal fin lower than in the type, but they preserve the relative length of the rays as above described. In these some of the barbels bear a knob, while others are simple as in the type. A possible suggestion that the knob may have been lost in some of the specimens cannot be entertained, for it is found of all sizes in different individuals, being barely indicated in certain examples and in nowise comparative to the size of the fish. Mr. Regan has employed the character of the barbel as the major division in his synopsis of the genus *Artedidraco*, but the variation within the limits of the present species indicates that such character is untenable for diagnostic purposes.

Colours.—The markings are extremely striking; the ground is white but more or less clouded with yellow and with brown blotches, especially developed on the hinder portion of the body; the lower surface from vent to tail is dark brown. On the head the markings take the form of a broad bar connecting the eye and the snout, another below the eye, and another across the opercle. The numerous pores as shown in the accompanying figure have black rims; the first dorsal is uniformly black, as is also the upper half of the second fin, whose base bears spots in consonance with the markings on the upper surface of the body. This condition is reversed in the anal, the distal half being quite white, while the basal portion is black; the last rays of both dorsal and anal are connected with the caudal peduncle by a short membrane; the pectoral bears five or six brown bars, as shown in the original figure, and the lower rays are entirely black; an indistinct bar crosses the ventral; the caudal is white with an oblique black bar across its base; the upper rays bear elongate spots and a broad black bar crosses the fin obliquely, leaving a considerable portion of the ends of the rays white, the lowermost rays being scarcely involved.

Lateral Line.—The lateral line arises as four pores above the inner angle of the opercle; thence developing tubules, it falls rapidly and runs parallel to the dorsal profile to beneath the tenth ray of the second fin; it reappears as small pits in the mid line of the body and is continued to the caudal peduncle.

Reproduction.—The ova are very small, 0.8mm. in diameter, and white in colour.

The type was taken in Marguerite Bay, Fallieres Land, in the Weddell Quadrant, and we now have the species from nearly the same latitude but in the Victoria Quadrant, on the opposite side of the pole.

The largest specimen above referred to is the one figured on the accompanying plate. The species has been refigured on account of the very striking markings presented by our specimens.

In his account of the expedition, Sir Douglas Mawson* has published a coloured plate of three deep-water fishes living in the vicinity of Shackleton Ice-shelf. The two upper figures can be identified with certainty, but as regards the lower one, the

* Mawson, "Home of the Blizzard," ii., 1915, p. 270.

absence of most of its characters makes identification a matter of guess work. As much as is illustrated, however, leads me to believe that *Dolloidraco longedorsalis* was the subject of the photograph.

POGONOPHRYNE REGAN, 1914.

POGONOPHRYNE SCOTTI *Regan*.

Pogonophryne scotti Regan, Ann. Mag. Nat. Hist. (8), xiii. 1914, p. 13; and Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1914, p. 9, pl. vi., fig. 1.

B. v. ; D. ii. 25 ; A. 16 ; P. 20 ; V. i. 5 ; C. 9 + 6 ; L. lat. 21 + 12.

Length of head, 2.5 ; width of head, 3.1 ; depth of body, 4.4 ; and length of caudal, 4.0 in the length ; diameter of eye, 4.8 ; interorbital space, 3.8 ; and length of snout, 4.3 in the head ; gills, four, a slit behind the fourth, pseudobranchiæ present.

As some of the features of this species are to be gathered only from the excellent figure published by the author, such not being referred to in the text, the following remarks are offered on comparing our example with the illustration. The peculiar boss produced by the upper distal end of the premaxilla is situated nearer to the eye than in the type, its position being better portrayed in the illustration of the upper surface of the head ; the interorbital space is concave. Within the upper angle of the opercle is a flat spine with a forwardly directed hook above.

Fins.—The spines of the first dorsal fin were evidently damaged in the type, for in our example they have a normal character ; the first spine is shorter, and the second is equal in length to the diameter of the eye ; all the rays of the second dorsal are longer than those figured, the second, or longest ray, being four-sevenths the length of the head, or longer than the body is deep. The caudal, ventrals, and pectorals are longer than in the type, the latter reaching to the second anal ray ; the inner ventral ray is divided almost to its base.

Lateral Lines.—Head and body scaleless ; the upper lateral line is arrested beneath the seventh posterior dorsal ray ; the lower one, which runs along the middle of the caudal peduncle, commences two rays in advance of the termination of the upper line ; both lines bear tubules.

Colours.—The general colour is grey with brown markings ; the snout and the sides of the head spotted, the body with four cross bars, one behind the head, two below the dorsal fin, and one beneath its termination ; dorsal, pectoral, and caudal with rows of large spots.

Length.—240mm., or smaller than the type, which measured 290mm.

Locality.—A single example obtained at Station VII., Lat. 65° 42' S., Long. 92° 10' E., off Drygalski Island, at a depth of 60 fathoms. The bottom records showed red algae and a few small rocks. At this station the takings were mainly animal forms; but no ooze.

Stomach Contents.—Crustaceans of the suborder *Macrura* were obtained from the stomach of this individual.

FAMILY BATHYDRACONIDÆ.

BATHYDRACO GÜNTHER, 1878.

BATHYDRACO NUDICEPS *sp. nov.*

(Plate I., fig. 3, and Text fig. 4.)

B. vii. ; D. 27 ; A. 22 ; V. i. 5 ; P. 22 ; C. 10 + 4 ; L. lat. 6.

Length of head, 3.0 ; height of body, 7.2 ; and length of caudal, 5.5 in the total ; diameter of eye, 3.2 ; interorbital space, 12.0 ; and length of snout, 2.9 in that of the head.

Head broad and depressed, under surface quite flat, interorbital space flat, snout spatulate, lower jaw projecting, the maxilla reaches to the anterior margin of the eye. The eye is large, cuts the upper profile, and occupies the upper half of the head ; the nostril is situated in a prominent tube, placed in front of the eye, midway between it and the end of the snout. Gills, four, a slit behind the fourth ; gill rakers on the outer

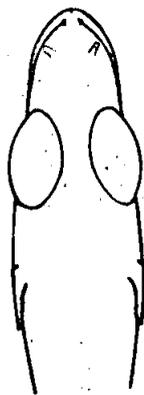


Fig. 4.—*Bathyraco nudiceps*.

Upper view of head. Natural size.

side of the arch long and slender, 17 on the lower limb and 5 on the upper limb of the first arch. Gill openings wide, narrowly attached to the isthmus ; pseudobranchiæ present. A flat blunt spine on the opercle, directed upwards and backwards. A system of large depressions is developed on the head, occurring on the upper part and sides of the snout and the interorbital space ; four such depressions occupy the temporal

region, each of the series being connected by three depressions across the occiput; the eye is surrounded, and a series on the preopercle runs along the underside of the mandible, the three anterior ones being perforate and constituting large pores. Body sub-cylindrical, caudal peduncle quadrangular.

Teeth.—Villiform teeth in narrow bands in the jaws, wider in front, no teeth on vomer, palatines, or tongue, and no frenum.

Fins.—The dorsal fin commences at a point distant from the front of the eye equal to the length of the head, the third and fourth rays are equal and longest; the following gradually diminishing; the anal arises beneath the seventh ray of the dorsal or nearer the tip of the lower jaw than the end of the caudal; its termination is a little posterior to that of the dorsal; the pectoral is rounded, the seventh, or longest ray, reaches to the base of the third anal ray; the ventrals reach the vent; the caudal is truncate, its peduncle is long and slender, slightly longer than the eye, its depth less than one-fourth that of the body.

Scales.—Head entirely naked; body wholly covered with adherent cycloid scales. The lateral line forms a low arch over the opercle and consists of five or six large pores; a series of imperforate depressed scales forms a line from above the pectoral, thence along the midline of the body to the base of the caudal rays.

Colours.—The head and body are very pale brown above and deep brown below; the margin of the opercle is almost black; the dorsal fin is colourless; all the other fins being of dark hue.

Stomach Contents.—The contents of the stomach were identified by Mr. Whitelegge as fragments of Polychaete worms.

Reproduction.—The ova are large, being 2.6mm. in greatest diameter, and of bright yellow colour.

Length.—144mm. Type in the South Australian Museum.

Locality, etc.—The type specimen was taken at Station IX., off Shackleton Ice-shelf, Lat. 65° 20' S., Long. 95° 27' E., at a depth of 240 fathoms, the temperature being -1.38 C. Two other examples were taken at Station X., in the same neighbourhood, but in the deeper water of 325 fathoms, at a temperature of -1.65 C., the dates respectively being January 28th and 29th, 1914.

Remarks.—This species is well characterised, differing from those previously known by the scaleless head, the smaller number of rays in the vertical fins, and by the greater length of the ventral fins, which reach to the vent; in *B. antarcticus* Günther,* *B. macrolepis* Boulenger,† and *B. scotica* Dollo‡ they fail to reach the vent by

* Günther, Ann. Mag. Nat. Hist. (5) ii. 1878, p. 18.

† Boulenger, Nat. Ant. Exped. II. 1907, p. 4, pl. I., fig. 3.

‡ Dollo, Proc. Roy. Soc. Edin. xxvi., 1906, p. 65.

at least one-sixth their length. The short lateral line is also distinctive; but the sum of the characters falls well within those assigned to the genus *Bathhydraco*. It may be noted that the reversed colouration is common to both *B. nudiceps* and to *B. antarcticus*.

GERLACHEA DOLLO, 1900.

GERLACHEA AUSTRALIS *Dollo*.

Gerlachea australis Dollo, Bull. Acad. Roy. Belg. Sci., 1900, p. 196; and Res. Voy. Belgica, 1904, p. 25, pl. ii., fig. 1, pl. v., fig. 2. Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 283. Roule, Deux. Expéd. Antarct. Française, Poiss. 1914, p. 10, pl. i., fig. 1; pl. ii., figs. 1, 2; pl. iii., fig. 5.

B. vi.; D. 45; A. 34; V. i. 5; P. 26; C. 10 + 6; L. lat. 85 + 6; Sc. tr. 6 + 25.

Length of head, 3.4; height of body, 12.2, and length of caudal, 7.32 in the length; diameter of eye, 4.2; interorbital space, 14.0, and length of snout, 2.4 in the head.

Head, a little wider than deep; snout, spatulate; interorbital space, concave; eye, circular, occupying two-thirds the depth of the head and placed exactly in the middle of its length; the nostril is situated an eye diameter in front of the orbit; the lower jaw is the longer, and the maxilla extends to a point half way between the nostril and the eye; gills, four, a slit behind the fourth; gill rakers represented by about eight low dentigerous patches on the first arch; gill openings very wide, narrowly attached to the isthmus, a broad truncate convex spine on the opercle; the body and tail are compressed, subquadrangular in section.

Teeth.—A narrow band of very small teeth in front of each jaw, passing into a single series on the sides; no teeth on vomer, palatines, or tongue.

Fins.—The dorsal fin commences behind the base of the pectoral, and its distance from the snout is equal to a third the total length, caudal included; the rays are of subequal height, those in front and behind being shorter; the anal commences under the twelfth ray of the dorsal, a little nearer the tip of the snout than the end of the caudal rays, and is three-fourths the length of the dorsal; the pectorals are rounded and reach the vent, which lies in the middle of the length, exclusive of the caudal; the ventral is shorter and extends to beneath the third dorsal ray; the angles of the caudal are rounded and its shorter middle rays produce a sinuous margin.

Scales.—Small scales on the cheeks and opercles, those on the latter being non-imbricate; the body is fully clothed, the scales being small and cycloid. The upper lateral line originates above the angle of the opercle, rises to below the fourth dorsal ray, thence follows the profile to below the last ray; the lower lateral line is represented by about six scales above the second fourth of the anal.

Colours.—General colour brownish yellow. A dark line passes from the snout to the eye, thence obliquely downwards across the opercles; six broad brown bars on the body, the first of which crosses the base of the pectorals. All the fins are dusky with exception of the anal, which is white; the spine and tips of the ventral rays are black.

Stomach Contents.—Crustaceans, too far digested to be determined.

Length.—208mm.

Locality, etc.—A single example netted at Station XI., Lat. 64° 44' S., Long. 97° 28' E., in 358 fathoms, off Shackleton Ice-shelf. The type taken, by the "Belgica," was obtained off Graham Land. Four specimens were secured off Charcot Land in the Weddell Quadrant by the "Pourquoi Pas?"

Remarks.—The above description was written before Prof. Roule's paper reached me, at which time one knew only of the single type example. Though four additional specimens were made known by the collections of the "Pourquoi Pas?," ours is still the largest recorded, and is, no doubt, fully adult, as smaller examples previously taken were found to be in ova.

Roule has mentioned that the lower lateral line is unequally developed on the two sides of the same fish, and a similar condition exists in our specimen.

ACONICHTHYS GEN. NOV.

Head, almost naked; body, wholly scaly; snout, spatulate; gill rakers, rudimentary; pseudobranchiæ present; teeth, villiform in broad bands in the jaws; without canines. A single dorsal fin, elevated in front; three lateral lines, the upper concurrent with the dorsal profile.

Of the four genera previously assigned to the family Bathydraconidæ, one, *Gymnodraco*, has the body naked; *Racovitzia* has the scales in scattered groups; *Bathydraco* has a single lateral line; *Gerlachea* is characterised by its short second lateral line above the base of the anal; from the last named *Aconichthys* differs also by the anterior portion of the dorsal fin being conspicuously raised as in the species of *Bathydraco*.

ACONICHTHYS HARRISSONI *sp. nov.*

(Plate II., fig. 1, and Text fig. 5.)

B. vii.; D. 37; A. 29; V. i. 5; P. 22; C. 10 + 6; L. lat. 84 + 14 + 10; Sc. tr. 7 + 24.

Length of head, 3.2; height of body, 8.7; and length of caudal, 5.4 in the total; diameter of eye, 4.1; interorbital space, 28.8; and length of snout, 3.0 in the head.

Head depressed one-fourth wider than deep; interorbital space extremely narrow, slightly concave; snout wide, four-fifths the width of the head, with three ridges which coalesce in front of the interorbital; the nostril is a little nearer the eye than the tip of the snout and lies in a short tube; there is a simple pore in front and another behind

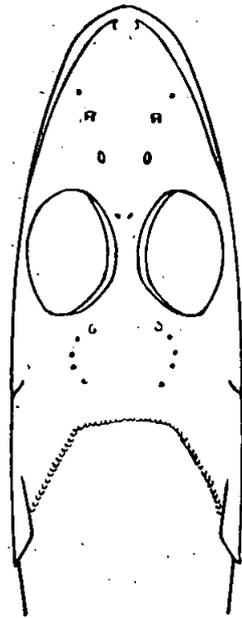


Fig. 5.—*Aconichthys harrissoni*.

Upper view of head. Natural size.

the nasal tube; the lower jaw is the longer, and the maxilla reaches to within the front edge of the eye; gills, four, a slit behind the fourth; gill rakers represented by mere knobs, of which there are 12 on the lower limb of the first arch; gill openings wide, narrowly attached to the isthmus; pseudobranchiæ present; a long narrow flat spine with serrated edge on the opercle; body rounded in front and subquadrate behind.

Teeth.—Villiform teeth in broad bands in the jaws; none on vomer, palatines, or tongue; no frenum.

Fins.—The dorsal fin commences its own length behind the snout or above the mid-length of the pectoral; the first ray is shorter than the second or third, which latter is the longest, being 2.3 in the head; the first nine rays form an anterior lobe, the rest of the rays being subequal; the anal commences beneath the seventh ray of the dorsal and extends further than that fin; the pectoral is feebly rounded, the median seven rays being subequal and one-fourth less than the head; it reaches to above the fourth anal ray. The ventral is pointed, its middle ray being nearly half the length of the head; it does not attain to the first third of the pectoral and is its own length short of reaching the anal. The caudal is slightly rounded, its peduncle above equals the length of the snout and its least depth is one-third the same.

Scales.—The head is naked; with the exception of groups of imbedded scales on the upper part of the opercle; the scales on the body are small with scalloped edges. The upper lateral line arises at the opercular notch; ascends slightly to below the first dorsal ray, thence follows the dorsal contour and terminates evenly with the last adpressed anal ray; the second lateral line is short and confined to the caudal peduncle, occupying a median position; the lower line is also short and is situated above the bases of the last 10 to 12 rays of the anal.

Colours.—The ground colour is pale olive; the upper part of the snout and head bears narrow wavy dark-brown lines of which two, passing in front and behind the eye over the opercles to the base of the pectorals, are the best defined, and are continued in a more or less broken series to the caudal peduncle. Six rectangular brown blotches cross the back, and include the upper lateral line; each is margined with a black line. The general colour below is sooty without defined markings; the fins are generally barred; while the tail has the outer rays black and its distal half sooty.

Stomach Contents.—The stomach was crowded with Crustaceans, determined by Mr. Whitelegge as Amphipoda.

Length.—278mm. Type in the South Australian Museum.

Locality, etc.—Two examples were obtained at Station X., Lat. 65° 6' S., Long. 96° 13' E., off Shackleton Ice-shelf, on January 29th, 1914, in 325 fathoms, temperature -1.65 C. Three specimens were taken at Station IX. also in Davis Sea, Lat. 65° 20' S., Long. 95° 27' E., in 240 fathoms, temperature -1.38 C. All were secured at the Western Base in the large Agassiz trawl in charge of Mr. Charles Harrisson, one of the biologists of the expedition. Mr. Harrisson was on board the Australian Federal trawler "Endeavour" when she left Macquarie Island on December 3rd, 1914. The vessel was never again heard of and; doubtless, went down with all on board.*

NOTE.—In Sir Douglas Mawson's book on the expedition is a plate produced by Paget colour photography of deep water fishes living in the vicinity of Shackleton Ice-shelf. The upper figure undoubtedly represents *Aconichthys harrissoni*.†

CYGNODRACO GEN. NOV.

Head very large, naked; snout spatulate; mouth not protractile; teeth villiform; in bands in the jaws; palatines and vomer edentulous; body elongate, compressed; naked, no spinous dorsal fin, lateral line single.

The scaleless body places this genus in association with *Gymnodraco* and *Parachænichthys*. From the former it differs by its long spatulate snout and extremely narrow interorbital; from the latter by the absence of bony plates on the lateral line; and from both by the large number of dorsal rays.

* Hedley, "Endeavour" Biol. Res. III. 1915, p. x.

† Mawson, "Home of the Blizzard" ii. 1915, p. 270.

The removal of *Parachænichthys* from the Chænichthyidæ to the Bathydraconidæ by Mr. Regan makes the presence or absence of a spinous dorsal fin a family character.

CYGNODRACO MAWSONI *sp. nov.*

(Plate III., fig. 1, and Text fig. 6.)

B. vi. ; D. 61 ; A. 36 ; V. i. 5 ; P. 22 ; C. 10 + 6 ; L. lat. 107.

Length of head, 2.5 ; height of body, 6.2 ; and length of caudal, 7.8 in the length ; diameter of eye, 5.8 ; interorbital space, 33.0 ; and length of snout, 2.2 in the head.

Head somewhat compressed, long, and swan-like, its width seven-ninths of its depth ; interorbital space extremely narrow, forming a groove between the eyes ; the eye cuts the upper profile and is placed nearer to the opercular margin than to the end of the snout ; the distance of the nostril from the tip of the snout is one-third the length of

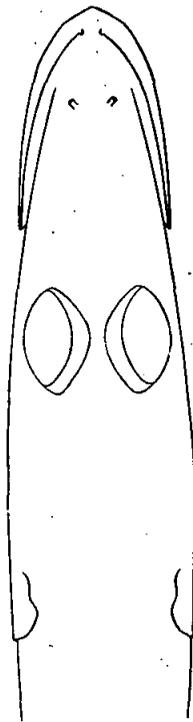


Fig. 6.—*Cygnodraco mawsoni*.

Upper view of head. Half natural size.

the snout ; the lower jaw projects slightly and the maxilla fails to reach the eye by two-thirds the orbital diameter ; gills, four, a slit behind the fourth ; gill rakers developed as low knobs, 14 on the lower limb of the first arch ; gill openings very wide, narrowly attached to the isthmus below the front edge of the eye ; pseudobranchiæ present ; a flat multifid spine on the opercle ; body compressed, tapering evenly to the tail.

Teeth.—The villiform teeth are set in bands in the jaws, none on the other bones of the head nor on the tongue, and no frenum in the mouth.

Fins.—The dorsal fin commences above the hinder insertion of the pectoral, and its length is nearly half the total, caudal included; the rays rise gradually to the eighth or ninth, whence they are subequal as far as the twentieth, being a little less than half the length of the snout; they then decrease evenly to the last third or fourth ray. The anal originates beneath the twenty-seventh ray of the dorsal; it has three rays beyond that fin; the rays are lower than those of the dorsal. The pectoral is evenly rounded, and extends to beneath the sixteenth ray of the dorsal, or nearly its own length from the anal; its length is equal to that of the ventral. The second ray of the latter fin is the longest and attains to the middle of the body, excluding the caudal. The membrane of the spine and the first two rays are thickened and clubbed.

Lateral Line.—There is only one true lateral line, it commences above the angle of the opercle, rises to beneath the anterior dorsal rays, and follows the profile to below the tenth last ray. A broken series of depressed non-perforate scales originates slightly in advance of the insertion of the anal on the middle of the side and extends to the base of the caudal rays; these scales are separated by a space equal to the interorbital, but anteriorly are less regularly disposed.

Colours.—The ground colour is greyish-brown. A broad dark line runs along each side of the snout; there is another below and a third behind the eye directed to the subopercle; the under surface of the head is lighter but mottled; the body is adorned with seven dark bars, the first of which crosses the occiput, the second is placed in front of the dorsal fin, the next four beneath the fin, and the seventh crosses the peduncle; they become increasingly oblique backwards. All the fins are dusky, the vertical ones with darker margins; the dorsal has two dark lines running the entire length of the fin.

Stomach Contents.—Remains of fishes, too far digested to be determined, were obtained from the stomach of the fish.

Length.—466mm. Type in the South Australian Museum.

Locality, etc.—A single specimen taken at Station VII., Lat. 65° 42' S., Long. 92° 10' E., off Drygalski Island, at a depth of 60 fathoms.

Remarks.—This striking species is characterised by the very large size of the head, which is more than one-third the entire length, caudal included; by the remarkably narrow interorbital space, little more than a groove between the eyes; and the large number of rays in the dorsal and anal fins. The club-like rays of the ventral fin are a feature common to older specimens of many species of Antarctic fishes in the *Nototheniidae*, *Bathydraconidae*, and *Chaenichthyidae*, etc.

PRIONODRACO REGAN, 1914.

PRIONODRACO EVANSII *Regan*.

Prionodraco evansii Regan, Ann. Mag. Nat. Hist. (8) xiii., 1914, p. 13; and Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1914, p. 10, pl. vii., fig. 1.

The specimens obtained agree well with the published description and figure. Mr. Regan states that the lower series of plates on the side of the body end in a group of nearly normal serrated scales behind the pectoral fin. The condition, as exhibited by my specimens, may be expressed by stating that the lower series of serrated plates originates in a scaly area behind the base of the pectoral and becomes better defined in its backward course. The scales along the middle of the side, about 48 in number, have depressed centres which, towards the tail, become shallow pits, producing the appearance of a line of pores. This series arises close below the origin of the tubular line, which latter is composed of 14 tubes, continued to below the sixth spine of the dorsal fin.

Length.—The largest example obtained measures 127.5mm. in length. Young specimens were collected by Mr. Harrison at the Western Base in 270 fathoms; they measure 22mm. in length, at which size their characters are easily recognisable.

Stomach Contents.—The stomachs of the specimens preserved are crowded with the remains of small Crustaceans, identified by Prof. Haswell as of *Euphausia*, the colour of which imparts an orange tint to the abdominal region. A small amphipod was also secured from the stomach of one individual.

Locality.—Twelve specimens were preserved: two at Station VII., Lat. 65° 42' S., Long. 92° 10' E., off Drygalski Island, at a depth of 60 fathoms; and 10 at Station IX., Lat. 65° 20' S., Long. 95° 27' E., off Shackleton Ice-shelf, at a depth of 240 fathoms, and a temperature -1.38 C. The type specimens were obtained from the Ross Sea.

FAMILY CHÆNICHTHYIDÆ.

DACODRACO GEN. NOV.

Head and body naked; operculum spinate; snout, narrow and pointed; no rostral spine; no gill rakers; pseudobranchiæ present; a single row of small teeth in the jaws with an inner series of large spaced canines; two dorsal fins, widely separated; ventrals with one spine and five soft rays, of which the middle ones are the longest; two lateral lines.

The genus differs from other forms with two lateral lines by having the lower one placed above the anal and not in a median position, and by the small number of dorsal spines (iii.), which are not higher than the rays.

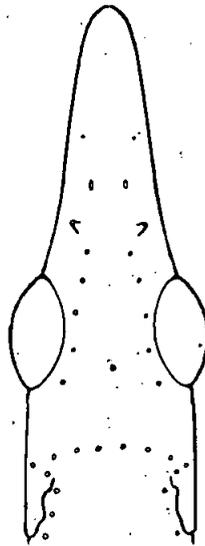
DACODRACO HUNTERI *sp. nov.*

(Plate II., fig. 2; and Text fig. 7.)

B. vi. ; D. iii. 32 ; A. 29 ; V. i. 5 ; P. 24 ; C. 11, + 6 ; L. lat. 90 + 47.

Length of head, 2.6 ; height of body, 6.4, and length of caudal, 6.0 in the length ; diameter of eye, 4.5 ; interorbital space, 5.8, and length of snout 1.9 in the head.

Head subquadrate, deeper than wide ; snout depressed, long, and pointed, the nostril placed in front of the eye, rather more than one-fourth the length of the snout ; interorbital space wide and concave ; eye round, lateral, its front edge in the middle of the head. ; the lower jaw projects slightly ; the tips of both jaws are upturned ; the maxilla extends to beneath the middle of the eye ; gills, four, a slit behind the fourth ; gill openings wide, membranes narrowly attached to the isthmus beneath the front

Fig. 7.—*Dacodraco hunteri*.

Upper view of head. Natural size.

edge of the eye. A broad flat spine on the opercle. A series of widely spaced pores commences near the tip of the snout, passes backwards above and behind the eye and returns to the snout close to the maxilla. Another series crosses the occiput and is continued down the preopercle and along the under jaw to its tip. The position of other pores on the upper surface of the head is illustrated in the accompanying text figure. Body and tail compressed.

Teeth.—A series of small depressible teeth on the outer margin of each jaw, and an inner series of large fixed conical teeth slightly curved backwards. These are arranged in twos, of which the anterior ones are quite small ; the larger teeth number six or seven in each ramus of the jaws. An extensive frenum in the upper jaw reaches backwards as far as the space between the nostril and the eye ; no vomerine or palatine teeth, the space they would normally occupy being covered by the frenum.

Fins.—The first dorsal fin commences in advance of the base of the pectoral; the spines are low, subequal, as long as the diameter of the eye; to which the intradorsal space is also equal; the first two rays are shorter than the succeeding ones, which are as long as the spines, but the following ones are gradually reduced. The base of the anal is as long as that of the second dorsal, but the fin has a more posterior insertion originating beneath the fifth ray, or nearly in the middle of the entire length, caudal included; the pectoral is deep and obtusely pointed, the middle rays reach to the base of the sixth anal ray; the ventrals just reach the anal; the caudal is truncate; the depth of the peduncle is little more than half the diameter of the eye.

Lateral Lines.—The upper lateral line arises above the angle of the opercle, rises to below the intradorsal space, and follows the profile to the base of the caudal rays; the lower line begins above the twelfth ray of the anal, and running near to the lower profile attains the base of the caudal rays. The lines are formed of closely set pores without any trace of scales.

Colours.—The general colour in preservative is reddish brown with seven darker bars across the body, the first two of which are slightly oblique. The first dorsal fin is black; the other fins are dusky, the pectoral being black proximally and the ventral distally.

Reproduction.—The ova are white in colour and extremely small, being .3mm. in diameter.

Length.—211mm. Type in the South Australian Museum.

Locality, etc.—Two specimens were taken at Station XI., off Shackleton Ice-shelf, Lat. 65° 6' S., Long. 96° 13' E., in 325 fathoms, the temperature being -1.65 C.

NOTE.—This species was illustrated by Paget colour photography in Sir Douglas Mawson's book. The photograph therein reproduced was certainly taken from one of the two specimens placed in my hands. It is, however, unfortunate that the fins were not extended, but the example photographed can readily be selected by the characters portrayed.*

PAGETOPSIS REGAN, 1913.

PAGETOPSIS MACROPTERUS *Boulenger*.

Champscephalus macropterus Boulenger, Nat. Antarct. Exped. ii. 1907, p. 3, pl. ii. (†); Pappenheim, Deutsche Südpolar Exped. 1901-3, xiii. Fische, 1912, p. 174.

Pagetopsis macropterus Regan, Trans. Roy. Soc. Edin. xlix. 1913, p. 286.

(Text fig. 8.)

Three specimens were obtained, all from different stations as below:—The largest, 264mm. in length, was taken at Station III., Lat. 66° 32' S., Long. 141° 39' E., in 157

* Mawson "Home of the Blizzard" ii. 1915, p. 270, middle figure.

† The plate is wrongly marked "pl. i.," but the text and also the description of the plate refer to the illustrations under "pl. ii." This will account for authors quoting differently.

fathoms, the temperature being -1.62 C. A smaller example, 170mm. long, was netted at Station XII., Lat. $64^{\circ} 32' S.$, Long. $97^{\circ} 20' E.$, the depth being 110 fathoms; while the third, of similar size, was secured at Station XI., Lat. $64^{\circ} 44' S.$, Long. $97^{\circ} 28' E.$, at a depth of 358 fathoms.

Pappenheim mentions that in his examples the lower jaw is the longer, while Boulenger describes the jaws as being equal in front. Our specimens agree in the greater length of the lower jaw, and as Boulenger's figure indicates some upward distortion of the snout, the discrepancy may be thus accounted for. Some further variation in the number of the fin rays, etc., may also be noted as below:—

| Specimen. | Total Length. | Dorsal Rays. | Anal Rays. | Lateral Line. |
|-----------|---------------|--------------|------------|---------------|
| A | 264 | xiii. 27 | 24 | 74 + 7 |
| B | 170 | xi. 26 | 23 | 76 + 5 |
| C | 170 | ix. 26 | 21 | 71 + 3 |

The small number of dorsal spines in the third specimen brings it within the characters assigned to *Champocephalus* by Mr. Regan, but the high spinous dorsal, the small number of rays, and the spine on the snout all show agreement with *Pagetopsis*.

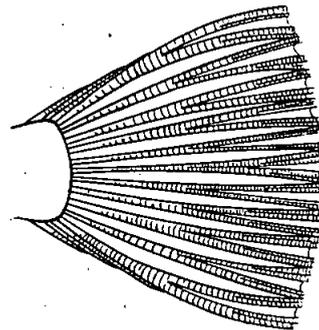


Fig. 8.—*Pagetopsis macropterus*.

Tail. Natural size.

The tails in the type specimens were incomplete. A perfect example shows that the rays are of the same length as the snout and that the margin is rounded, the exact shape being shown in the accompanying figure.

The markings in the largest specimen exactly agree with the published illustration, but those of the smaller ones exhibit seven broad bands which subdivide with age.

Stomach Contents.—The stomachs contained red seaweed and digested Crustaceans, which Prof. Haswell states are "Unrecognisable remains of some Decapods."

Habitat.—The localities above recorded form links in the chain which connects the Ross Sea and Kaiser Wilhelm Land, whence the species was previously known.

CRYODRACO DOLLO, 1900.

CRYODRACO ANTARCTICUS *Dollo*.

Cryodraco antarcticus Dollo, Bull. Acad. Roy. Belg. 1900, p. 130; and Voy. Belgica, Poiss. 1904, p. 20, pl. i. and v., fig. 7.

Cryodraco atkinsoni Regan, Ann. Mag. Nat. Hist. (8), xiii. 1914, p. 13; and Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1914, p. 11, pl. vii., fig. 2.

A single specimen was obtained at Station VII., off Drygalski Island, Lat. 65° 42' S., Long. 92° 10' E., in 60 fathoms. The type of the genus was taken in Lat. 71° 18' S., Long. 88° 2' W., at a depth of 450m. (= 246 fathoms), and is 200mm. in length. It is characterised by the large eye, the long ventrals, and the forward origin of the second dorsal fin. A second specimen, taken on the "Terra Nova" Expedition, is considerably larger, 292mm., and was obtained in Lat. 74° 25' S., Long. 179° 3' E., in 158 fathoms. It differs from the type "in the smaller eye, shorter pelvic fins, etc." A third example, now recorded, is still larger, being 451mm. in length. A review of the characters of all three specimens suggests that they are of the same species, the variations noted to be accounted for by differences of age.

The ventral fins, which form such a striking feature, are more than half the total length in the type specimen, slightly more than a third in the intermediate one, and but one-fourth in the largest. In the younger examples the ends of the longest rays are spatulate; but in the older ones they are much thickened and have grown together, forming a club-like termination. Changes in the relative length of the ventral fins, due to growth, appear to be a common feature in members of the related families Bathydraconidæ and Chænichthyidæ. Such a feature is well illustrated in the case of *Pagetopsis macropterus* Boul.* Of the two individuals figured on the plate quoted the ventral fins of the juvenile are relatively much longer than in the adult.

As with most other fishes, the eye is proportionately smaller in the largest specimen and the interorbital space is wider. Comparing the two published figures with our example, it is seen that in the smallest specimen the lower lateral line originates above the commencement of the anal; in *C. atkinsoni* it has retreated to above the sixteenth ray; while in our example it has a similar point of origin, but is somewhat broken anteriorly, and is apparently still further receding.

Respecting the relative length of the head and body compared with the caudal portion, in the type the former is the longer, while in the other two specimens the condition is reversed. The position occupied by the second dorsal fin appears to be another feature of disagreement. In the type the fin originates considerably in advance

* Boulenger, Nat. Antarct. Exp. ii, 1907, Fishes, pl. ii.

of the anal, slightly so in our specimen, while in *C. atkinsoni* the anal is a little in advance. The dorsal fins really occupy a similar relative position in all specimens; the difference occurs in regard to the origin of the anal.

The characters tabulated below show the close agreement in the features of the three known specimens here associated with *Cryodraco antarcticus*—

| | Specimen obtained on the— | | |
|---------------------------|---------------------------|---------------|-----------|
| | “Belgica.” | “Terra Nova.” | “Aurora.” |
| Dorsal rays..... | iii. 44 | iii. 42 | iii. 41 |
| Anal rays..... | 43 | 46 | 45 |
| Pectoral rays..... | 25 | — | 23 |
| Caudal rays..... | 20 | — | 11 + 6 |
| Head in length..... | 3½ | 3¼ | 3.08 |
| Body in length..... | 8 | 7½ | 6.4 |
| Eye in head..... | 4 | 5 | 5.2 |
| Interorbital in head..... | 5 | 4¾ | 4.19 |
| Snout in head..... | 2 | 2 | 2.1 |
| Ventral in head..... | 5 | 7.5 | 1.15* |
| Pectoral in head..... | 1.4 | 1.6 | 1.6 |
| Lengths in mm..... | 200 | 293 | 451 |

The three small specimens associated with this species by Pappenheim,† under the name *Pagetodes antarcticus*, are undoubtedly distinct, as recognised by Regan‡ in the name *Cryodraco pappenheimi*. He writes:—“The fish named *Pagetodes* by Richardson (“Erebus” and “Terror” Fish., p. 15, pl. viii., fig. 3) may have belonged to the genus *Cryodraco*; but in the form of the body, the length of the pelvic fins, and the continuous dorsals, it shows more resemblance to *Pagetopsis*. Until Richardson’s species is rediscovered, the name *Pagetodes* cannot be used.” As the specimen on which the genus was founded was appropriated by the ship’s cat before a description or proper drawing could be made, and as it is not known whether the fish was scaly or otherwise, the name *Pagetodes* may well be eliminated, for surely no one could claim that an uncharacterised species had been rediscovered. Later, Regan§ questions the association of *C. pappenheimi* with *Cryodraco*, and suggests that in some of its characters it approaches *Chænocephalus*.

* In words, the ventral is twice, one and one-third, and three-fourths the length of the head respectively.

† Pappenheim, Deutsche Südpolar Exped. 1901-3, xiii. Fische, 1912, p. 175.

‡ Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 289 and footnote.

§ Regan, Brit. Antarct. Exped. (“Terra Nova”), 1910, i. 1914, p. 11.

CHIONODRACO LÖNNBERG, 1906.

CHIONODRACO KATHLEENÆ *Regan*.

Chionodraco kathleenæ Regan, Ann. Mag. Nat. Hist. (8) xiii. 1914, p. 13; and Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1914, p. 12, pl. viii.

B. vii.; D. vi. 39; A. 34; V. i. 5; P. 22; C. 12 + 6; L. lat. 96 + 12 + 73.

Length of head, 2.8; depth of body, 7.1; and length of caudal, 6.6 in the total; diameter of eye, 4.5; length of snout, 2.1; and interorbital space, 4.2 in the head.

The head is subquadrangular in section, flat above; snout broad and spatulate; interorbital space broad and concave, with the orbital margins conspicuously raised; the eye occupies more than the upper half of the head, and its distance from the tip of the snout is more than the postorbital length; the nostril is small and placed in front of the eye, its distance therefrom being one-fourth the length of the snout; the mouth is large and horizontal, the maxilla reaching to below the first third of the eye, its length being nearly two-thirds that of the head; a large spine at the upper angle of the opercle is directed upwards and bears two points on its lower edge, and the lower angle has a double spine partially enclosed in an extensive membrane which is not included in the measurement of the head. Gill membranes very wide, narrowly attached to the isthmus; gills, four, a slit behind the fourth; gill rakers, none, pseudobranchiæ present; body moderately compressed, evenly tapering from head to tail.

Teeth.—Needle-like teeth in two rows in the jaws, the outer row being smaller, curved and visible when the mouth is closed; vomer, palatines, and tongue edentulous; a frenum behind the teeth in both jaws.

Fins.—The first dorsal arises above the margin of the opercle, its third spine is the longest and equal to half the length of the head; the second dorsal is low, its rays subequal in length and equal to the diameter of the eye; the anal is similar to the second dorsal, arising beneath its sixth ray, and has a slightly posterior insertion; the pectoral is broad and long, its longest rays equal to the distance from the end of the snout to the middle of the eye; it is truncated behind, due to the subequal length of the upper rays, the seven lower ones only being successively shorter; the ventrals are very long, the second ray being equal to the eye and snout together; they extend to the same point as the pectorals, that is, to below the base of the sixth anal ray. The caudal is short and truncated, and the depth of the peduncle is a little more than half the diameter of the eye.

Lateral Lines.—The body is entirely naked, with three lateral lines, one from the upper part of the opercle, parallel to the base of the dorsal and extending to beneath the last ray, when adpressed; the second line is short, in the middle of the caudal peduncle; the lower line commences above the origin of the anal and is coterminous with its last adpressed ray.

Colours.—The general colour is greenish, the head with brown spots above and on the upper lip, a large spot on the middle of each ramus of the mandible, a dark bar below the eye and two oblique ones behind it, eight oblique bars on the back and sides, the first dorsal wholly black, the other fins dusky, all without markings.

Stomach Contents.—Crustaceans exclusively, determined by Mr. Whitelegge as Copepods.

Length.—276mm. (Specimen "E" of the following table.)

Locality, etc.—The example described is one of two taken at Station X., Lat. 65° 6' S., Long. 96° 13' E., off Shackleton Ice-shelf, at a depth of 325 fathoms, the temperature being -1.65 C. Four larger specimens (355-430mm.) were secured at Station VII., Lat. 65° 42' S., Long. 92° 10' E., off Drygalski Island, in 60 fathoms.

Remarks.—The smaller specimens differ from the others in the absence of supra-orbital crenulations, and in the longer ventral fin, which extends to the sixth anal ray. In all specimens the fin reaches the vent, the loss of length in the longer examples is, doubtless, correlated with the characteristic thickening of the rays.

The "Terra Nova" specimens were taken in Ross Sea in 50 to 200 fathoms, and the depth is extended to 325 fathoms by the "Aurora" examples taken in somewhat lower latitude.

Differences in the radial formulæ and comparative proportions of the six specimens obtained may be thus expressed—

| | A. | B. | C. | D. | E. | F. |
|----------------------------|---------|-------|-------|--------|--------|--------|
| Dorsal rays | vii. 43 | v. 42 | v. 51 | vi. 36 | vi. 38 | vi. 39 |
| Anal rays | 37 | 35 | 37 | 36 | 33 | 34 |
| Total length in mm. | 430 | 418 | 388 | 355 | 276 | 240 |
| Head in length | 2.8 | 2.7 | 2.6 | 2.6 | 2.8 | 2.7 |
| Depth in length | 6.06 | 6.6 | 6.2 | 5.6 | 7.06 | 6.8 |
| Caudal in length | 7.9 | 7.0 | 6.8 | 7.4 | 6.6 | 5.6 |
| Eye in head | 5.7 | 6.0 | 6.2 | 5.7 | 4.5 | 4.6 |
| Interorbital in head | 3.6 | 3.8 | 3.6 | 4.1 | 4.2 | 4.2 |
| Snout in head | 1.9 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 |

FAMILY CYCLOPTERIDÆ.

PARALIPARIS COLLETT, 1878.

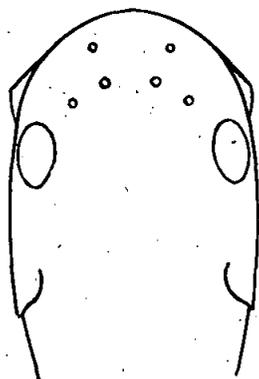
PARALIPARIS WILDI *sp. nov.*

(Plate IV., fig. 1, and Text fig. 9.)

B. vi. ; D. 60 ; A. 54 ; P. 20 + 5 ; C. 11.

Length of head, 4.2 ; depth of body, 4.4 ; and length of caudal, 9.8 in the total ; diameter of eye, 4.4 ; interorbital space, 1.9 ; and length of snout, 2.7 in the head.

The head is deeper than wide, and the eye is placed in the middle of its length and considerably below the profile ; the interorbital space is almost as wide as the head ; the snout is blunt and deep, nearly vertical in front, and is divided into three equal parts by the two nostrils ; the mouth is very wide and slightly oblique ; jaws equal ; the maxilla extends to below the anterior margin of the eye ; the pores on the head are large and arranged in two series on each side, seven pores in the upper and six in the lower series, the former traverses the upper border of the gape and passes below

Fig. 9.—*Paraliparis wildi*.

Upper view of head. Natural size.

the eye to near the opercular angle ; the lower series similarly extends along the area below the mouth and joins the upper series, the last pore being common to both, the entire condition being shown in the figure ; gills, four, a small slit behind the fourth ; gill rakers short and conical, 11 in number on the first arch, of which six are on the lower limb, no pseudobranchiæ ; gill openings restricted, extending downwards only as far as the middle of the base of the pectoral ; the body is greatly compressed and tapers to the hypural.

Teeth.—Bands of villiform teeth in the jaws, but no teeth on the vomer, palatines, or tongue.

Fins.—The dorsal commences behind the origin of the pectoral; its distance from the snout equals one-fourth the total length, caudal included; its anterior rays are very short, but they regularly lengthen to the middle of the fin where the longest ray equals half the depth of the body; the hindermost ray is joined to the middle of the upper caudal ray; the anal arises beneath the sixth dorsal ray and has a similar form to that fin, being likewise connected to the caudal. The pectoral consists of two portions connected by three more widely-spaced rays, the upper part is the longer, its third, or longest ray, being three-fourths the length of the head; the middle ray of the lower part is almost as long, the caudal projects more than half its length beyond the points of attachment of the hinder rays of the dorsal and anal fins.

Colours.—The general colour in preservative is a pale flesh tint, but when taken from the trawl was pink throughout, as gathered from the label attached to the specimen.

Stomach Contents.—A large number of small Crustaceans, identified by Mr. Whitelegge as Amphipods, was taken from the stomach of the single specimen obtained.

Length.—187mm. Type in the South Australian Museum.

Locality, etc.—The only example secured was taken at Station X., Lat. 65° 6' S., Long. 96° 13' E., off Shackleton Ice-shelf, in 325 fathoms, the temperature being —1.65 C., and the bottom ooze.

Remarks.—This species differs from *P. antarcticus* Regan,* the only other species described from Antarctica,† in the following characters:—The eye is slightly smaller and the snout longer; the pores on the head are more numerous, occurring on the snout, none being so figured in *P. antarcticus*. The shape of the vertical fins is different, while the caudal is partly enclosed by the dorsal and anal membranes; the vent occupies a forward position, behind the lower portions of the pectoral, as is usual in these forms; while Regan's statement that these lower portions reach the vent would indicate that the latter is placed quite near to the origin of the anal fin, and, therefore, in a position normal to the majority of fishes. Perhaps Mr. Regan will kindly re-examine the condition in his specimen. *P. wildi* appears to be more nearly allied to the northern *P. bathybi* Collett,‡ the type of the genus. Gilbert § has recently described several new species from Southern California.

* Regan, Ann. Mag. Nat. Hist. (8) xiii. 1914, p. 11, and Zool. Brit. Antarctic ("Terra Nova") Expedition 1910, i. 1914 p. 13, pl. ii., fig. 1.

† See Addendum, p. 81.

‡ Collett, Vidensk.-Selsk. Forh. Christiana, 1878, No. 14, p. 32.

§ Gilbert, Proc. U.S. Nat. Mus. xlviii. 1915, pp. 354, et seq. pl. xviii.

2. MACQUARIE ISLAND AND THE SUBANTARCTIC.

Though Macquarie Island on the one hand, and the Auckland, Campbell, Antipodes Islands, etc., forming the Subantarctic islands of New Zealand on the other, are here associated, it is not to be, therefore, inferred that the respective fish faunas are identical, or even closely allied. The relationship can, perhaps, be best ascertained by considering the fishes of Macquarie Island as far as, and now for the first time, made known, and afterwards make a comparison with those of the New Zealand Subantarctic islands which have been already investigated.

In this connection one cannot neglect some consideration of the fauna of the Kerguelen District, for it similarly offers a littoral between temperate and Antarctic lands.

Ten species of the following genera are now known from Macquarie Island:—

Somniosus?

Idiacanthus aurora sp. nov.

Notosudis hamiltoni sp. nov.

Myctophum antarcticum Günther

Lampanyctus braueri Lönnberg

Notothenia coriiceps Richardson

Notothenia macrocephala Günther

Notothenia colbecki Boulenger

Harpagifer bispinis Forster

Zanclorhynchus spinifer Günther

Macquarie Island lies 850 miles S.S.E. of Hobart. It is about 21 miles in length, and of an average width of under 3 miles. It was surveyed by Mr. L. R. Blake, the geologist of the island party, and the position of the Observation Station ascertained to be Lat. 54° 31' S., Long. 158° 58' E.

The fishes of the Subantarctic islands of New Zealand have been determined by various ichthyologists, and in 1909 were listed by the writer.* One species, *Anguilla australis*, was omitted and three are added as a result of the collections I more recently

* Waite, Subantarctic Islands of N.Z., ii. 1909. p. 585.

made at the Auckland Islands. The fishes of this region, as far as known, therefore, are as follows :—

Euprotomicrus bispinatus Quoy and Gaimard.
Amblygaster neopilchardus Steindachner.
Anguilla aucklandii Richardson.
Anguilla australis Richardson.
Galaxias brevipinnis Günther.
Galaxias fasciatus Gray.
Galaxias attenuatus Jenyns.
Myctophum antarcticum Günther.
Syngnathus blainvillianus Eydoux and Gervaise.
Rhombosolea tapirina Günther.
Bovichthys variegatus Richardson.
Aurion effulgens sp. nov.
Notothenia coriiceps Richardson.
Notothenia macrocephala Günther.
Notothenia microlepidota Hutton.
Notothenia colbecki Boulenger.
Notothenia filholi Sauvage.
Tripterygion varium Forster.

Mr. Regan * has catalogued the fishes of the Kerguelen District; his list is here appended :—

Raia eatoni Günther.
Raia murrayi Günther.
Murcenolepis marmoratus Günther.
Notothenia squamifrons Günther.
Notothenia acuta Günther.
Notothenia mizops Günther.
Notothenia cyaneobranchia Richardson.
Notothenia coriiceps Richardson.
† *Notothenia macrocephala* Günther.
Harpagifer bispinis Forster.
Chænichthys rhinoceratus Richardson.
Chænichthys rugosus Regan.
Zanclorhynchus spinifer Günther.

* Regan, Brit. Antarct. Exped. ("Terra Nova"), i, 1914, p. 36.

† See footnote, p. 69.

In attempting to determine the relationship of the Macquarie Island fish fauna, it must be first noted that but 10 species are known therefrom; and of these one, *Idiacanthus*, was taken in deep water, a fact which minimises its value in such connection. *Myctophum antarcticum* is a pelagic species, and ranging from temperate to Antarctic latitudes, must be eliminated from the consideration.

Mr. Regan would associate Kerguelen with Antarctica, not altogether on account of species common to both, but because they possess allied species of Nototheniiform fishes, which he enumerates. On the other hand he states that *Zanclorhynchus* is related to *Congiopodus*, a south temperate form, but does not, in this connection, mention that *Notothenia coriiceps* and *Harpagifer bispinis*, included with Antarctic species, range into Subantarctic waters.

Though the Kerguelen group, including Heard, Crozet, Marion, and Prince Edward Islands, is classed with Antarctica, Mr. Regan finds it necessary to qualify the alliance as follows:—"The only way to mark the dissimilarity of the fish fauna of Kerguelen from that of Magellan or of the Subantarctic islands of New Zealand, and to express its affinity to that of Antarctica, is to include it in the Antarctic Zone as a separate district, small and impoverished, but with well marked characters."*

Macquarie Island is certainly more Subantarctic as regards its fishes. The exclusively Antarctic genus *Trematomus* is absent from both; and we miss from Macquarie Island members of the Chænichthyidæ, of which two species occur in Kerguelen. *Lampanyctus braueri*, *Notothenia colbecki*, and *Notothenia macrocephala* are Subantarctic, but the last named is now recorded from Kerguelen. A third species, *Notothenia coriiceps*, though common in Antarctica, ranges through the Auckland Islands as far north as New Zealand. Macquarie Island and Kerguelen are associated by *Zanclorhynchus spinifer*, the genus not being known elsewhere; and *Harpagifer bispinis*, which, however, extends to Antarctic coasts. *Notosudis* is so far known only from Macquarie Island; while *Notolepis*, another member of the Sudidæ, is confined to Antarctic waters. The occurrence of a shark, provisionally associated with *Somniosus*, can scarcely be utilised in determining the zoological position of Macquarie Island; the stranded specimen was, perhaps, a waif from warmer seas.

Though I have excluded *Idiacanthus* on account of its bathybial habitat, it may be noted that, as far as known, the genus is an inter-temperate one, the Macquarie Island record constituting the highest latitude yet attained.

Though Mr. Hamilton spent almost two years (December 22nd, 1911, to November 28th, 1913) on Macquarie Island, it must not be inferred that representatives of all its permanent coastal fishes were therefore obtained. I have myself twice visited the island, and on one occasion spent two full weeks there. It is very seldom that fishing can be done, even from the rocks, owing to the high seas which are the rule rather than otherwise.

* Regan. Fishes Brit. Antarct. Exped. ("Terra Nova"), i. 1914, p. 36.

Hand lines and traps were the only appliances available, and the fact that the island party had only a small boat, rendered it next to impossible to venture beyond the shelter of the protecting rocks; as a consequence the off shore waters were not exploited.

Macquarie Island lies in higher latitude, and is also nearer the pack ice than Kerguelen Island, which latter is further south than the Crozets or Marion Island, and it might, therefore, be anticipated that the fauna of Macquarie Island would partake more of an Antarctic character than that of Kerguelen. It must be noted, however, that the island rises from deep water (to the height of 1,421ft.), a condition thus expressed by Captain Davis *—"Some idea of the steepness of the submarine mountain of which Macquarie Island forms the crest may be gathered from a sounding, taken $10\frac{1}{2}$ miles east of the island, which gave 2,745 fathoms and no bottom. In other words, if the sea were to dry up, there would be a lofty mountain rising from the plain of the ocean's bed to a height of nearly 18,000ft." The geographical proximity of the island to the Campbell and the Auckland Islands has influenced the constituents of the fauna inasmuch as it has thence received two, if not the third, species of *Notothenia*. Its association with Kerguelen is evidenced by the occurrence in both of *Harpagifer*, *Zanclorhynchus* and *Notothenia macrocephala*. It may be said, therefore, that the two groups form a broken and zigzagged series of stepping stones, those of Macquarie Island being placed nearer the Subantarctic islands, while those of Kerguelen Island, though further from the icepack, are zoologically in touch with Antarctica.

The fish fauna of the several districts here enumerated is expressed in the following table, the names of the fishes known from the Subantarctic islands of New Zealand, Macquarie Island, and the Kerguelen District being placed in the first column. The distribution of the species beyond these localities is also indicated. As before mentioned, Mr. Regan has associated Kerguelen and adjacent islands with Antarctica, but for convenience of reference they are here listed separately.

* Davis, in Mawson's "Home of the Blizzard" ii. 1915, p. 30.

DISTRIBUTION OF THE FISHES OF MACQUARIE ISLAND, THE KERGUELEN DISTRICT, AND THE SUBANTARCTIC ISLANDS OF NEW ZEALAND.

Vol. III, Part I—c

| | Macquarie Island. | Kerguelen Island. | Subantarctica. | Antarctica. | South Temperate Zone. |
|----------------------------------------|-------------------|-------------------|----------------------------------------------------|-------------|------------------------------------------|
| <i>Somniosus ?</i> | x | — | — | — | — |
| <i>Euprotomicrus bispinatus</i> | — | — | Campbell Island | — | New Zealand, Mauritius, Indian Ocean |
| <i>Raia eatoni</i> | — | x | — | — | — |
| <i>Raia murrayi</i> | — | x | — | — | — |
| <i>Amblygaster neopilchardus</i> | — | — | Auckland Islands | — | Australia, New Zealand. |
| <i>Anguilla aucklandii</i> | — | — | Auckland Islands | — | Australia, New Zealand, S. Pacific. |
| <i>Anguilla australis</i> | — | — | Auckland Islands | — | Australia, Tasmania, New Zealand, Timor. |
| <i>Galaxias brevipinnis</i> | — | — | Auckland Islands | — | New Zealand. |
| <i>Galaxias fasciatus</i> | — | — | Auckland Islands | — | New Zealand, Chatham Island. |
| <i>Galaxias attenuatus</i> | — | — | Campbell Island, Magellan, Falkland Islands | — | Australia, Tasmania, New Zealand. |
| <i>Idiacanthus aurora</i> | x | — | — | — | — |
| <i>Notosudis hamiltoni</i> | x | — | — | — | — |
| <i>Myctophum antarcticum</i> | — | — | Circumpolar from Lat. 64° 14' S. to Lat. 28° 0' S. | — | — |
| <i>Lampanyctus braueri</i> | x | — | Off Falkland Islands | Coates Land | — |
| <i>Syngnathus blainvillianus</i> | — | — | Auckland Islands | — | New Zealand, S. America. |
| <i>Muraenolepis marmoratus</i> | — | x. | — | — | — |
| <i>Rhombosolea tapirina</i> | — | — | Auckland and Campbell Islands | — | Australia, Tasmania, New Zealand. |
| <i>Bovichthys variegatus</i> | — | — | Snares, Auckland, and Campbell Islands | — | Australia, New Zealand. |

FISHES—WALTE.

DISTRIBUTION OF THE FISHES OF MACQUARIE ISLAND, THE KERGUELEN DISTRICT, AND THE SUBANTARCTIC ISLANDS
OF NEW ZEALAND—continued.

| | Macquarie Island. | Kerguelen Island. | Subantarctica. | Antarctica. | South Temperate Zone. |
|---------------------------------------|----------------------|----------------------|-------------------------------------------------------------------|----------------------------------------------------------|------------------------------|
| <i>Aurion effulgens</i> | — | — | Auckland Islands | — | — |
| <i>Notothenia squamifrons</i> | — | x | — | — | — |
| <i>Notothenia acuta</i> | — | x | — | — | — |
| <i>Notothenia mizops</i> | — | x | — | — | — |
| <i>Notothenia cyaneobrancha</i> | — | x | — | — | — |
| <i>Notothenia coriiceps</i> | x | x | Auckland Islands | S. Georgia, S. Orkneys, Graham Land, Victoria Land | — |
| <i>Notothenia macrocephala</i> | x | x | Auckland and Campbell Islands, Magellan, Falk- land Islands | — | New Zealand, Chili. |
| <i>Notothenia microlepidota</i> | — | — | Snares, Auckland, and Campbell Islands | — | — |
| <i>Notothenia colbecki</i> | x | — | Auckland, Campbell, and Antipodes Islands | — | — |
| <i>Notothenia filholi</i> | — | — | Campbell Island | — | — |
| <i>Harpagifer hispinis</i> | x | x | Magellan, Falkland Islands | S. Georgia, S. Orkneys, Graham Land | Patagonia. |
| <i>Chænichthys rhinoceratus</i> | — | x | — | — | — |
| <i>Chænichthys rugosus</i> | — | x | — | — | — |
| <i>Tripterygion varium</i> | — | — | Snares, Auckland Islands | — | New Zealand, Chatham Island. |
| <i>Zanclorhynchus spinifer</i> | x | x | — | — | — |

? FAMILY SCYMNORHINIDÆ.

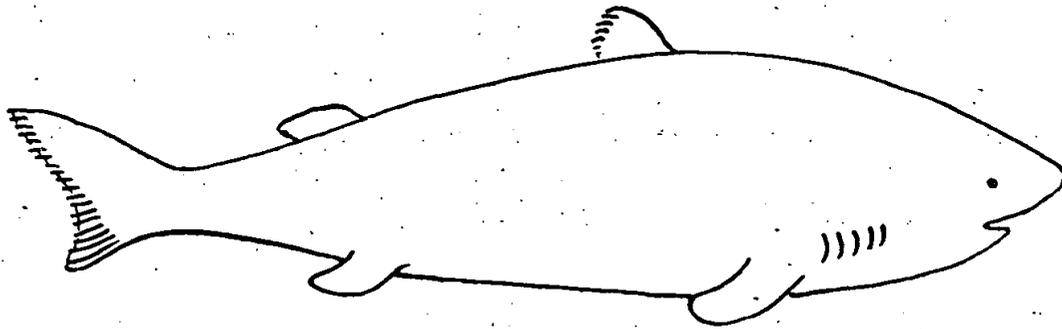
? *SOMNIOSUS* *sp.*

(Text fig. 10.)

Under date, August 17th, 1913, Mr. Hamilton wrote :—" I am sending you a rough drawing of an Elasmobranch which was cast up on to the beach last year. It measured 8ft. 2in. in length, and I preserved the teeth and portion of the skin. None of the sealers has seen a shark here before ; it probably drifted down from warmer seas."

Though not a specialist in the group, Mr. Hamilton has had a biological training, and his sketch may be referred to for general features, though additional details, which one would desire, were not noted.

The following are the principal characters revealed by the sketch, which is here reproduced :—Body stout ; two dorsal fins, apparently without spines, and in normal position ; no anal fin ; eye small ; snout short ; mouth inferior ; gill openings small, five in number ; caudal short.

Fig. 10.—? *Somniosus* *sp.*

Sketch by H. Hamilton. One-eighteenth natural size.

In attempting to identify the sketch with members of known genera it may be well to indicate how the deductions were made.

The sum of the characters above indicated limits the shark to the Squaloidei. It next becomes a question as to whether the dorsal fins were each preceded by a spine, or whether such spines were absent. In the majority of the genera of the Squalidæ the spines are pronounced and could scarcely be overlooked ; but in *Centroscymnus*, for example, they are almost hidden and scarcely to be seen unless looked for. Presuming, for the present, that dorsal spines were absent, the Squalidæ is disposed of, and the Echinorhinidæ, with its posteriorly placed dorsal and the characteristic Pristiophoridæ may also be eliminated. The family Scymnorhinidæ, therefore, alone remains, and with this the characters of the sketch fully accord.

Accepting the classification adopted by Garman* the Scymnorhinidæ includes five genera:—

Euprotomicrus has the first dorsal much smaller than the second, a large eye, a median tooth, and only 23 teeth in the lower jaw.

The teeth of *Scymnorhinus* are still fewer in number, there being but 19 in a series in each jaw; the eye is large; the body slender; and the caudal comparatively long.

The little *Isistius*, with its large eye and lower triangular teeth in 31 rows, is quite characteristic.

Heteroscymnus and *Somniosus* are so nearly alike externally, and possibly also in the character of the teeth, that their number can, in the present connection, be our only guide. In the former genus, compared with *Euprotomicrus* by its author, the teeth are in small and equal number in each jaw, namely 18; while in *Somniosus* the series is much larger and the number of teeth differ greatly in the two jaws.

In the Macquarie Island specimen the upper teeth, 44 in number, are raptorial; while the lower series, to the number of 56, are sectorial, and there is no median tooth. As regards their character they agree quite well with those of *Somniosus*; but in this genus, as far as I know, the number of tooth series in the upper jaw exceeds those of the lower jaw.

Some of the Squalidæ likewise possess teeth of dual character, and in *Centroscymnus* they approach those under consideration, but again are more numerous in the upper than in the lower jaw. The reverse obtains in *Etmopterus*, but the teeth are of different character.

Lastly, the scales in the fragment of skin agree with those of *Somniosus*, being small, non-imbricate, and slightly hooked tubercles. Here the matter must be left for the present.

For convenience the shark is referred to as ? *Somniosus*, but it possibly may not belong to that genus, and may indeed be one of the Squalidæ, though the material at hand is insufficient for more certain identification.

* Garman, Mem. Mus. Comp. Zool. xxxvi. 1913, p. 233.

FAMILY STOMIATIDÆ.

IDIACANTHUS PETERS, 1876.

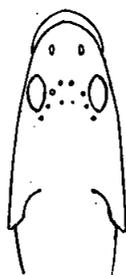
IDIACANTHUS AURORA *sp. nov.*

(Plate V., fig. 1, and Text fig. 11.)

B. xvi.; D. 60; A. 37; V. 6; C. 15 + 10; Vert. 31 + 19 + 32.

Length of head, 14.8; and that of caudal, 24.0 in the length; diameter of eye, 5.4; interorbital space and length of snout, 4.5 in the head.

The head is compressed, its depth two-thirds its length, the gape extends nearly to the margin of the opercle. The barbel, attached to the membrane behind the mental symphysis at one-fourth the length of the mandible, is nearly two and a half times the length of the head; the distal dilation is nearly one-third the length of the barbel and consists of a main broad portion, narrowly margined before and behind with

Fig. 11.—*Idiacanthus aurora*.

Upper view of head. . Natural size.

membrane, bearing an axillary branch at its proximal end and a pair of smaller ones near its tip. The tongue is large and has a small, though distinct, papilla at its tip. The eye is in the anterior half of the head; a small phosphorescent organ lies behind the eye close to the maxilla. Gills, four, the first free, the others broadly united, a small opening behind the fourth; no gill rakers; pseudobranchiæ absent.

Teeth.—The teeth are needle-like, with wide compressed bases, wholly depressible, and set in a single series in each jaw; they are of very unequal length, as shown by the following consecutive measurements in millimetres computed from before backwards* :—

Upper jaw, 1, 2, 5, 2, 4, 5, 2, 4, 3, 4, 5, and a graduated series of six teeth 2mm. to 3mm. in length.

* Made by my assistant Mr. Herbert M. Hale.

Lower jaw, 1, 1, 3, 4, 5, 7, 2, 3, 4, 5, 2, 3, 4, 4, 1, 1, 1, 1, and eight minute teeth.

One median and two lateral pairs of curved teeth are found on the vomer, and a single similar tooth in the middle of each palatine; three irregularly disposed teeth on the tip of the tongue, and a single median tooth further back.

Fins.—The distance between the tip of the snout and the origin of the dorsal is three-fourths the distance between the same point and the end of the caudal, in other words the fin commences three-sevenths the total length behind the tip of the snout; the ventral is placed beneath the origin of the dorsal and the anal arises below the twenty-fourth ray of the dorsal, or at the second third of the total length, caudal excluded, its point of origin being midway between the first dorsal ray and the base of the caudal.

Colours.—Head, body, fins, iris, and within the mouth entirely black.

Length.—425mm. Type in the South Australian Museum.

Locality, etc.—Twenty-five miles northward off Macquarie Island in 1450-636 fathoms.

Remarks.—The single example was obtained during the second Subantarctic cruise, 1912, under Prof. Flynn. The fish is in a dilapidated condition, the skin hanging in shreds from the body; the head is intact and the position of the vertical fins is assured, but having floated off with the skin the actual position of the ventral fins during life cannot be ascertained with certainty. The photophore on the head has been already referred to; but those probably on the body cannot now be discovered. Under such circumstances no complete description can be made, but some points of affinity or difference may be briefly discussed, and the tentative name, *I. aurora*, may be used for convenience of quotation. Five species have been previously described, namely:—

I. fasciola Peters, Monatsb. Akad. Wiss. Berlin, 1876, p. 847.

I. (Bathyophis) ferox Günther, Ann. Mag. Nat. Hist. ii. 1878, p. 181; and Chall. Rep. xxii. 1887, p. 216, pl. lii., fig. D.

I. antrostomus Gilbert, Proc. U.S. Nat. Mus. xiii., 1890, p. 54; Garman, Mem. Mus. Harvard, xxiv. 1899, p. 280.

I. atlanticus Brauer, Wiss. Ergebn. der Deutschen Tiefsee Exped. ("Valdivia"), xv. 1906, p. 62.

I. niger Regan, Ann. Mag. Nat. Hist. (8), xiii. 1914, p. 14; and Zool. Brit. Antarctic ("Terra Nova") Exped., 1910, i. 1914, p. 14, pl. x., fig. 2.

So far I have been unable to consult the description of *I. atlanticus*, and the characters of this species are omitted from the following table of comparisons, which, however, in consequence of the different methods of computation, is very incomplete.

| | <i>I. fasciola.</i> | <i>I. ferox.</i> | <i>I. antrostomus.</i> | <i>I. niger.</i> | <i>I. aurora.</i> |
|---------------------------------------|-------------------------------|------------------------------|------------------------|------------------------------|------------------------------------|
| Branchiostegals..... | xviii. | — | xii. | — | xvi. |
| Dorsal rays..... | 70 | 60 | 55-57 | 59 | 60 |
| Anal rays..... | 41 | 45 | 33-34 | 38 | 37 |
| Vertebrae..... | — | 22 + 17 + 30 | Ca. 79 | — | 31 + 19 + 32 |
| Head in length..... | — | 1/14 | 1/12 | 2/27 | 1/14 |
| Snout to ventrals in the length..... | — | 1/3 | — | 3/8 | 2/5 |
| Eye in head..... | — | — | 7.0 | 8.5 | 5.8 |
| Interorbital in head..... | — | — | — | 5.0 | 4.8 |
| Barbel in head..... | — | × 2 | × 2 | × 2 | × 2.3 |
| Origin of dorsal..... | Nearer to head than ventrals | Opposite ventrals | Advance of ventrals | Behind ventrals | Opposite ventrals |
| Origin of anal..... | — | — | — | Nearer caudal than ventrals | Midway between caudal and ventrals |
| Origin of ventrals..... | — | Midway between head and vent | — | Midway between head and anal | Nearer anal than head |
| Total length in mm..... | 51,127 * | 227 | 115 | 400 | 425 |
| Lower jaw, length..... | — | 14 | — | 28 | 27 |
| Barbel, length..... | — | 24 | — | 58 | 69 |
| Length to caudal..... | — | 192 | — | 380 | 408 |
| Length to dorsal..... | — | 66 | — | 170 | 177 |
| Length to ventrals..... | — | 66 | — | 150 | 177 |
| Length, ventrals to anal..... | — | 58 | — | 120 | 109 |
| Length, origin of anal to caudal..... | — | 68 | — | 110 | 122 |
| Locality..... | N. Australia N. New Guinea | N. Atlantic | S. California | Cape North New Zealand | Off Macquarie Island |
| Depth in fathoms..... | Surface | 2,750 | 603 | † | 1,450 |

Taking its geographical position into account one would seek to associate *I. aurora* with *I. niger*, but in the latter species the number of branchiostegal rays and vertebrae, both of which indicate considerable differences in the several species, were not counted; the larger eye, longer barbel, the backward situation of the ventrals, and the more forward position of the anal are characters which require considerable allowance for variation if the two species are to be regarded as identical. Regan has figured the barbel as arising at the mid-length of the mandible, whereas in our example it originates at the first third of the length, a position in agreement with the figure and description of *I. ferox* and *I. antrostomus* respectively.

* Two specimens.

† "From the stomach of a Groper" (? *Polyprion oxygeneios* Bloch and Schneider, or if from deep water more probably *P. americanus* Bloch and Schneider, see Waite, Trans. N.Z. Inst. xlv. 1913, p. 215).

FAMILY CLUPEIDÆ.

AMBLYGASTER BLEEKER, 1849.

AMBLYGASTER NEOPILCHARDUS *Steindachner*.

Clupea neopilchardus Steindachner, Denk. K. Akad. Wiss. Wien, xli. 1879, p. 12.

Clupanodon neopilchardus Waite, Mem. Aust. Mus. iv. 1899, p. 53.

In an account of the birds of the Subantarctic islands of New Zealand I described how specimens obtained from myriads of shags (*Phalacrocorax colensoi*), observed at the Auckland Islands, were found to be feeding upon the crustacean *Munida subrugosa*, and that in one instance only were small fish bones found in the stomach of one of the birds.*

My visit in the "Aurora" constituted the third occasion on which I had set foot on the Auckland Islands, and on request, Captain Davis put me ashore on Figure-of-Eight Island, in Carnley Harbour, where I spent the whole day (June 27th, 1912) and obtained the fishes noted in this article. As on the previous occasion I caught some of the shags of which one of the many colonies frequenting this beautiful harbour is located on Figure-of-Eight Island. My raid on this occasion was the means of adding the pilchard to the known fauna of the group, for as soon as they were caught the birds obligingly deposited their dinners at my feet.

FAMILY SUDIDÆ.

NOTOSUDIS GEN. NOV.

Head as broad as deep; snout long, subacute; mouth large, the premaxilla forms the gape, reaches beyond the eye, and is free from the maxilla, a supramaxilla present. A single series of teeth in the jaws, on the palatines, and a band on the vomer; body elongate, subcylindrical; dorsal fin short in a median position, an adipose fin present; pectoral fins normal; ventral fins unknown; anal short, in advance of the adipose; caudal with numerous procurrent rays; scales presumably present, but completely lost; lateral line well developed.

The specimen on which this genus is founded is very imperfect, the scales and ventral fins being absent; the position of the vent and other characters are not ascertainable; the affinities of the genus are not, therefore, easy to determine; but the features, as far as at present known, lead me to ascribe it to the family Sudidæ. The fact that the entire head of the vomer is dentigerous scarcely agrees with the diagnosis of the family, but the enlarged lateral patches show affinity with those forms in which the teeth constitute two widely separated groups, the intermediate teeth in *Notosudis* being comparatively inconspicuous.

* Waite, "Subantarctic Islands of New Zealand," ii. 1909, p. 582.

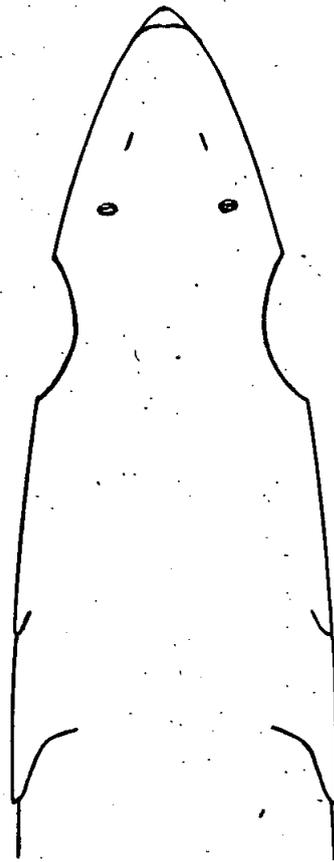
NOTOSUDIS HAMILTONI *sp. nov.*

(Plate V., fig. 2, and Text fig. 12.)

B. x.; D. 12; A. 15; P. 12; V. ?; C. 19 + 22.

Length of head, 4.3; depth of body, 8.2 in the length; caudal incomplete; diameter of eye, 5.3; interorbital space, 4.1; and length of snout 3.5 in the head.

Head flat above, cheeks vertical, snout acute but rounded at the tip, formed by the premaxilla which extends beyond the eye a third of the orbital diameter, or to beyond the middle of the head; it is free from the maxilla, which is dilated behind; the depth of the supramaxilla is equal to the combined depths of the distal extremities of the premaxilla and maxilla; mouth large, slightly oblique, the lower

Fig. 12.—*Notosudis hamiltoni*.

Upper view of head. Natural size.

jaw the longer, fitting into a low notch in the premaxilla; the posterior nostril is transverse, has an upward aspect, and lies in front of the eye one-fourth the distance of the orbit from the snout; eye large and lateral, extending from within the dorsal profile almost to the maxilla below, wholly in the anterior half of the head; gills, four, an opening behind the fourth; gill rakers, confined to the lower limb, to the number

of about 20 on the first arch, those on the anterior half being small knobs merging into strong needle-like spines on the hinder portion; gill membranes very wide, free from the isthmus; no pseudobranchiæ; opercles thin, unarmed.

Teeth.—A single series of small closely-set conical teeth in both jaws, and a larger depressible series on the palatines; a narrow band of depressible teeth on the vomer, in the form of a horseshoe, four teeth on each extremity being considerably larger; tongue smooth.

Fins.—The first dorsal fin lies in the middle of the total length, caudal included; its base is short, less than twice the diameter of the eye; all the rays are broken; the third and fourth are the strongest and probably the longest, the portions remaining being as high as the fin is long; the adipose fin is well developed, its height being equal to the diameter of the eye and its distance behind the dorsal equals that from the opercular margin to the base of the first dorsal ray; the anal base is three-fourths that of the dorsal, the fin lies in advance of the adipose, the front edge of which is above the last anal ray; the pectorals lie relatively high but are badly damaged; the longest rays of the caudal are broken; the tail is deeply forked and supported by numerous procurrent rays above and below; the peduncle is a little deeper than its length and is three and a half times the diameter of the eye.

Scales.—All scales, excepting those remaining on the lateral line, have been lost; but judging from the pits they were moderately large: the lateral line is very pronounced where still existing, and there are about 24 pores in a space equal to the length of the head. On the hinder part of the body the line occupies a median position, but its anterior course is unknown.

Length.—505mm. to the end of the longest broken caudal ray. Type in the South Australian Museum.

Locality.—Macquarie Island.

Remarks.—This mutilated specimen was picked up on the beach by Mr. Harold Hamilton. It has the appearance of having been considerably digested, and was probably ejected by a seal. There still remains enough, however, to enable such a description and figure to be made as will probably be sufficient for the recognition of any example of the species that may be hereafter obtained.

I have pleasure in associating with this specimen the name of Mr. Harold Hamilton, who acted as zoologist for the expedition at Macquarie Island. He is the son of my old friend, the late Augustus Hamilton, Director of the Dominion Museum, Wellington, New Zealand, and by a lengthened stay on the island carried into effect a wish that his father had expressed after returning from a disastrous trip to Macquarie Island in 1894:—"I should certainly liked to have had the opportunity of staying for 12 months on the island to complete a year's observations, the few days which we spent there being quite inadequate for observations of much value."*

* Hamilton, Trans. N.Z. Inst. xxvii. 1895, pp. 559-579.

FAMILY MYCTOPHIDÆ.

MYCTOPHUM RAFINESQUE, 1810.

MYCTOPHUM ANTARCTICUM *Günther*.

Scopelus antarcticus Günther, Ann. Mag. Nat. Hist. (5) ii. 1878, p. 184; and Chall. Rep. xxii. 1887, p. 196, pl. li., fig. D.

Scopelus colletti Lütken, Spolia Atlantica, ii. 1892, p. 249, fig. 7. (*Geopelus colletti* Lütken, *vide* Brauer.)

Benthoosema colletti Goode and Bean, Oceanic Ichth. 1895, p. 78.

Myctophum antarcticum Lönnberg, Fishes of Swedish South Polar Exped. 1905, p. 60. Brauer, Wiss. Ergebn. der Deutschen Tiefsee Exped. ("Valdivia") xv. 1906, 168, fig. 82, a-c.

(Plate IV., fig. 2, and Text fig. 13.)

B. viii.; D. 14; A. 21; V. i. 7; P. 16; C. 19 + 12; L. lat. 39, L. tr. 3 + 6.

Length of head, 3.6; height of body, 3.8; and length of caudal, 4.0 in the total length; diameter of eye, 2.42; interorbital space, 4.14; and length of snout, 8.3 in the head.

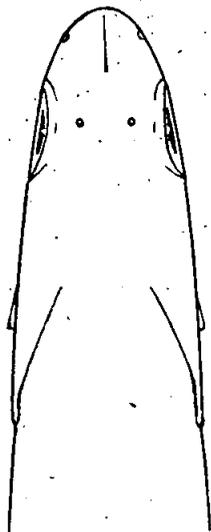


Fig. 13.—*Myctophum antarcticum*.

Upper view of head. Twice natural size.

Mouth subhorizontal, the maxilla extends a little further than the hinder margin of the orbit; its distal extremity is dilated, the preopercle nearly vertical; the gill rakers are long, 29 on the first arch, of which nine are on the upper limb.

Fins.—The dorsal commences slightly nearer to the tip of the snout than to the base of the caudal rays; the length of its base is equal to that of its third, or longest ray, which is also the length of the maxilla. The origin of the adipose fin is midway between the hinder insertion of the dorsal and the base of the caudal rays. The anal overlaps

the dorsal by the length of one scale; it is lower, but its base is more than one-half longer than that of the dorsal. The ventral is inserted wholly in advance of the dorsal. The length of the pectoral is six-sevenths that of the head. The caudal peduncle is comparatively short and stout, its least depth being one-third the length of the head or 2.7 in the depth of the body.

Scales.—The scales are deciduous; but those of the lateral line and those bearing the photophores are more adherent. The scales of the lateral line are vertically enlarged, their depth being twice that of the others, while the largest measure one-third the length of the head.

Photophores—

Anteorbital.—A luminous area in which the nostrils are situated.

Mandibular.—Three. (Brr.)

Opercular.—Three (Op.) behind the preopercular border, and one (P.L.O.) underneath the edge of the opercle.

Pectoral (P.V.O.).—Two, one on the base of the pectoral fin, the other close behind the edge of the opercle.

Anterolateral (V.L.O.).—One, above the base of the ventral fin.

Mediolateral (S.A.O.).—Three, the two lower ones form a straight horizontal line with the Anterolateral; the upper one, which forms a somewhat obtuse angle with the lower ones, is placed close to the lower edge of the lateral line, over the insertion of the anal.

Posterolateral (Pol.).—None.

Thoracic (P.O.).—Five, the last raised and in front of the ventral fin.

Ventral (V.O.).—Four, the first close behind the fin and the lowest of the series.

Anal (A.O.).—Seventeen, forming an unbroken series, the tenth being raised and situated below the adipose fin.

Caudal (Prc.).—Two, slightly detached from the anal series.

Supercaudal (p.).—Occupies the length of three scales but is not divided (= Leuchplatte).

Length.—64mm.

Locality.—The specimen described and figured was washed aboard the "Aurora" during the night of June 23rd, 1912, when we experienced very heavy weather, the position being between the Macquarie and Auckland Islands, Lat. 52° 30' S., Long. 162° 0' E. Six further examples were taken in the tow net, south-west of Tasmania, in Lat. 45° 0' S., Long. 138° 0' E. Two individuals were picked up on the beach at Macquarie Island by Mr. H. Hamilton after a storm on March 2nd, 1913. These are considerably abraded, but are of large size, measuring 115mm. in length.

Remarks.—Lütken's diagram does not illustrate the scales, and some slight variation in the position of the photophores is also to be noted. Günther's figure does not show the situation of the photophores very clearly, and it may be observed that seven are incorrectly described and figured in the position of the mediolaterals. At the date of publication of the "Challenger Report" the importance of the number and disposition of the photophores was not realised, it being left to Raffaele,* Lütken,† and later to Brauer‡ to elaborate the scheme of nomenclature. The last-named author has designated the photophores by letters which facilitate marking diagrams, but he generally adopts the classification already in vogue; the upper "opercular" photophore has received a distinctive character, "P.L.O." The letters used are inserted after the ordinary nomenclature in the above description. In the paper referred to he revises the classification of the family. Excluding *Neoscopelus*, he recognises one genus only (*Myctophum*), with three subgenera, *Myctophum*, *Nyctophus*, and *Lampanyctus*. Had full generic rank been accorded, some of the undoubtedly useful subdivisions already proposed could have been used subgenerically.

Myctophum antarcticum has a circumpolar distribution outside the Antarctic Circle, but has been taken within it in the Victoria Quadrant.

LAMPANYCTUS BONAPARTE, 1840.

LAMPANYCTUS BRAUERI Lönnberg.

Myctophum (Lampanyctus) braueri Lönnberg, Fishes, Swedish South Polar Exped. 1905, p. 64, fig. 1.

(Text figs. 14 and 14A.)

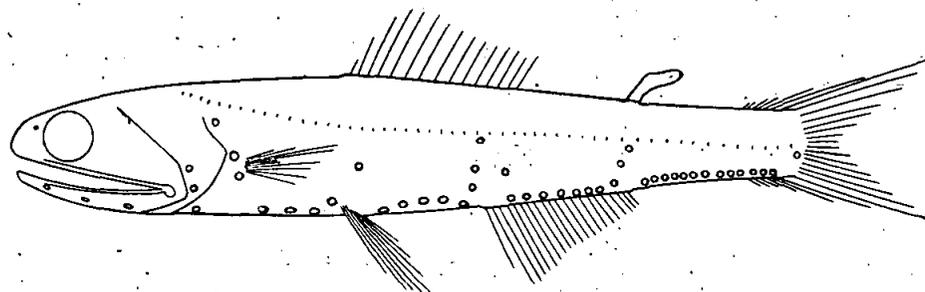


Fig. 14.—*Lampanyctus braueri*.

Natural size.

Three specimens were found on the beach at Macquarie Island, March 2nd, 1913. They were more or less damaged; but where one is defective the others chance to be undamaged, so that the fish may be reconstructed, excepting as regards the fins and scales. There is little doubt that they are correctly identified with this species, the

* Raffaele, Mitt. Zool. Stat. Neapel, ix. 1889, p. 179. † Lütken, Spolia Atlantica, Viden. Selsk. Skrift. vii. 1892, p. 223.

‡ Brauer, Zool. Anzeig. xxviii. 1905, p. 377.

type of which, taken off the Falkland Islands, was also damaged, facts which will account for the following differences noted as regards the number and position of the photophores.

The opercular (Op.) forms an oblique line with the first thoracic (P.O.) and not an obtuse angle as figured in the type. The pectorals (P.V.O.) lie one at the upper and one at the lower base of the fin; not both below the base. Of the "six ventrals"

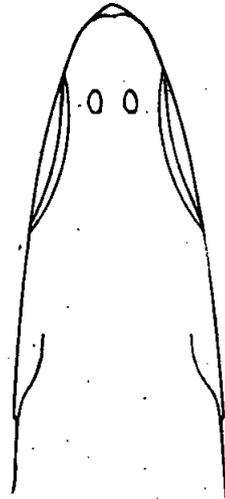


Fig. 14A.—*Lampanyctus braueri*.

Upper view of head. Twice natural size.

(V.O.) I can find but five. The mediolaterals (S.A.O.), together with the last pore of the ventrals, form an obliquely vertical line of four pores, or one more than figured by the author.

The accompanying diagram indicates the relative position of the photophores as revealed by the Macquarie Island examples, the largest of which measures 115mm. in length without the caudal.

FAMILY BOVICHTHYIDÆ.

AURION GEN. NOV.

Head and body naked, a luminous organ in front of the head. Teeth in several series in front in the jaws, present also on the vomer and palatines. Opercle with a very strong spine. Origin of the first dorsal above the opercle; rays of all the fins branched excepting the lower ones of the pectoral, which are thickened and partly free distally.

This genus agrees with *Bovichthys* in the naked body, presence of a strong opercular spine and the character of the pectoral fin, but differs by having a luminous organ in front of the head, by the less forward position of the spinous dorsal, the uniform character of the anal, and by its pelagic habit, the species living in the open sea at or near the surface.

As far as known, all other members of the family are of littoral habit, and the best known species of the type genus in Australasian waters (*Bovichthys variegatus* Rich.) is one of the commonest denizens of the rock pools. Representatives of other Notothenioid families do live in the open sea, as remarked by Regan,* but, apparently, all in fairly deep water; such genera are *Bathhydraco*, *Gerlachea*, and *Racovitzia* of the family Bathydraconidæ, and *Cryodraco* of the family Chænichthyidæ.

AURION EFFULGENS *sp. nov.*

(Plate IV., fig. 3.)

B. vii.; D. viii. 20; A. 16; P. 15; V. i. 5; C. 14 + 12; L. lat. 84.

Length of head, 3.1; height of body, 2.81; and length of caudal, 4.09 in the length; diameter of eye, 3.26; interorbital space, 4.7; and length of snout, 4.0 in the head.

Head slightly compressed with upper profile rounded; eye lateral, a little removed from the profile, and with a marked supraorbital ridge; the interorbital space is slightly concave, but concealed from between the eyes forward by a pair of leaf-like luminous organs, the outer edge of each leaf overhangs the eye and the petioles unite on the front part of the snout; the nostril lies in front of the base of the lobe of the leaf and has a complete raised margin; mouth horizontal and protractile, the maxilla expanded behind and extending to below the first third of the eye; opercular spine very strong and longer than the eye; gills four, a slit behind the fourth; gill rakers moderate, nine on the lower limb of the first arch; pseudobranchiæ present; body strongly compressed.

Teeth.—Several series of minute teeth in the front of the jaws, also on the vomer and palatines; a frenum in the upper jaw.

Fins.—The first dorsal commences slightly in advance of the edge of the opercle, its first spine is the highest, one-half longer than the eye. The following spines regularly diminish in height, the last being one-fourth the height of the first; the second fin arises close behind and its base is twice that of the first fin. The rays rise gently to the seventh, which is a little higher than the first spine. The anal commences beneath the sixth dorsal ray, is lower than that fin, and has its margin incised. The pectoral is broad and rounded and reaches to the second anal ray, its length being 1.27 in the head; the seven lower rays are undivided. The ventral is inserted in advance of the pectoral; the spine is long, nearly twice the diameter of the eye, and its second, or longest ray, reaches to the vent; the rays are not thickened. The caudal is slightly emarginate with the lobes rounded, its peduncle is shorter than its depth, which equals the diameter of the eye.

* Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 251.

Lateral Line.—There are 84 pores in the lateral line which commences with a low arch above the opercular spine; it runs parallel to the dorsal profile, but at some distance therefrom, traverses the middle of the caudal peduncle and reaches the base of the middle caudal ray.

Colours.—When alive, of intense blue with colourless fins, the frontal organs whitish and translucent.

Length.—53.5mm. Type in the Canterbury Museum.

Locality.—One example obtained south-west of Adam's Island, Auckland Islands, Lat. 50° 60' S., Long. 165° 0' E.

Remarks.—The little fish was washed on to the deck of the "Aurora" during a heavy sea on June 24th, 1912, and handed to me alive by one of the seamen. It appears to be the only member of the Notothenioid fishes so far recorded as living at the surface of the open sea.

FAMILY NOTOTHENIIDÆ.

NOTOTHENIA RICHARDSON, 1844.

NOTOTHENIA CORIICEPS *Richardson* var. *MACQUARIENSIS nov.*

Notothenia coriiceps Richardson, Voy. "Ereb." and "Terr.," Fish, 1844, p. 5, pl. iii.

(For references see page 22.)

(Plate V., fig. 3, and Text fig. 15.)

B. vi.; D. vi. 33-34; A. 28; P. 22; V. i. 5; C. 12 + 6; L. lat. 53 + 14 - 54 + 22;
Sc. 68 - 72; Sc. tr. 10 + 26.

Length of head, 3.2; height of body, 4.4; and length of caudal, 5.6 in the length; diameter of eye, 5.9; interorbital space, 3.1; and length of snout, 3.5 in the head.

The head is depressed and flat to between the nostrils, falling slightly to the lips; the eye is sublateral, its upper edge close to the profile; a low ridge from the front of the eye to above the nostril; the maxilla reaches to below the middle of the eye, the jaws are equal; the preopercle is inclined slightly backwards below. The gill-rakers are of moderate length, the longest being one-third the diameter of the eye; there are 16 on the first arch, 10 of which are on the lower limb.

Teeth.—A single row of widely-spaced canines in each jaw, and a band of smaller teeth behind, extending backwards almost to the angle of the mouth.

Fins.—The dorsal commences over the edge of the opercle, and is longer than high; the second and third, or longest spines, slightly exceed the eye in length; the fourth ray of the second fin is twice the length of the longest spine, the base of the fin measures half the distance between the front edge of the eye and the base of the middle caudal

rays; the anal commences beneath the eighth dorsal ray and extends a little further backwards than the dorsal; the pectoral is very evenly rounded and extends to above the vent, its length is two-thirds that of the head; the ventral is one-sixth shorter

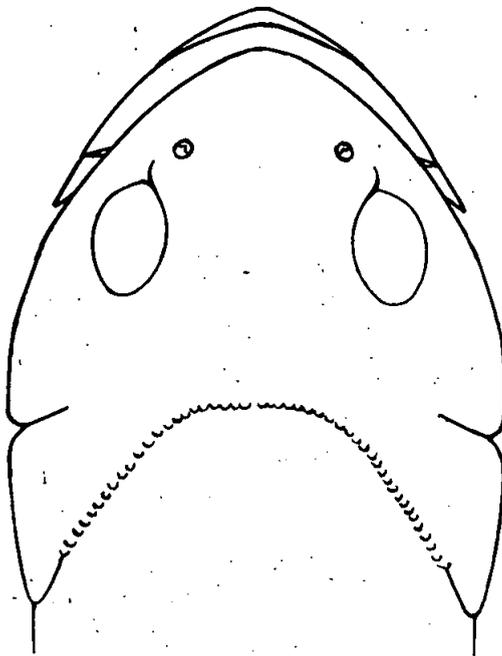


Fig. 15.—*Notothenia coriiceps* var. *macquariensis*.

Upper view of head. Natural size.

than the pectoral, and reaches a point half way between its base and the third anal ray; the caudal is feebly rounded, and the depth of its peduncle is barely twice the diameter of the eye.

Scales.—The head is naked, with the exception of a large patch of scales on the temporal region behind and below the hinder half of the eye and on the upper part of the opercle; the scales below the eye are directed upwards and backwards. The top of the head is covered with granules which are, however, so small as to leave the skin comparatively smooth. The scales on the body are largest along the sides, and are continued some distance up the bases of the pectoral, ventral, and caudal fins. The upper lateral line reaches to below the sixth last ray of the dorsal, and the lower line commences seven scales in advance of the end of the upper one.

Colours.—The general colour is olive grey above and yellow beneath; each scale with a lighter margin; head marbled above and on the sides; body with eight dark bars extending to below the upper lateral line. The first dorsal fin is dusky, darker on the outer half, with a median dark bar; the second dorsal has two or three irregular bars; the other fins are dusky with lighter margins.

Stomach Contents.—Fishes only were found in the stomachs of this species at Macquarie Island, one small victim being readily identified as of *Notothenia macrocephala*.

Length.—400mm. (the second specimen measures 302mm.).

Locality.—This appears to be a rare species at the island, or its haunts were not sufficiently prospected, for after a residence of nearly two years (December 22nd, 1911, to November 28th, 1913), during which period Mr. Hamilton did a considerable amount of fishing with lines and traps, he only secured two examples. During the two visits I paid to Macquarie Island I obtained specimens of *N. macrocephala* in numbers, but did not meet with either *N. coriiceps* or *N. colbecki*.

Having a wide range, this species is subject to considerable variation, and the Macquarie Island specimens exhibit differences which, though not sufficient to invalidate their inclusion with the species, are so marked that the island fishes can at once be detected as different from the Antarctic specimens, the principal differences being as follows:—The mouth is larger and the lips thinner; the preopercle is less oblique; the pectoral is not so long, barely reaching the anal; and the scales extend further up the bases of the paired and caudal fins. This form may be accorded the varietal name of *N. coriiceps* var. *macquariensis*.

NOTOTHENIA MACROCEPHALA *Günther*.

Notothenia macrocephalus Günther, Cat. Fish. Brit. Mus. ii. 1860, p. 263; Smitt, Bih. Sv. Vet. Akad. Handl. xxiii., 1897, p. 9, pl. iii.

Notothenia maoriensis Haast, Trans. N.Z. Inst. v. 1873, p. 276, pl. xvi., fig. 4.^d

Notothenia angustata Hutton, Ann. Mag. Nat. Hist. (4) xvi. 1875, p. 315; and Trans. N.Z. Inst. viii. 1876, p. 213.

Notothenia hassleriana Steindachner, Sitzb. Akad. Wiss. Wien, lxxii. 1875, p. 41, pl. vi.

Notothenia antarctica Peters, Monatsb. Akad. Berlin, 1877, p. 837.

Notothenia arguta Hutton, Trans. N.Z. Inst. xi. 1879, p. 339.

Notothenia porteri Delfin, Rev. Chilen. Hist. Nat. iii. 1899, p. 117.

Notothenia macrocephala Regan, Trans. Roy. Soc. Edin. xlix. 1913, p. 277.

(Plate III., fig. 2, and Text fig. 16.)

B. vi.; D. iv. 30; A. 24; V. i. 5; P. 16; C. 13 + 6; L. lat. 40 + 10; Sc. 56;
Sc. tr. 8 + 18; Vert. 17 + 29 = 46.

Length of head and height of body, 3.2; and length of caudal, 5.2 in the length; diameter of eye, 6.1; interorbital width, 2.09; and length of snout, 3.7 in that of the head.

The head is as deep as wide; the nostril, in a short tube, lies in a depression nearer the eye than the front of the head, and from it a deep groove passes to the orbit, being overhung by a protuberance which does not, however, extend to the supraciliary region.

The interorbital space is markedly, though evenly, convex, and the rather small eye is well below the profile and almost laterally disposed. The mouth is comparatively horizontal, and the maxilla extends to the first fourth of the orbit; the jaws are equal; no spines on the opercles; all but a narrow portion of the gill membranes is attached to the isthmus; gills four, a long slit behind the fourth; the gill rakers are rather short, feebly spinose, and 17 in number on the first arch, 13 being on the lower limb; pseudo-branchiæ present.

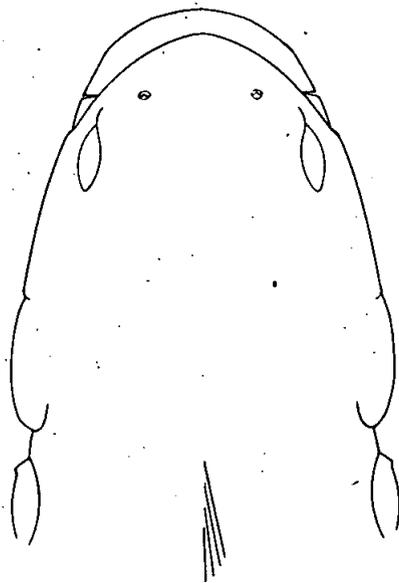


Fig. 16.—*Notothenia macrocephala*.

Upper view of head. Half natural size.

Teeth.—A single row of widely-spaced canines in front, followed by a narrow band of villiform teeth in both jaws. No teeth on vomer, palatines, or tongue.

Fins.—The spinous dorsal originates above a point close behind the opercle; the first spine is the longest, one-half more than the diameter of the eye, and the following three regularly decrease in height. This fin is attached to the base of the first ray by a low membrane. The rays of the second fin increase in height to the fourth, which, with the fifth, are the longest, being one-third longer than the first spine. The base of the soft fin measures half the distance between the tip of the snout and the base of the caudal rays; the anal commences beneath the eighth ray of the dorsal and the two fins are coterminous. The upper pectoral rays are much longer than the lower ones, and the margin is feebly rounded; the fourth, or longest ray, is nearly two-thirds the length of the head, and the fin does not quite reach the vent. The ventral arises beneath the space between the preopercular and opercular margins: its length is two-thirds that of the pectoral. The caudal is subtruncate, and the depth of the peduncle is twice the diameter of the eye.

Scales.—A few isolated scales behind the eye and across the upper part of the opercle; the head is otherwise naked but covered with granules which do not, however,

extend to the snout; the whole of the body is covered with thin cycloid scales, those on the occiput and chest being smallest. The upper lateral line ceases beneath the twenty-fifth dorsal ray, below which point the second line commences; it does not extend on to the base of the caudal.

Colours.—The general colour is olive grey, the lower parts yellow; the markings are black and somewhat irregular, but two oblique bands may be traced below the eye; a branch from the upper one crossing the lower part of the opercle; the rest of the upper parts and sides of the head bear irregular spots and lines; six or seven bands cross the back to below the lateral line, whence they break and form blotches alternating with the bands. The first dorsal fin is dark and clouded; the second has a dark intramarginal band and a white edge; diagonal bars cross the lower portion, and the clouding leaves lacunæ in the membrane; the anal is sooty, but the tips of the rays are lighter; the other fins are also sooty but without markings.

Stomach Contents.—Fish remains. Many specimens of several species of Amphipoda, two species of zoophytes with large gonophores, ? *Eucopeia*, ? *Obelia*, and algae.

Reproduction.—The ova are very small, developed in considerable quantity, appearing as granules of rosy hue.

Length.—435mm.

Smaller specimens well agree with Steindachner's description and figure, the eye being relatively larger and the pectoral longer than in adults; the concavity in the hinder edge of the caudal, so strongly marked in the young, decreases with age. The type of *N. hassleriana* was 100mm. in length, but we have them as small as 70mm. Small specimens of this species were obtained from the stomachs of *N. coriiceps*, taken at the island.

This species proves to be plentiful and the commonest fish at the island. It is the one illustrated in Sir Douglas Mawson's book* under the title "A good catch of fish at Lusitania Bay." During my visits to the island it was freely caught from the rocks by means of hook and line. The fish trap, set among the kelp, also yielded three examples the only time it was hauled; two of them were small, about 140mm. in length: the remains of the third indicated that it had been quite large, but nothing remained of it but some bones, a fact to be accounted for by the presence of crabs in the trap, the advent of the two smaller fishes being doubtless later, the trap having been down some days prior to hauling.

I also poisoned a large rock pool and secured a number of specimens up to a length of 240mm. Mr. Hamilton also handed me some individuals he had obtained previously to my visit. Small specimens of this species were taken from the stomachs of *N. coriiceps*.

* Mawson, "Home of the Blizzard" ii., 1915, p. 252.

Respecting the plenitude of these fishes, Mr. Ainsworth* writes as follows:—“Hamilton and Blake went out fishing in the dinghy on the 9th and made a remarkable haul of fish, sixty in number, ranging in size from a few ounces to twelve and a half pounds. They were all of the same species, somewhat resembling rock cod, but as usual they were covered with external parasites, and their flesh was full of worm-cysts. Hamilton preserved a number of them and the rest were cooked, but we did not relish them very much, and the one meal was enough.” The large fish of “twelve and a half pounds” was preserved, and proves to be *N. colbecki*, the only specimen of the species known from the island, all the other examples being *N. macrocephala*. Mr. Ainsworth has another note on these parasitic worms (*loc. cit.* p. 193):—“Hamilton and Sawyer caught several three-pound fish on April 2nd They were good eating, but, unfortunately, were very much worm-infested. These parasitical worms are about an inch and a half long and taper to a point at each end. They penetrate right through the flesh and are plainly noticeable after the fish is cooked. One has to dodge the worms as the meal proceeds; either that or persuade oneself that they do not matter.”

Parasites of allied, if not identical, genera appear to infest all the *Notothenias* of the Subantarctic islands, or at any rate those grouped southward of Australia and New Zealand. I have taken them also from *N. microlepidota* at the Snares and the Auckland Islands, and from *N. colbecki*, at Antipodes Island. The fluke-like parasites which glided over the body of the last-named species were identified by Prof. Benham as species of *Tristoma*.†

Distribution.—*N. macrocephala* is found in the coastal areas of the Magellan and Antipodes Districts, also at Kerguelen Island.‡ There is no Subantarctic land in the Pacific Zonal Quadrant; but in the south temperate zone (which this species also affects in Chili and New Zealand) it enters the Quadrant at the Chatham Islands, according to Mr. Regan’s map.§ It may be, however, that the “w” there indicating this species should have been placed in the Australian Zonal Quadrant at Lyttelton, where it is known to occur. At Kerguelen it enters the African Zonal Quadrant.

NOTOTHENIA MICROLEPIDOTA Hutton.

Notothenia microlepidota Hutton, Trans. N.Z. Inst. viii. 1876, p. 213; Waite, Subantarctic Islands of N.Z. ii. 1909, p. 590, fig. 24.

Notothenia parva Hutton, Trans. N.Z. Inst. xi. 1879, p. 339.

Taken at the Auckland Islands, where it was previously known to be common.

* Ainsworth, in Mawson’s “Home of the Blizzard,” ii. 1915, p. 235.

† Waite, Subantarctic Is. of N.Z. ii. 1909, p. 594.

‡ In this connection Mr. Regan writes to me under date June 24th, 1915:—“To the published list of Kerguelen Island fishes I should have added *Notothenia macrocephala*. Peters described it from the island as *N. antarctica*, and there are two very small examples taken by the ‘Challenger’ at Kerguelen, hitherto undetermined, which I refer to this species.”

§ Regan, Brit. Antarct. Exped. (“Terra Nova”), 1910, i: 1914, p. 31.

NOTOTHENIA COLBECKI *Boulenger*.

Notothenia colbecki Boulenger, Rep. "Southern Cross," 1902, p. 185, pl. xvi.; Waite, Subantarctic Is. N.Z. ii, 1909, p. 594; Regan, Trans. Roy. Soc. Edin. xlix., 1913, p. 278.

The only example preserved was caught by Mr. Hamilton with the hook amongst kelp. He remarks that it is the largest *Notothenia* taken, and is of quite exceptional size, weighing 12½lbs. when freshly caught. The species was previously known from the Antipodes, Auckland, and Campbell Islands, and the largest specimen hitherto actually identified measured 550mm. in length. The Macquarie Island example is larger, measuring 685mm.: the remains of a specimen, taken at the winter quarters of the "Discovery" and regarded by Mr. Boulenger as probably of this species, indicates that it grows to a gigantic size.*

Stomach Contents.—The stomach contained remains of fishes too far digested to be determined, and a large isopod, together with a considerable quantity of green algae.

Reproduction.—The ova, developed in great number, are extremely minute and of greyish pink colour.

As mentioned elsewhere (pp. 6, 69), this species is subject, in common with other members of the genus, to the presence of both external parasites and muscle worms, nearly every example taken at the Antipodes Island being so infested.

HARPAGIFER RICHARDSON.

HARPAGIFER BISPINIS *Forster*.

Callionymus bispinis Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 45.

Harpagifer bispinis Richardson, Voy. "Ereb." and "Terr.," 1844, p. 11, and 1845, p. 19, pl. vii., figs. 1-3; and pl. xii., 8, 9; Pappenheim, Deutsche Südpolar Exped. 1901-3, xiii. Fische, 1912, p. 177, pl. ix., fig. 5.

Harpagifer palliolatus Richardson, *loc. cit.* 1845, p. 20, pl. xii., figs. 5-7.

During my visit to Macquarie Island in June, 1912, I poisoned some rock pools and obtained many examples of this fish. On the occasion of my second visit in the following year, Mr. H. Hamilton handed me a further lot which he had obtained by similar means. The known range of this monotypic genus is now so extended as to show that its distribution is almost circumpolar, the absence of land in the Subantarctic region of the Pacific Zonal Quadrant accounting for its absence there. *Harpagifer* is known from Patagonia, Terra del Fuego, Magellan Strait, Graham Land, Falkland Islands,

* Boulenger, Nat. Antarct. Exped. ii., 1907, Fishes, p. 1.

South Georgia, and South Orkneys in the American Zonal Quadrant, and from the Marion Islands and Kerguelen in the African Zonal Quadrant. It is now definitely recorded from the Australian Zonal Quadrant at Macquarie Island.

Mr. Augustus Hamilton, who wrote a paper entitled "Notes on a visit to Macquarie Island," briefly refers to the fishes as follows:—* "In the tidal pools at low water some small gobies were found which have not yet been examined critically, but I think one of the two species is *Harpagifer bispinis*, also found at Kerguelen. A good sized fish was obtained by fishing with a hook from one of the rocks, and specimens were preserved but have not come to hand; and two small specimens were picked up on the beach of a small sprat-like fish."

It is interesting to be able to confirm the suspected identity of *Harpagifer*, and there can be little doubt that the fish taken on the line was a *Notothenia*, possibly *N. macrocephala*.

The stomach contents of the specimens have been determined by Mr. Whitelegge as species of Amphipoda and Isopoda. Small univalve shells were also present.

FAMILY BLENNIIDÆ.

TRIPTERYGIUM Risso, 1826.

TRIPTERYGIUM VARIUM *Forster*.

Blennius varius Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 178.

Tripterygion varium Cuvier and Valenciennes, Hist. Nat. Poiss. xi. 1836, p. 414; Waite, Pisces "Subantarctic Is. N.Z." ii. 1909, p. 597, and Rec. Cant. Mus. ii. 1913, p. 7, pl. iii.

Tripterygion nigripenne Cuvier and Valenciennes, *loc. cit.* p. 413, pl. cccxxxix.

Tripterygion capito Jenyns, Fishes, Voy. "Beagle," 1841, p. 94, pl. xix., fig. 1.

Trypterygium forsteri Hutton, Trans. N.Z. Inst. v. 1873, p. 263.

Trypterygium fenestratum Hutton, *loc. cit.*

Trypterygium robustum Clarke, *ib.* xi. 1879, p. 292, pl. xv.

Tripterygium jenningsi Hutton, *loc. cit.* xi. 1879, p. 339.

Taken under stones at Figure-of-Eight Island, Carnley Harbour, Auckland Islands, from which group it has been known since 1879 (*T. jenningsi*).

* Hamilton, Trans. N.Z. Inst. xxvii. 1895, p. 577, *et seq.*

FAMILY SCORPÆNIDÆ.

ZANCLORHYNCHUS GÜNTHER, 1880.

ZANCLORHYNCHUS SPINIFER Günther.

Zanclorhynchus spinifer Günther, Chall. Rep. i. 1880, p. 15, pl. viii., fig. A.

B. vii. ; D. viii.-ix., 14-15 ; A. 11 ; P. 9 ; V. i. 5 ; C. 10 + 8 ; L. lat. 11-12.

Length of head, 2·8 ; height of body, 3·2 ; and length of caudal, 3·9 in the length ; diameter of eye, 4·2 ; interorbital space, 6·8 ; and length of snout, 2·6 in the head.

The head is compressed, the occiput flat, but rising to the dorsal fin ; the interorbital space is concave ; the nostril lies in front of the eye, slightly below its median height ; the mouth is small but very protractile with thick reverted lips ; the maxilla does not reach to the line of the nostril ; gill slit restricted, extending from the upper angle of the opercle to above the base of the pectoral.

The disposition of the spines on the head is as follows :—One above the nostril and a minute one below it ; one in continuation of the supraorbital ridge ; two above the preopercle, of which the anterior one is small ; and a very large one above the opercle with an auxiliary prong, like an antler ; one on the cheek below the hinder half of the eye ; and one on each side immediately in front of the first dorsal spine. There is also a large spine on the body above the base of the pectoral fin.

The body is compressed and naked, but its greater part is covered with minute asperities, the base of the first dorsal fin being naked ; the lower portions, from below the origin of the lateral line to the vent and along the base of the anal fin to the caudal are devoid of asperities, but the skin is closely wrinkled.

Teeth.—Extremely minute teeth are present in the jaws and on the vomer.

Fins.—The dorsal fin commences behind the occiput, the first spine is as long as, the second twice, and the third, or longest, thrice the diameter of the eye ; they are all roughened in front. The following regularly decrease in length, but when depressed the third and following spines reach the same point, which lies midway between the tip of the snout and the end of the caudal. The two fins are connected by a low membrane ; the base of the second fin is two-thirds the length of the first ; its longest rays are half that of the third spine ; the anal has a shorter base, but its fourth and fifth rays are longer than the corresponding ones of the dorsal. The pectoral is pointed, its fourth lowest ray is nearly as long as the head, and extends to the point attained by the adpressed dorsal spines. The ventrals are large, the middle rays reaching the anal ; they lie midway between that fin and the pectorals. The caudal is truncate, the depth of the peduncle equals its length ; the rays of all the fin are undivided.

Lateral Line.—The lateral line commences on a level with the base of the opercular spine and passes straight to the middle of the caudal peduncle; it is formed of 11 or 12 elongated elevations, many of which bear a minute spine.

Colours.—Body purplish, merging into yellow behind; a dark blotch below the three first dorsal spines and an irregular bar below the spinous fin; another below the soft portion; and a third across the caudal peduncle. The fins are yellow, each with a broad dark bar, excepting the first dorsal, the hinder portion of which bears a dark blotch.

Stomach Contents.—Prof. Haswell has found among the material recovered from these specimens many remains of Amphipods and one *Priapulid*.

Reproduction.—The ova are small, 0.8mm. in diameter, and yellow in colour.

Length.—202mm. A second specimen in which the spines are blunted by wear, denoting an adult or aged condition, is larger, and measures 238mm. in length.

Locality.—The two specimens were handed to me at Macquarie Island by Mr. Hamilton, who caught them on a line at the northern end of the island, in eight fathoms. He told me that they were often seen swimming about in the kelp but were difficult to catch.

Remarks.—These fishes appear to constitute the second occasion on which the species has been obtained. The type represented by a single example, trawled by the "Challenger" off Kerguelen Island, was much smaller, being 3½ in. (90mm.) long. The immaturity of the type will well account for the statement that the mouth is toothless, and, perhaps, also for the non-mention of certain small spines on the head, namely, that below the nostril, the second on the preopercle, and the pair in front of the first spine of the dorsal fin. No mention is made of the auxiliary prong on the opercular spine. Abrasion has extended so far in my larger example that the opercular spine is worn down below the point whence the prong originates.

3. AUSTRALASIA.

With the exception of *Myctophum antarcticum* and *Nematonurus armatus*, the following fishes were taken on the summer Subantarctic cruise, 1912. No data accompanied the specimens, but they were probably taken on December 12th, when successful trawlings were made in 75 and 1,300 fathoms. Captain Davis states that from the deeper trawling "a large octopus and several interesting fish were obtained." It is, however, improbable that any of the fishes submitted, excepting *Antimora*, are from the greater depth, all the others being well known from under 100 fathoms.

Myctophum antarcticum Günther
Chlorophthalmus nigripinnis Günther
Notopogon lilliei Regan
Cælorhynchus australis Richardson
Nematonurus armatus Hector
Antimora viola Goode and Bean
Physiculus barbatus Günther
Zanclistius elevatus Ramsay and Ogilby
Scorpaena percoides Richardson
Lepidotrigla modesta Waite
Parapercis allporti Günther

FAMILY MYCTOPHIDÆ.

MYCTOPHUM RAFINESQUE, 1810.

MYCTOPHUM ANTARCTICUM *Günther*.

(For synonymy see page 59, pl. iv.)

Six examples were taken in the tow net, south-west of Tasmania, in Lat. 45° 0' S., Long. 138° 0' E.

FAMILY SUDIDÆ.

CHLOROPHTHALMUS BONAPARTE, 1840.

CHLOROPHTHALMUS NIGRIPINNIS *Günther*.

Chlorophthalmus nigripinnis Günther, Ann. Mag. Nat. Hist. (5), ii. 1878, p. 182; and Chall. Rep. xxii. 1887, p. 193, pl. li., fig. A. Waite, Mem. Aust. Mus. iv. 1899, p. 54, fig. 4, and Rec. Cant. Mus. i. 1911, p. 164, pl. xxv.

Twelve specimens were taken in 75 fathoms off the east coast of Tasmania. This species is also known from Victoria, New South Wales, and New Zealand seas.

FAMILY MACRORHAMPHOSIDÆ.

NOTOPOGON REGAN, 1914.

NOTOPOGON LILLIEI *Regan*.

Centriscops humerosus Waite, Rec. Cant. Mus. i., June, 1911, p. 169; McCulloch, "Endeavour" Sci. Res. i., Dec. 1911, p. 24, fig. 9, and pl. v.

Notopogon lilliei Regan, Ann. Mag. Nat. Hist. (8) xiii. 1914, pp. 14, 20; and Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1914, p. 15, pl. xii., fig. 4; McCulloch, "Endeavour" Sci. Res. ii. 1914, p. 91.

Three specimens were secured in 75 fathoms off the east coast of Tasmania where, however, it was previously known to occur.

The name *Centriscops cristatus* has crept into Mr. McCulloch's last-quoted paper (p. 93), but I believe that this was a manuscript name, intended to designate the species which Mr. Regan named as above, in which case it should not appear further in literature.

FAMILY MACROURIDÆ.

CÆLORHYNCHUS GIORNA, 1803.

CÆLORHYNCHUS AUSTRALIS *Richardson*.

Lepidoleprus australis Richardson, Proc. Zool. Soc. 1839, p. 100.

Macrurus australis Günther, Cat. Fish. Brit. Mus. iv. 1862, p. 391.

Cælorhynchus mortoni Ogilby, Proc. Roy. Soc. Tasm. 1897, p. 83.

Cælorhynchus australis Waite, Rec. Cant. Mus. i. 1911, p. 177, pl. xxix., fig. 1.

Two specimens obtained off the east coast of Tasmania; the species was previously known from this locality. Of the two stations recorded they were probably taken at 75 fathoms; 1,300 fathoms, the depth of the second station, being considerably beyond the known limits of the species.

Reproduction.—The ova are of different sizes, suggesting that they do not all ripen together; they are yellow in colour; and the largest measures 1mm. in diameter.

NEMATONURUS GÜNTHER, 1887.

NEMATONURUS ARMATUS *Hector*.

Macrurus armatus Hector, Ann. Mag. Nat. Hist. (4) xv. 1875, p. 81; and Trans. N.Z. Inst. vii. 1875, p. 249, pl. xi., fig. 78A.

Coryphænoides variabilis Günther, Ann. Mag. Nat. Hist. (5) ii. 1878, p. 27.

Nematonurus armatus Günther, Chall., Rep. xxii. 1887, p. 150, pl. xl., fig. A.

A single specimen of this well-known species was taken on February 24th, 1914, in Lat. 35° 55' S., Long. 134° 18' E., in 1,800 fathoms, about 140 miles west of Kangaroo Island, South Australia, on the final return of the "Aurora" from the Antarctic. This is the specimen described to me as a "large white fish, taken in deep water." It proves to be of the variety described by Günther as "a kind of albino, not quite white, but of a much lighter colour than the ordinary specimens." A note attached to the specimen by Mr. Hunter reads as follows:—"Pinkish above, paler below, operculum with bluish streaks." Of many examples hitherto obtained at different times, the largest seems to be 558mm. in length; but our specimen is much longer, being 805mm.

One of the "Challenger" specimens was taken south of Australia.

Stomach Contents.—The mass of the contents of the specimen obtained off South Australia consisted of remains of Cephalopods, the beaks only showing definite structure; the jaws of an Echinoid were also recovered.

FAMILY GADIDÆ.

ANTIMORA GÜNTHER, 1878.

ANTIMORA VIOLA *Goode and Bean*.

Haloporphyrus viola Goode and Bean, Proc. U.S. Nat. Mus. i. 1879, p. 257.

Antimora viola Günther, Chall. Rep. xxii. 1887, p. 94, pl. xv.

Associated with this species is a single mutilated specimen taken during the second Subantarctic cruise of the "Aurora," 25 miles off Tasmania, in 1,300 fathoms. The available portion consists of the head and body to the beginning of the anal fin; but all the scales and most of the rays have been lost.

Three species of the genus have been described, namely:—

A. rostrata Günther, 1878.

A. viola Goode and Bean, 1879.

A. microlepis T. H. Bean, 1890.

A. rostrata was taken from between the Cape of Good Hope and Kerguelen Island, near Marion Island, and off Monte Video.

A. viola and *A. microlepis* were obtained from the North Atlantic.

All three species are apparently allied, and one would naturally seek affinity with *A. rostrata* on account of similarity in geographical position. The sum of the available characters, however, indicates association with *A. viola*, the figures published by Günther well portraying our specimen.

The wide distribution of deep sea species is a well known fact, and another Gadioid, *Melanonus gracilis* Günther, has similarly been taken in the North Atlantic and Antarctic Oceans.

PHYSICULUS KAUP, 1858.

PHYSICULUS BARBATUS Günther.

Pseudophyscis barbatus Günther, Ann. Mag. Nat. Hist. (3) xi. 1863, p. 116; McCoy, Prod. Zool. Vict. 1878, p. 29, pl. xx.

Physiculus palmatus Klunzinger, Arch. für Naturg. xxxviii. 1872, p. 38.

Lotella grandis Ramsay, Proc. Linn. Soc. N.S.W. v. 1881, p. 462.

Physiculus barbatus Waite, Mem. N.S.W. Nat. Club, ii. 1904, p. 24.

Two specimens from off the east coast of Tasmania from, presumably, 75 fathoms.

FAMILY BOVICHTHYIDÆ.

BOVICHTHYS CUVIER AND VALENCIENNES, 1831.

BOVICHTHYS VARIEGATUS Richardson.

Bovichthys variegatus Richardson, Voy. "Ereb." and "Terr." 1846, p. 56, pl. xxxiv.

Bovichiths roseo-pictus Hutton, Trans. N.Z. Inst. xxxvi. 1904, p. 148.

Previously known from the Auckland Islands, this species was taken in rock pools on Enderby Island, one of the group.

The name *Bovichthys* is accepted as a correction of *Bovichtus*, the original spelling of the genus.

FAMILY HISTIOPTERIDÆ.

ZANCLISTIUS JORDAN, 1907.

ZANCLISTIUS ELEVATUS *Ramsay and Ogilby.*

Histiopterus elevatus Ramsay and Ogilby, Proc. Linn. Soc. N.S.W. (2) iii. 1888, p. 1311 ;
Waite, Mem. Aust. Mus. iv. 1899, p. 114, pl. xxvi.

Zanclistius elevatus Jordan, Proc. U.S. Nat. Mus. xxxii. 1907, p. 236 ; McCulloch,
" Endeavour " Sci. Results, i. 1911, p. 67, figs. 14-18.

Three specimens were obtained off the east coast of Tasmania in, presumably, 75 fathoms. In the paper above quoted, McCulloch has amply illustrated the variations which take place in the contour of this species during its growth. He has also shown that similar changes occur in respect to *Maccullochia labiosa* Günther.

FAMILY SCORPÆNIDÆ.

SCORPÆNA LINNÆUS, 1758.

SCORPÆNA PERCOIDES *Richardson.*

Sebastes percoides Richardson, Ann. Mag. Nat. Hist. (1) ix. 1842, p. 384 ; and Voy.
" Ereb." and " Terr." 1845, p. 23, pl. xv. ; McCoy, Prod. Zool. Vict. i. 1879,
pl. xxxiii.

Scorpcena barathri Hector, Trans. N.Z. Inst. vii. 1875, p. 245.

Sebastapistes percoides Waite, Mem. Aust. Mus. iv. 1899, p. 100.

Scorpcena (Helicolenus) percoides McCulloch, Rec. Aust. Mus. vi. 1907, p. 350.

Scorpcena percoides Waite, Rec. Cant. Mus. i. 1911, p. 249.

Helicolenus percoides McCulloch, " Endeavour " Sci. Res. iii. 1915, p. 158.

Thirty examples were taken in 75 fathoms, off the east coast of Tasmania. The species is common in Tasmanian and Southern Australian waters, and is also found on the coast of New South Wales, becoming scarcer northwards.

The generic status of the species has proved the subject of some uncertainty. Mr. McCulloch, in the paper first quoted above, remarked that *Helicolenus* is a genus doubtfully distinct from *Scorpcena* ; but in the second paper adopts the name without comment. Reversion to *Scorpcena* is not to be taken as any definite pronouncement on the subject, rather that the question is still undecided.

Mr. McCulloch mentions that a female taken on the " Woy Woy " contained unripe ova. In my New Zealand paper above listed I remarked that " In common with many other Sebastoid fishes, this species is viviparous."

FAMILY TRIGLIDÆ.

LEPIDOTRIGLA GÜNTHER, 1860.

LEPIDOTRIGLA MODESTA *Waite*.

Lepidotrigla modesta Waite, Mem. Aust. Mus. iv. 1899, p. 106, pl. xxiii.

Eighteen specimens were preserved from the takings off the east coast of Tasmania in 75 fathoms. The species was originally described from examples taken off the coast of New South Wales, and has not, I believe, been again recognised until now.

FAMILY LEPTOSCOPIDÆ.

PARAPERCIS BLEEKER, 1864.

PARAPERCIS ALLPORTI *Günther*.

Percis allporti Günther, Ann. Mag. Nat. Hist. (4) xvii. 1876, p. 394.

Parapercis ocellaris Waite, Mem. Aust. Mus. iv. 1899, p. 109, pl. xxiv.

Parapercis allporti McCulloch, "Endeavour" Sci. Res. ii. 1914, p. 157.

A single example taken off the east coast of Tasmania in 75 fathoms, from similar locality whence it was obtained by the "Endeavour." The publication of the results of this ill-fated trawler are here quoted as "Scientific Results"; but it may be noted that different parts dealing with the fishes appear under the titles "Zoological Results," "Biological Results," and "Scientific Results."

ADDENDUM.

After the proofs of the foregoing had been passed for printing off, I received from Mr. C. Tate Regan his second paper on the fishes of the "Terra Nova" Expedition, entitled "Larval and Post-larval Fishes."* This masterly paper demonstrates how the possession of knowledge, coupled with method and patience, may be the means of identifying larval forms that give little indication of their ultimate character. By counting the myotomes, fin-rays, and vertebræ, and noting other structures, generic and even specific determinations have been made. Not the least interesting portion of the paper is that devoted to "Notes and Conclusions." Many valuable inferences are deduced from study of the larval forms; of special interest being the statement that the larvæ of some deep-water species have an extended pelagic existence, and may travel long distances before assuming the adult state. It is also inferred that certain coastal fishes owe their wide dispersal to the oceanic habit of their young, which habit is relinquished as growth proceeds.

The status of the fishes of the Australasian Antarctic Expedition is not specially affected by Mr. Regan's latest publication, but the following species included in his paper may be briefly noticed:—

PARALIPARIS TERRÆ NOVÆ *Regan*.

"Larval and Post-larval Fishes," p. 129, pl. i., fig. 6.

This new species differs more from *P. antarcticus* than does *P. wildi*, possessing fewer fin-rays, and having no elongate lower rays in the pectoral. Three species are now known from Antarctica.

SARDINA NEOPILCHARDUS *Steindachner*.

"Larval and Post-larval Fishes," p. 136, pl. v., figs. 3 and 4. Australasian Antarctic Expedition Report, p. 56.

The name *Sardina*, though commonly used for the European Pilchard, does not appear in the various Nomenclatores, and I am unaware of its author and date of publication. If earlier than 1849 it must take precedence of *Amblygaster* used in my paper.

* Regan, Brit. Antarct. Exped. ("Terra Nova"), 1910, i. 1916, pp. 125-156. pls. i.-x.

LEPTOCEPHALUS.

"Larval and Post-larval Fishes," p. 140. Australasian Antarctic Expedition Report, p. 13.

Mr. Regan uses this name "as a generic term for larval Eels." Under the impression that *Leptocephalus* had been definitely associated with the Conger Eels, I followed Garman in employing the name *Atopichthys* for unidentified larval forms.

LIMNICHTHYS FASCIATUS *Waite*.

"Larval and Post-larval Fishes," p. 143, fig. 4.

Among the collections made off the northern islands of New Zealand by my friends Mr. D. G. Lillie and the late Lieutenant Pennell,* are specimens of this little species originally described from examples taken in rock pools on Lord Howe Island. Mr. Regan notes that it was also recorded from pools near Sydney, and reports its occurrence from off the Three Kings Islands, north of New Zealand. The little wanderer has, however, an even wider distribution, having been taken at the Kermadec Islands,† and more recently from rock pools on Norfolk Island, being included in a collection made thereat by Mr. A. M. Lea, Entomologist to the South Australian Museum. Mr. Regan mentions that Lord Howe Island is distant 600 miles from the coast of New South Wales; its nearest point to the mainland is Port Macquarie, 300 miles distant; while its distance from Norfolk Island is about 500 miles.

* Commander Harry L. L. Pennell, R.N., is reported to have lost his life in the Naval engagement off the Skager-rack on May 31st.

† Waite. Trans. N.Z. Inst. xlii. 1910, p. 379.

EXPLANATION OF PLATES, ETC.

MAP I.

Collecting Stations of the "Aurora," 1912-1914.

MAP II.

Subantarctic Cruises of the "Aurora" and "Tutanekai," 1912-1913.

PLATE I.

Fig. 1—*Austrolycichthys brachycephalus Pappenheim.*

Nat. size. Station X. Shackleton Ice-shelf; 320 fathoms.

Fig. 2—*Dolloidraco longedorsalis Roule.*

Nat. size. Station X. Shackleton Ice-shelf; 325 fathoms.

Fig. 3—*Bathydraco nudiceps Waite.*

Nat. size. Station IX. Shackleton Ice-shelf; 240 fathoms.

PLATE II.

Fig. 1—*Aconichthys harrissoni Waite.*

14/15 nat. size. Station X. Shackleton Ice-shelf; 325 fathoms.

Fig. 2—*Dacodraco hunteri Waite.*

Nat. size. Station XI. Shackleton Ice-shelf; 325 fathoms.

PLATE III.

Fig. 1—*Cygnodraco mawsoni Waite.*

6/7 nat. size. Station VII. Drygalski Island; 60 fathoms

Fig. 2—*Notothenia macrocephala Günther.*

12/13 nat. size. Macquarie Island.

PLATE IV.

Fig. 1—*Paraliparis wildi* *Waite*.

Nat. size. Station X. Shackleton Ice-shelf; 325 fathoms.

Fig. 2—*Myctophum antarcticum* *Günther*.

Twice nat. size. Surface between Macquarie and Auckland Islands.

Fig. 3—*Aurion effulgens* *Waite*.

Twice nat. size. Surface, S.W. of Adams Island, Auckland group.

PLATE V.

Fig. 1—*Idiacanthus aurora* *Waite*.

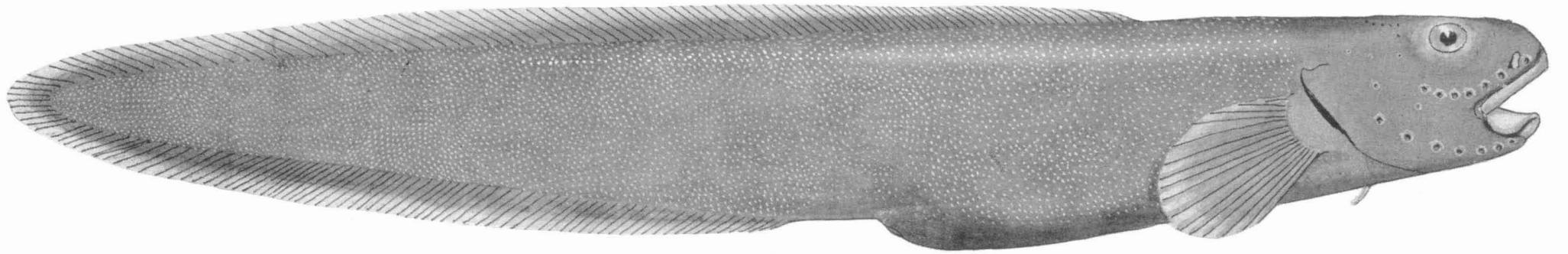
1/2 nat. size. 25 miles north of Macquarie Island; 636-1,450 fathoms.

Fig. 2—*Notosudis hamiltoni* *Waite*.

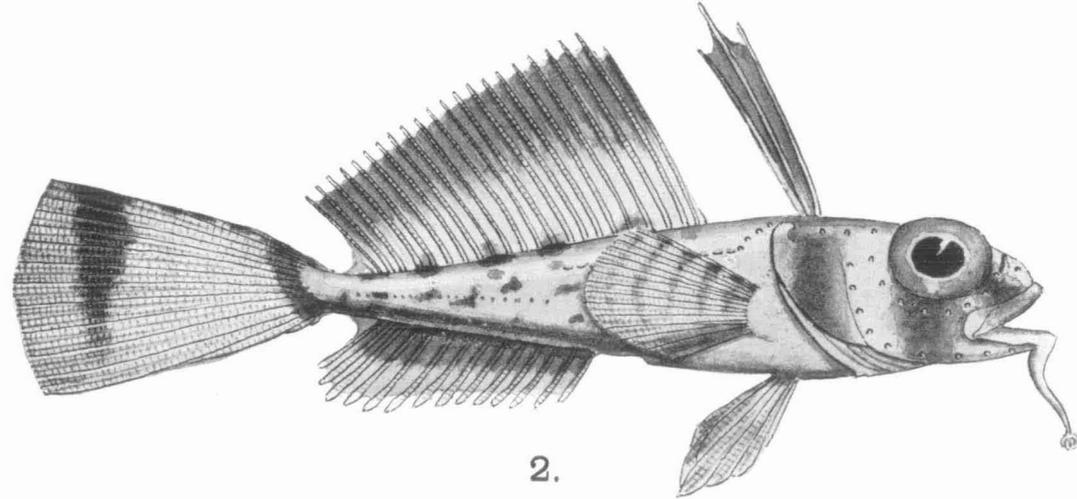
2/5 nat. size. Macquarie Island beach.

Fig. 3—*Notothenia coriiceps* *Richardson* var. *macquariensis* *Waite*.

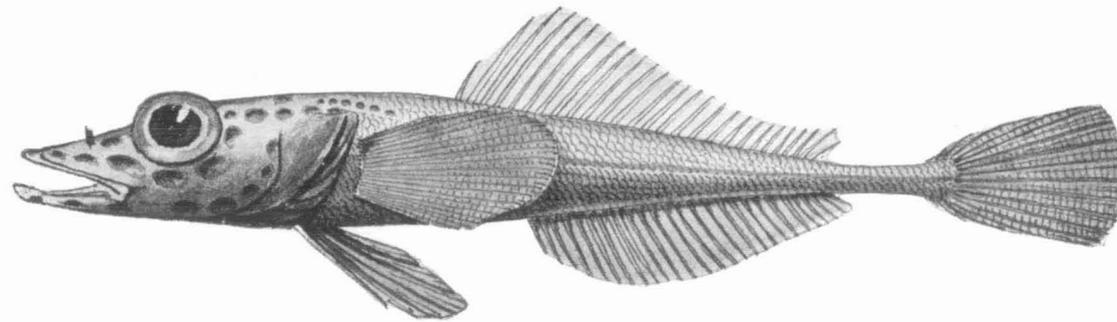
5/8 nat. size. Macquarie Island.



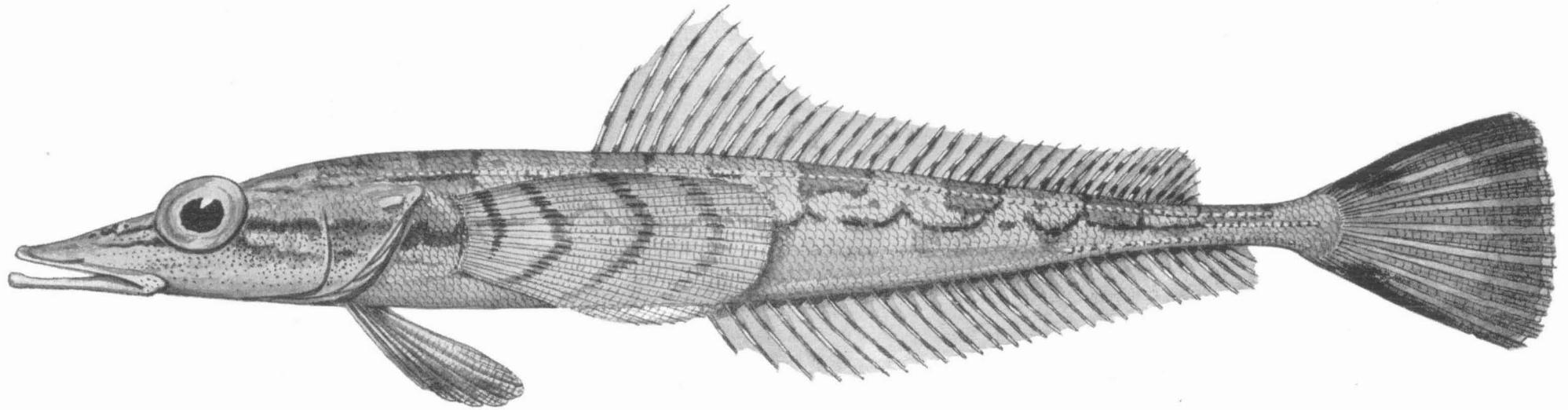
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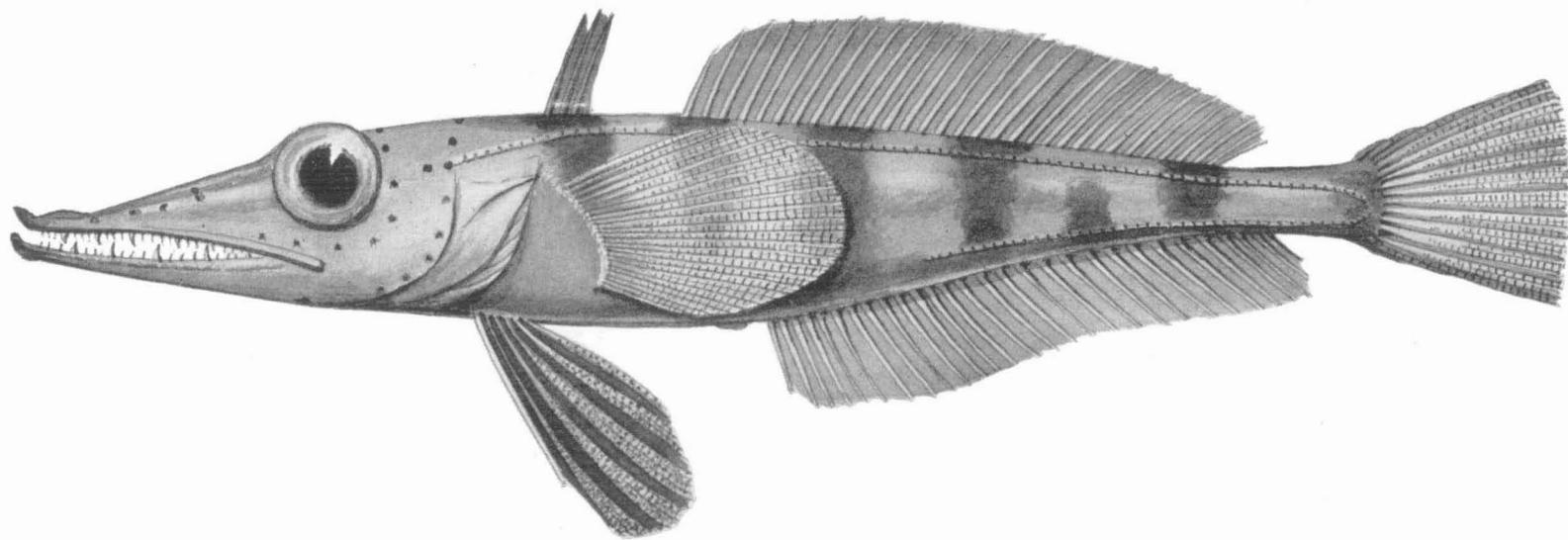
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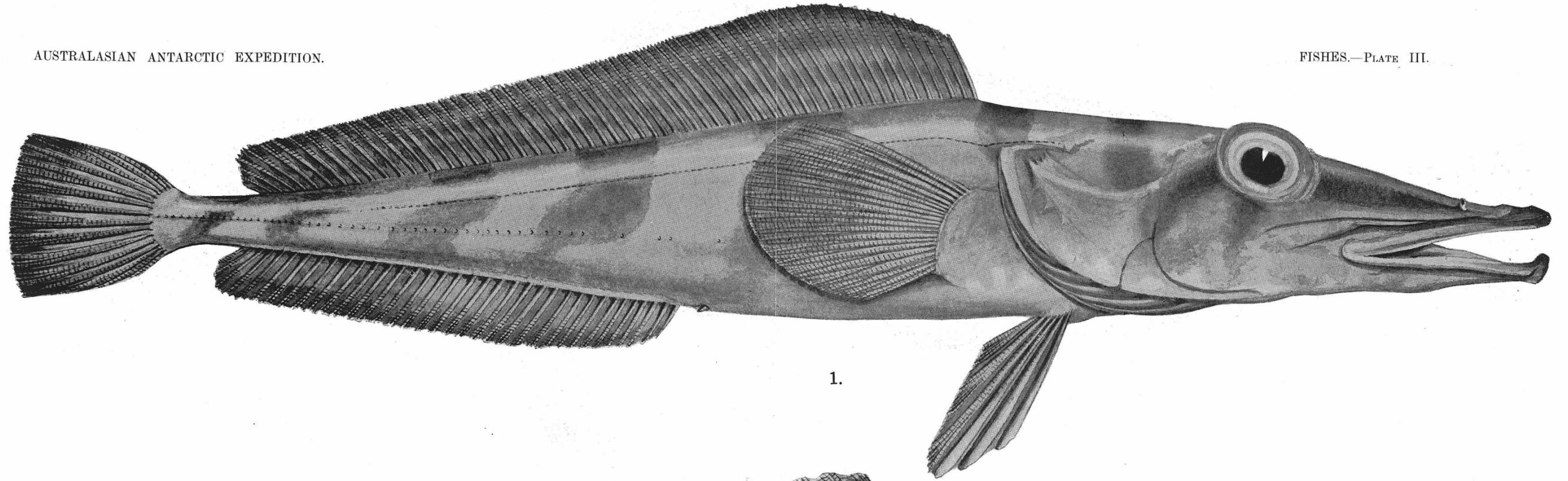
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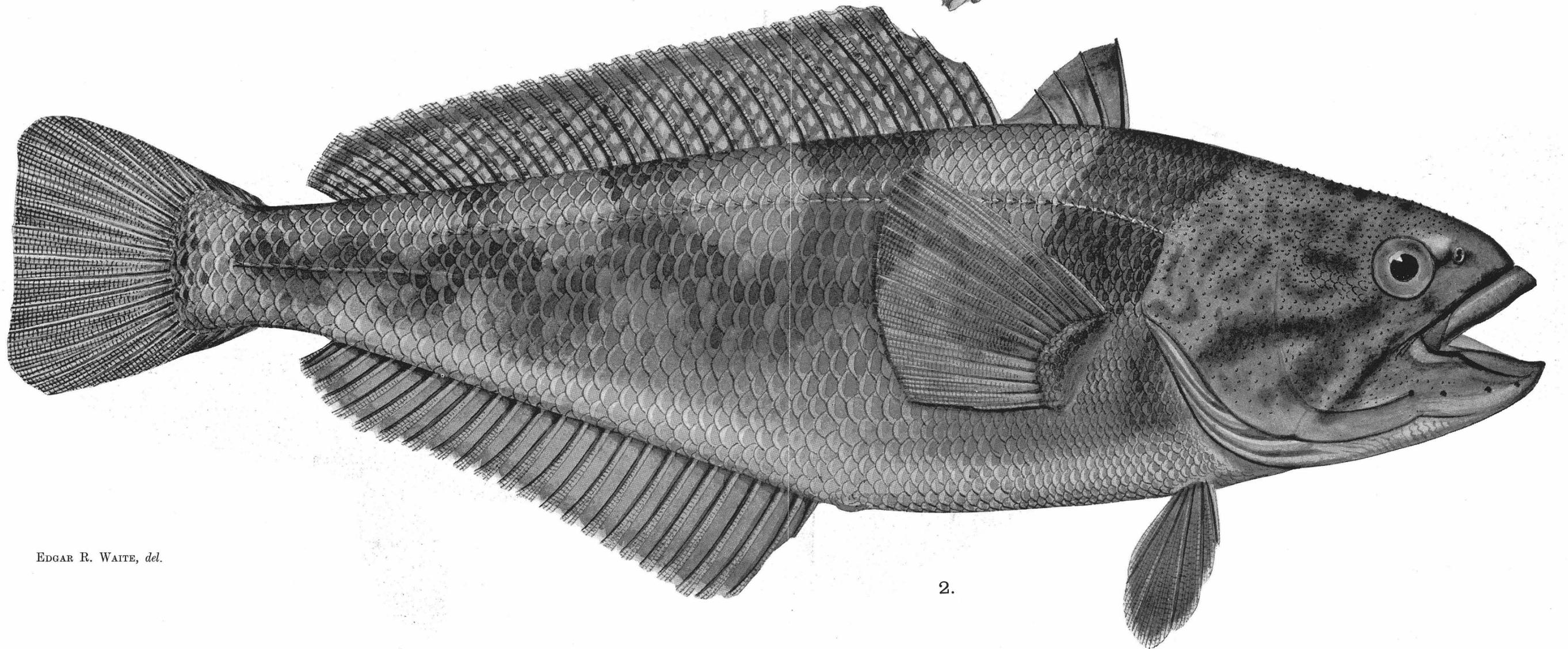
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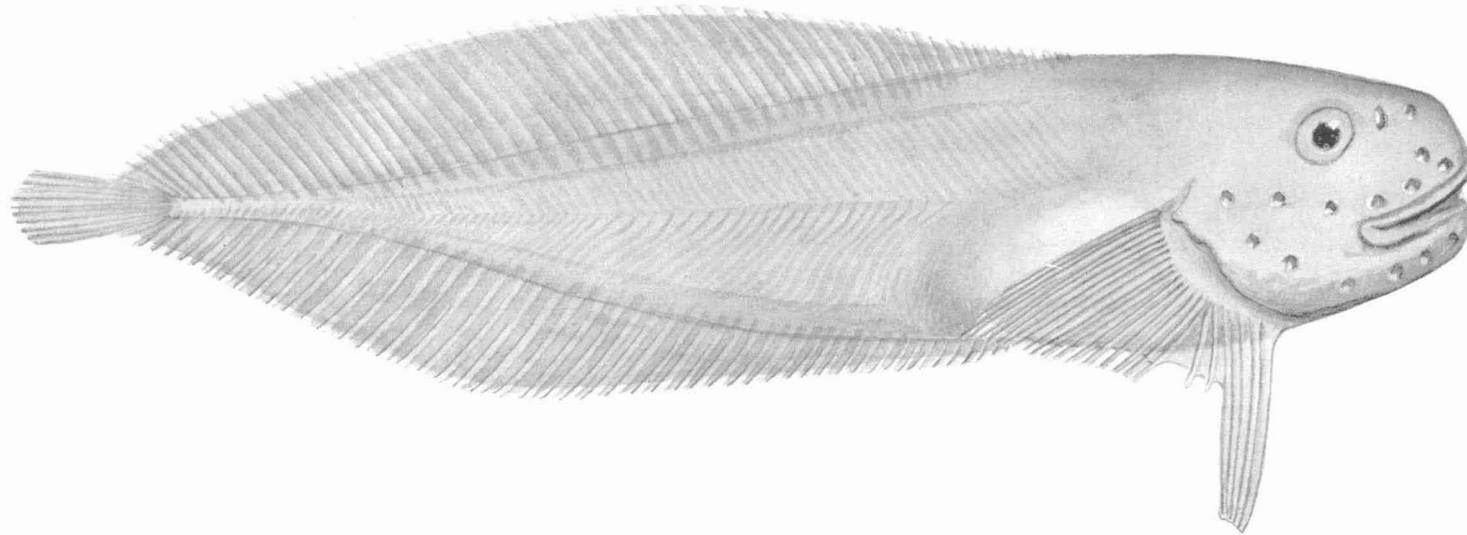
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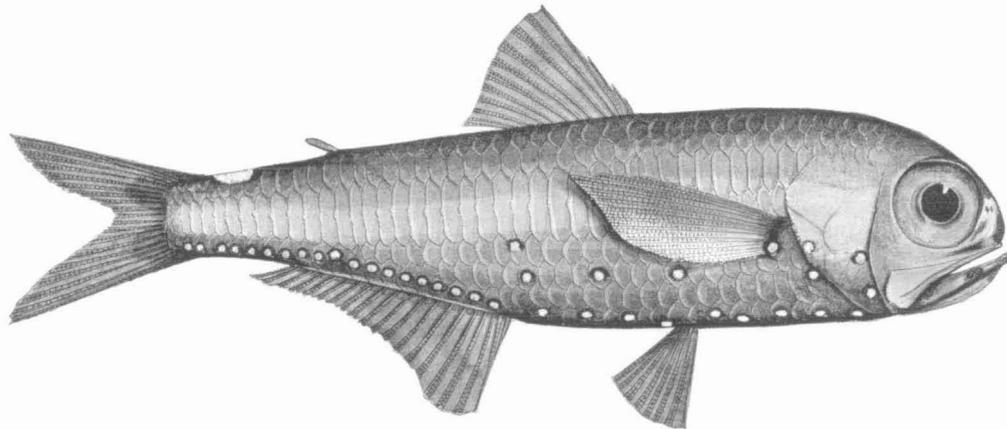
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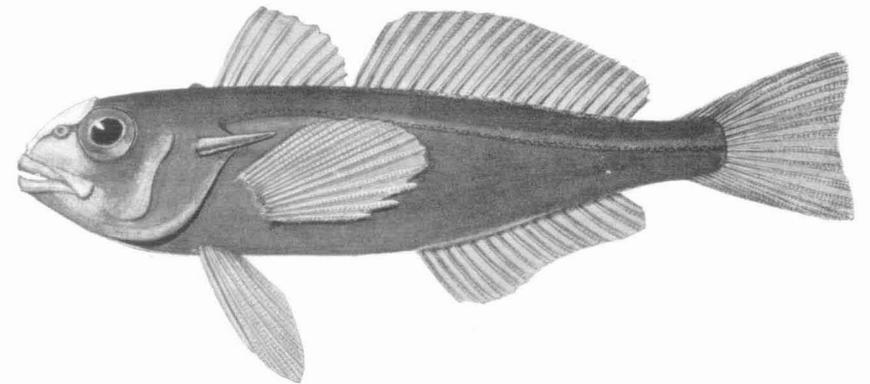


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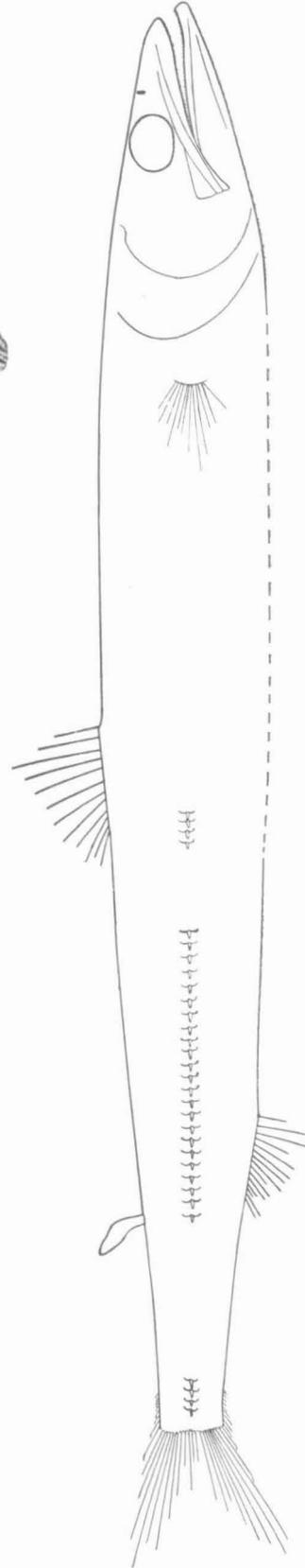
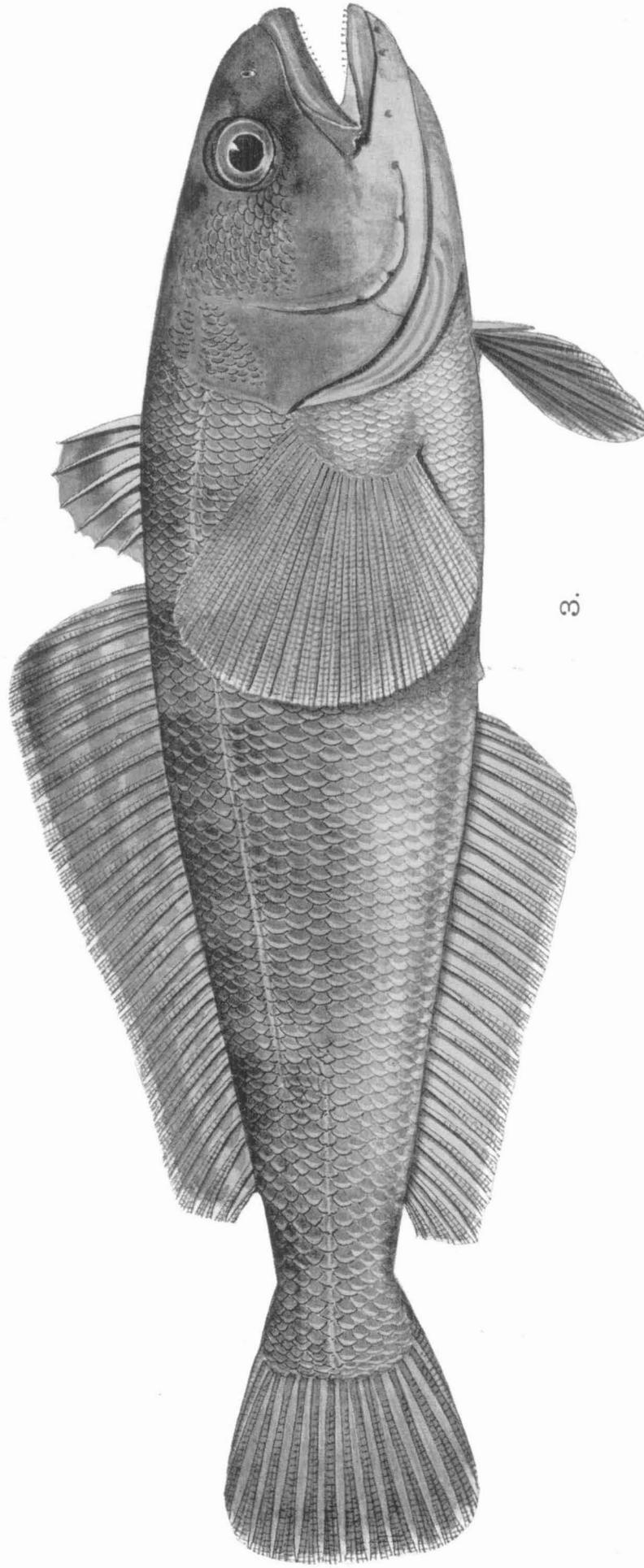
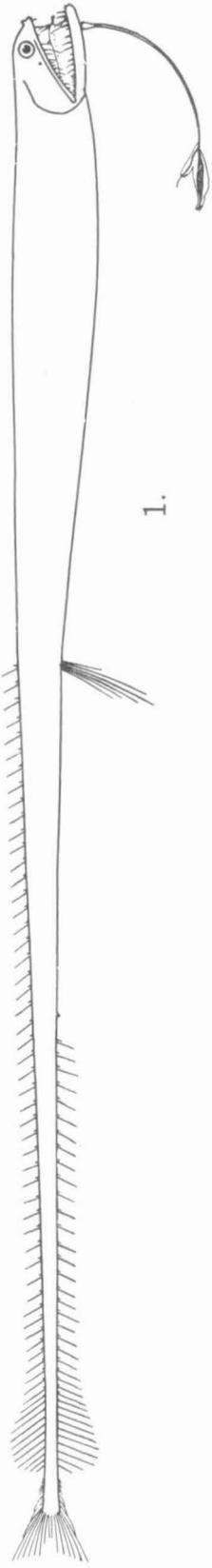


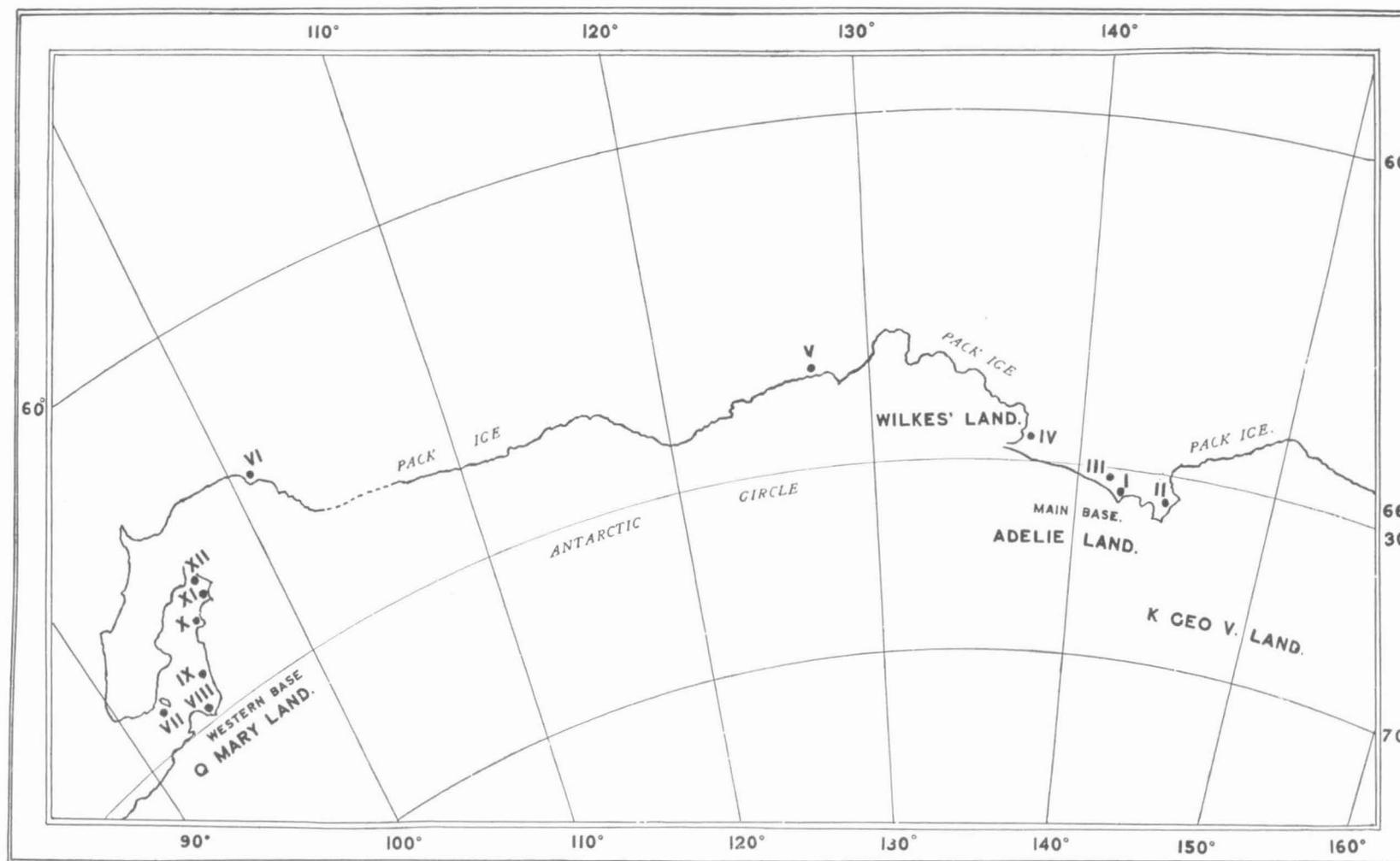
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EDGAR R. WAITE, *del.*



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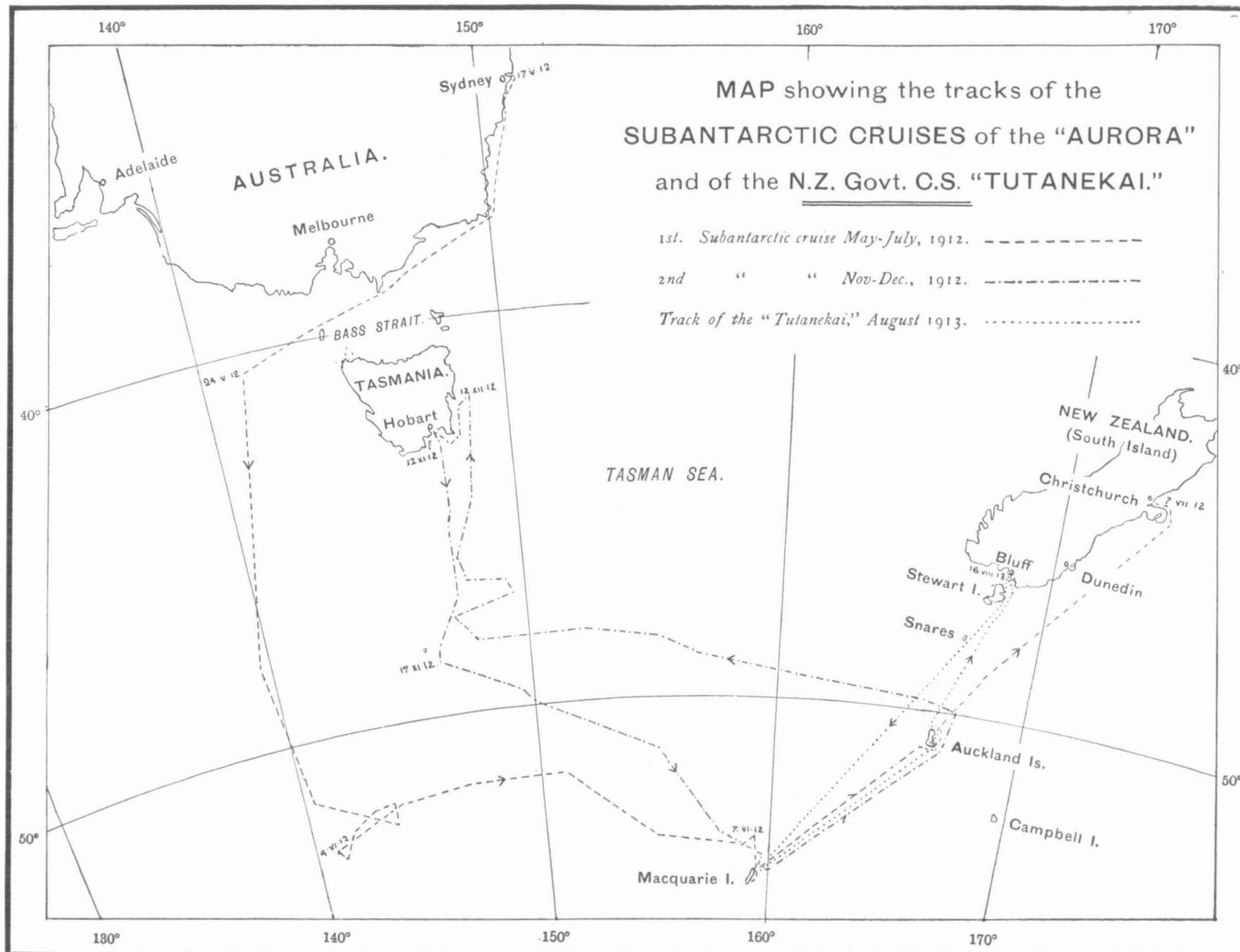


MAP SHOWING the COLLECTING STATIONS of the "AURORA," 1912-1914.

(Indicated by Roman Numerals).

Number VII. indicates the Station off Drygalski Island at the entrance to Davis Sea.

Numbers VIII.-XII. indicate the Stations off Shackleton Ice Shelf.



INDEX.

| | PAGE. |
|-------------------------------|----------------------------|
| ACONICHTHYS | 30 |
| harrissoni | 6, 10, 12, 30, 32 |
| acuta NOTOTHENIA | 46, 50 |
| allporti PARAPERCIS | 74, 79 |
| PERCIS | 79 |
| AMBLYGASTER | 56, 81 |
| neopilehardus | 46, 49, 56, 81 |
| americanus POLYPRION | 55 |
| ANGUILLA aucklandii | 46, 49 |
| australis | 45, 46, 49 |
| angustata NOTOTHENIA | 66 |
| antarctica NOTOTHENIA | 66, 69 |
| antarcticum MYCTOPHUM | 45, 46, 47, 49, 59, 61, 74 |
| PLEURAGRAMMA | 10, 12, 15, 22 |
| antarcticus BATHYDRACO | 28, 29 |
| CRYODRACO | 10, 11, 15, 39, 40 |
| LYCODICHTHYS | 10, 11, 14, 15 |
| PAGETODES | 40 |
| PARALIPARIS | 44, 81 |
| SCOPELUS | 59 |
| ANTIMORA | 74, 76 |
| microlepis | 76, 77 |
| rostrata | 76, 77 |
| viola | 74, 76, 77 |
| antrostomus IDIACANTHUS | 54, 55 |
| arguta NOTOTHENIA | 66 |
| armatus MACRURUS | 76 |
| NEMATONURUS | 74, 76 |
| ARTEDIDRACO | 23, 24, 25 |
| lonbergi | 24 |
| mirus | 24 |
| orianæ | 24 |
| shackletoni | 10, 11, 23, 24 |
| skottsbergi | 23, 24 |
| atkinsoni CRYODRACO | 39, 40 |
| atlanticus IDIACANTHUS | 54, 55 |
| ATOPICHTHYS | 10, 13, 82 |
| attenuatus GALAXIAS | 46, 49 |
| aucklandii ANGUILLA | 46, 49 |
| AURION | 62 |
| effulgens | 46, 50, 63 |
| aurora IDIACANTHUS | 45, 49, 53, 54, 55 |

| | PAGE. |
|---------------------------------------|------------------------|
| australis ANGUILLA | 45, 46, 49 |
| CÆLORHYNCHUS | 74, 75 |
| GERLACHEA | 10, 12, 29 |
| LEPIDOLEPRUS | 75 |
| MACRURUS | 75 |
| AUSTROLYCICHTHYS | 9, 15 |
| brachycephalus | 10, 11, 12, 15 |
| barathri SCORPÆNA | 78 |
| barbatus PHYSICULUS | 74, 77 |
| PSEUDOPHYCIS | 77 |
| bathybii PARALIPARIS | 44 |
| BATHYDRACO | 27, 29, 30, 63 |
| antarcticus | 28, 29 |
| macrolepis | 28 |
| nudiceps | 10, 12, 27, 29 |
| scotiæ | 28 |
| BATHYDRACONIDÆ | 27, 34, 63 |
| BATHYOPHIS ferox | 54 |
| BENTHOSOMUS colletti | 59 |
| bernacchii TREMATOMUS | 10, 11, 19 |
| bispinatus EUPROTOMICRUS | 46, 49 |
| bispinis CALLIONYMUS | 70 |
| HARPAGIFER | 45, 46, 47, 50, 70, 71 |
| blainvillianus SYNGNATHUS | 46, 49 |
| BLENNIIDÆ | 71 |
| BLENNIUS varius | 71 |
| BOVICHTHYIDÆ | 62, 77 |
| BOVICHTHYS | 62, 77 |
| roseo-pictus | 77 |
| variegatus | 46, 49, 63, 77 |
| brachycephalus AUSTROLYCICHTHYS | 10, 11, 12, 15 |
| LYCODES | 15 |
| braueri LAMPANYCTUS | 45, 47, 49, 61 |
| MYCTOPHUM | 61 |
| brevipinnis GALAXIAS | 46, 49 |
| CALLIONYMUS bispinis | 70 |
| capito TRIPTERYGION | 71 |
| CENTRISCOPS cristatus | 75 |
| humerosus | 75 |
| centronotus TREMATOMUS | 10, 11, 12, 21 |
| CENTROSCYMNUS | 51, 52 |
| CHÆNICHTHYIDÆ | 34, 35, 47, 63 |
| CHÆNICHTHYS rhinoceratus | 46, 50 |
| rugosus | 46, 50 |
| CHÆNOCEPHALUS | 40 |
| CHALINURA | 9, 13 |
| ferrieri | 10, 11, 13 |
| whitsoni | 10, 11, 14 |

| | PAGE. |
|---------------------------------------|----------------------------------------|
| CHAMPSOCEPHALUS | 38 |
| <i>macropterus</i> | 37 |
| CHIONODRACO | 41 |
| <i>kathleenæ</i> | 10, 11, 12, 41 |
| CHLOROPHTHALMUS | 74 |
| <i>nigripinnis</i> | 74 |
| CLUPANODON <i>neopilchardus</i> | 56 |
| CLUPEIDÆ | 56 |
| CLUPEA <i>neopilchardus</i> | 56 |
| CÆLORHYNCHUS | 75 |
| <i>australis</i> | 74, 75 |
| <i>mortoni</i> | 75 |
| <i>colbecki</i> NOTOTHENIA | 6, 45, 46, 47, 50, 66, 69, 70 |
| <i>colletti</i> BENTHOSOMUS | 59 |
| GEOPELUS | 59 |
| SCOPELUS | 59 |
| CONGIOPODUS | 47 |
| <i>coriiceps</i> NOTOTHENIA | 10, 11, 22, 45, 46, 47, 50, 64, 66, 68 |
| CORYPHÆNOIDES <i>variabilis</i> | 76 |
| <i>cristatus</i> CENTRISCOPS | 75 |
| CRYODRACO | 39, 40, 63 |
| <i>antarcticus</i> | 10, 11, 15, 39, 40 |
| <i>atkinsoni</i> | 39, 40 |
| <i>pappenheimi</i> | 40 |
| <i>cyaneobrancha</i> NOTOTHENIA | 18, 46, 50 |
| CYCLOPTERIDÆ | 43 |
| CYGNODRACO | 32 |
| <i>mawsoni</i> | 10, 11, 33 |
| DACODRACO | 35 |
| <i>hunteri</i> | 6, 10, 12, 36 |
| DOLLOIDRACO | 24 |
| <i>longedorsalis</i> | 6, 10, 12, 24, 26 |
| <i>eatoni</i> RAIÆ | 46, 49 |
| ECHINORHINIDÆ | 51 |
| <i>effulgens</i> AURION | 46, 50, 63 |
| <i>elegans</i> NOTOTHENIA | 19 |
| <i>elévatus</i> HISTIOPTERUS | 78 |
| ZANCLISTIUS | 74, 78 |
| ETMOPTERUS | 52 |
| <i>eulepidotus</i> TREMATOMUS | 10, 11, 12, 21, 22 |
| EUPROTOMICRUS | 52 |
| <i>bispinatus</i> | 46, 49 |
| <i>evansii</i> PRIONODRACO | 10, 11, 12, 35 |
| <i>fasciatus</i> GALAXIAS | 46, 49 |
| LIMNICHTHYS | 82 |
| <i>fasciola</i> IDIACANTHUS | 54, 55 |
| <i>fenestratum</i> TRYPTERYGIUM | 71 |

| | PAGE. |
|-------------------------------|------------------------|
| ferox BATHYOPHIS | 54 |
| IDIACANTHUS | 54, 55 |
| ferrieri CHALINURA | 10, 11, 13 |
| filholi NOTOTHENIA | 46, 50 |
| forsteri TRYPTEGYGIUM | 71 |
| GADIDÆ | 76 |
| GALAXIAS attenuatus | 46, 49 |
| brevipinnis | 46, 49 |
| fasciatus | 46, 49 |
| GEOPELUS colletti | 59 |
| georgianus TREMATOMUS | 19 |
| GERLACHEA | 29, 30, 63 |
| australis | 10, 12, 29 |
| gracilis MELANONUS | 77 |
| grandis LOTELLA | 77 |
| GYMNODRACO | 30, 32 |
| HALOPORPHYRUS viola | 76 |
| hamiltoni NOTOSUDIS | 45, 49, 57 |
| hansonii TREMATOMUS | 10, 12, 19, 20 |
| HARPAGIFER | 48, 70, 71 |
| bispinis | 45, 46, 47, 50, 70, 71 |
| palliolatus | 70 |
| harrissoni ACONICHTHYS | 6, 10, 12, 30, 32 |
| hassleriana NOTOTHENIA | 66, 68 |
| HELICOLENUS | 78 |
| percoides | 78 |
| HETEROSCYMNUS | 52 |
| HISTIOPTERIDÆ | 78 |
| HISTIOPTERUS elevatus | 78 |
| hodgsoni NOTOTHENIA | 18 |
| humerosus CENTRISCOPS | 75 |
| hunteri DACODRACO | 6, 10, 12, 36 |
| IDIACANTHUS | 47, 53 |
| antrostomus | 54, 55 |
| atlanticus | 54, 55 |
| aurora | 45, 49, 53, 54, 55 |
| fasciola | 54, 55 |
| ferox | 54, 55 |
| niger | 54, 55 |
| ISISTIUS | 52 |
| jenningsi TRIPTERYGIUM | 71 |
| kathleenæ CHIONODRACO | 10, 11, 12, 41 |
| labiosa MACCULLOCHIA | 78 |
| LAMPANYCTUS | 61 |
| braueri | 45, 47, 49, 61 |
| LEPIDOLEPRUS australis | 75 |
| lepidorhinus NOTOTHENIA | 19 |
| TREMATOMUS | 21 |

| | PAGE. |
|----------------------------------|---------------------------------------|
| LEPIDOTRIGLA | 79 |
| modesta | 74, 79 |
| LEPTOCEPHALUS | 82 |
| LEPTOSCOPIDÆ | 79 |
| lilliei NOTOPOGON | 74; 75 |
| LIMNICHTHYS fasciatus | 82 |
| loenbergii TREMATOMUS | 10, 11, 12, 20 |
| lonbergi ARTEDIDRACO | 24 |
| longedorsalis DOLLOIDRACO | 6, 10, 12, 24, 26 |
| LOTELLA grandis | 77 |
| LYCODES brachycephalus | 15 |
| LYCODICHTHYS | 9, 14 |
| antarcticus | 10, 11, 14, 15 |
| MACCULLOCHIA labiosa | 78 |
| macquariensis NOTOTHENIA | 64, 66 |
| macrocephala NOTOTHENIA | 6, 45, 46, 47, 48, 50, 65, 66, 69, 71 |
| macrolepis BATHYDRACO | 28 |
| macropterus CHAMSOCEPHALUS | 37 |
| PAGETOPSIS | 10, 11, 12, 15, 37, 39 |
| MACRORHAMPHOSIDÆ | 75 |
| MACROURIDÆ | 13, 75 |
| MACRURUS armatus | 76 |
| australis | 75 |
| maoriensis NOTOTHENIA | 66 |
| marmoratus MURCENOLEPIS | 46, 49 |
| mawsoni CYGNODRACO | 10, 11, 33 |
| MELANONUS gracilis | 77 |
| microlepidota NOTOTHENIA | 6, 18, 46, 50, 69 |
| microlepis ANTIMORA | 76, 77 |
| mirus ARTEDIDRACO | 24 |
| mizops NOTOTHENIA | 46, 50 |
| modesta LEPIDOTRIGLA | 74, 79 |
| mortoni CÆLORHYNCHUS | 75 |
| MURCENOLEPIS marmoratus | 46, 49 |
| murrayi RAI A | 46, 49 |
| MYCTOPHIDÆ | 59, 74 |
| MYCTOPHUM | 59, 61, 74 |
| antarcticum | 45, 46, 47, 49, 59, 61, 74 |
| braueri | 61 |
| NEMATONURUS | 76 |
| armatus | 74, 76 |
| neopilchardus AMBLYGASTER | 46, 49, 56, 81 |
| CLUPANODON | 56 |
| CLUPEA | 56 |
| SARDINA | 81 |
| NEOSCOPELUS | 61 |
| newnesi TREMATOMUS | 10, 11, 18 |
| nicolai NOTOTHENIA | 18 |
| TREMATOMUS | 10, 12, 18 |

| | PAGE. |
|-----------------------------------|----------------------------------------|
| niger IDIACANTHUS | 54, 55 |
| nigripenne TRIPTERYGIUM | 71 |
| nigripinnis CHLOROPHTHALMUS | 74 |
| NOTOLEPIS | 47 |
| NOTOPOGON | 75 |
| lilliei | 74, 75 |
| NOTOSUDIS | 47, 56 |
| hamiltoni | 45, 49, 57 |
| NOTOTHENIA | 6, 19, 22, 48, 64, 70, 71 |
| acuta | 46, 50 |
| angustata | 66 |
| antarctica | 66, 69 |
| arguta | 66 |
| colbecki | 6, 45, 46, 47, 50, 66, 69, 70 |
| coriiceps | 10, 11, 22, 45, 46, 47, 50, 64, 66, 68 |
| cyaneobrancha | 18, 46, 50 |
| elegans | 19 |
| filholi | 46, 50 |
| hassleriana | 66, 68 |
| hodgsoni | 18 |
| lepidorhinus | 19 |
| macquariensis | 64, 66 |
| macrocephala | 6, 45, 46, 47, 48, 50, 65, 66, 69, 71 |
| maoriensis | 66 |
| microlepidota | 6, 18, 46, 50, 69 |
| mizops | 46, 50 |
| nicolai | 18 |
| parva | 69 |
| porteri | 66 |
| scotti | 21 |
| sima | 19 |
| squamifrons | 46, 50 |
| NOTOTHENIIDÆ | 18, 34, 64 |
| nudiceps BATHYDRACO | 10, 12, 27, 29 |
| NYCTOPHUS | 61 |
| ocularis PARAPERKIS | 79 |
| orianæ ARTEDIDRACO | 24 |
| oxygeneios POLYPRION | 55 |
| PAGETODES | 40 |
| antarcticus | 40 |
| PAGETOPSIS | 37, 38, 40 |
| macropterus | 10, 11, 12, 15, 37, 39 |
| palliolatus HARPAGIFER | 70 |
| palmatus PHYSICULUS | 77 |
| pappenheimi CRYODRACO | 40 |
| PARACHÆNICHTHYS | 32, 33 |
| PARALIPARIS | 9, 43 |
| antarcticus | 44, 81 |

| | PAGE. |
|--------------------------|--------------------|
| PARALIPARIS bathybi | 44 |
| terre novæ | 81 |
| wildi | 10, 12, 43, 44, 81 |
| PARAPERKIS | 79 |
| allporti | 74, 79 |
| ocularis | 79 |
| parva NOTOTHENIA | 69 |
| pennellii TREMATOMUS | 10, 11, 20, 21 |
| PERKIS allporti | 79 |
| percoides HELICOLENUS | 78 |
| SCORPÆNA | 74, 78 |
| SEBASTAPISTES | 78 |
| SEBASTES | 78 |
| PHYSICULUS | 77 |
| barbatus | 74, 77 |
| palmatus | 77 |
| PLEURAGRAMMA | 22 |
| antarcticum | 10, 12, 15, 22 |
| POGONOPHRYNE | 26 |
| scotti | 10, 11, 26 |
| POLYPRION americanus | 55 |
| oxygenios | 55 |
| porteri NOTOTHENIA | 66 |
| PRIONODRACO | 35 |
| evansii | 10, 11, 12, 35 |
| PRISTIOPHORIDÆ | 51 |
| PSEUDOPHYSIS barbatus | 77 |
| RACOVITZAIA | 30, 63 |
| RAIA eatoni | 46, 49 |
| murrayi | 46, 49 |
| rhinoceratus CHÆNICHTHYS | 46, 50 |
| RHOMBOSOLEA tapirina | 46, 49 |
| robustum TRYPTERIGIUM | 71 |
| roseo-pictus BOVICHTHYS | 77 |
| rostrata ANTIMORA | 76, 77 |
| rugosus CHÆNICHTHYS | 46, 50 |
| SARDINA neopilchardus | 81 |
| SCOPELUS antarcticus | 59 |
| colletti | 59 |
| SCORPÆNA | 78 |
| barathri | 78 |
| percoides | 74, 78 |
| SCORPÆNIDÆ | 72, 78 |
| scotiæ BATHYDRACO | 28 |
| scotti NOTOTHENIA | 21 |
| POGONOPHRYNE | 10, 11, 26 |
| TREMATOMUS | 10, 11, 12, 21 |
| SCYMNORHINIDÆ | 51 |

| | PAGE |
|---------------------------------|--------------------|
| SCYMNORHINUS | 52 |
| SEBASTAPISTES percoides | 78 |
| SEBASTES percoides | 78 |
| shackletoni ARTEDIDRACO | 10, 11, 23, 24 |
| sima NOTOTHENIA | 19 |
| skottsbergi ARTEDIDRACO | 23, 24 |
| SOMNIOSUS | 45, 47, 49, 51, 52 |
| spinifer ZANCLORHYNCHUS | 45, 46, 47, 50, 72 |
| SQUALIDÆ | 51, 52 |
| squamifrons NOTOTHENIA | 46, 50 |
| STOMATIIDÆ | 53 |
| SUDIDÆ | 47, 56, 74 |
| SYNGNATHUS blainvillianus | 46, 49 |
| tapirina RHOMBOSOLEA | 46, 49 |
| terræ novæ PARALIPARIS | 81 |
| TREMATOMUS | 18, 19, 47 |
| bernacchii | 10, 11, 19 |
| centronotus | 10, 11, 12, 21 |
| eulepidotus | 10, 11, 12, 21, 22 |
| georgianus | 19 |
| hansoni | 10, 12, 19, 20 |
| lepidorhinus | 21 |
| loennbergii | 10, 11, 12, 20 |
| newnesi | 10, 11, 18 |
| nicolai | 10, 12, 18 |
| pennelli | 10, 11, 20, 21 |
| scotti | 10, 11, 12, 21 |
| TRIGLIDÆ | 79 |
| TRIPTERYGION | 71 |
| capito | 71 |
| nigripenne | 71 |
| varium | 46, 50, 71 |
| TRIPTERYGIUM jenningsi | 71 |
| TRYPTERYGIUM robustum | 71 |
| TRYPTERYGIUM fenestratum | 71 |
| forsteri | 71 |
| variabilis CORYPHÆNOIDES | 76 |
| variegatus BOVICHTHYS | 46, 49, 63, 77 |
| varius BLENNIUS | 71 |
| varium TRIPTERYGION | 46, 50, 71 |
| viola ANTIMORA | 74, 76, 77 |
| HALOPORPHYRUS | 76 |
| whitsoni CHALINURA | 10, 11, 14 |
| wildi PARALIPARIS | 10, 12, 43, 44, 81 |
| ZANCLISTIUS elevatus | 74, 78 |
| ZANCLORHYNCHUS | 47, 48, 72 |
| spinifer | 45, 46, 47, 50, 72 |
| ZOARCIDÆ | 14 |