CANTERBURY COLLEGE

(University of New Zealand).

RECORDS

OF THE

CANTERBURY MUSEUM

Vol. I.

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

CHRISTCHURCH, NEW ZEALAND.
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FISHES OF NEW ZEALAND,

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INTRODUCTION.

EVERY worker in systematic zoology appreciates the value, almost the necessity, of having at hand, a list which supplies exact references to the original descriptions of the constituents of the fauna he is studying.

The catalogue of fishes in the "Index Faunæ Novæ Zealandiæ," prepared by the late Captain F. W. Hutton, F.R.S.,[1] forms the foundation of this list, and considering that the Index was issued only three years ago, it may reasonably be asked, why another list, almost indentical as regards species, is published so soon.

The "Index" does not supply references to the original descriptions, nor to any list where such are indicated, and as this information forms the foundation of the present work, I have entitled it a "basic list."

Zoologists have agreed to accept the tenth edition of the "Systema Naturæ," (1758), as the starting point of nomenclature, but this rule has not been observed in the "Index" and we find currency given to generic names, bestowed previous to 1758; for example:—1686 (Willoughby), 1738 (Artedi), 1743 Klein, 1748 (Linnæus, sixth edition), 1754 (Gronovius). It will be obvious, therefore, that many of the generic names differ in the respective lists. Some of the species also now appear in unfamiliar guise, and for purposes of ready comparison with the "Index," numbers are enclosed within square brackets; the first indicating the page, and the second the

1. Hutton, Index Faunæ Novæ Zealandiæ, 1904, Pisces, pp. 40-55.

position of the species thereon, thus [43-18], against No. 162 of the basic list, indicates that *Histiophorus herschelii*, the 18th species on page 43 of the "Index" is herein referred to as *Tetrapturus indicus*.

While species are natural, though mutable, genera are largely artificial and subject to the personal views of the investigator; it follows, therefore, that in time an approach will be made to a thorough knowledge of the species, by the discovery of new, and the elimination of nominal forms: zoologists are not, however, likely to agree in respect to genera, except by mutual arrangement, and it is to be noted that this list is intended merely as a basis for future zoological or systematic research.

Care has been taken in the matter of authorities and dates. An accurate reference to the original description of the species has been the chief aim; the genus with which each was first associated, and that with which it is now indentified is given, and also the author and date of modern genera.

The Selacians are arranged according to the recent classification of Mr C. Tate Regan,[2] the Teleosteans mainly on that proposed by by Dr. G. A. Boulenger,[3] but the writer is not in full accord with the nomenclature respectively used. The writings of American Ichthyologists have been freely consulted, especially those of Dr. Gill, Dr. Jordan and his colleagues, also Drs. Evermann, Fowler, and Gilbert.

E. R. W.

15th March 1907.

2. Regan, Proc. Zool. Soc. 1906, p. 722.
3. Boulenger, Cambr. Nat. Hist. VII., 1904.

THE FISHES

OF

NEW ZEALAND.

Class I. LEPTOCARDII (Lancelets).

Family BRANCHIOSTOMIDÆ.

HETEROPLEURON, Kirkaldy, 1895.

1. HETEROPLEURON HECTORI, Benham.

Heteropleuron hectori, Benham, Q.J.M.S., (2) xliv., 1901, p. 273. [55-3]

Class II. CYCLOSTOMATA (Borers and Lampreys).

Order Hyperotreti (Hagfishes).

Family EPTATRETIDÆ (Borers).

EPTATRETUS, Duméril, 1819.

2. EPTATRETUS CIRRHATUS, Forster.

Petromyzon cirrhatus, Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 532. [55-2]

Order Hyperoartii (Lampreys).

Family PETROMYZONIDÆ.

GEOTRIA, Gray, 1851.

3. GEOTRIA AUSTRALIS, Gray.

Geotria australis, Gray, Proc. Zool. Soc. 1851, p. 239. [55-1]

Class III. PISCES (Fishes).

Sub-Class. Selachii (Sharks and Rays).

PLEUROTREMATA (Sharks).

Division I. Notidanoidei.

Family HEXANCHIDÆ.

HEPTRANCHIAS, Rafinesque, 1810.

4. HEPTRANCHIAS INDICUS, Agassiz.

Notidanus indicus, Agassiz, Poiss. Foss. Feuilleton, 1835, p. 71. [54-12]

Division II. Galeoidei.

Family LAMNIDÆ.

LAMNA, Cuvier, 1817.

5. LAMNA NASUS, Bonnaterre.

Squalus nasus, Bonnaterre, Tableau Encycl., Ichth., 1788, p. 10. [54-6]

CARCHARODON, Smith, 1837.

6. CARCHARODON CARCHARIAS, Linnæus.

Squalus carcharias, Linnæus, Syst. Nat. ed. x. 1758, p. 235. [54-5]

CETORHINUS, Blainville, 1816.

7. CETORHINUS MAXIMUS, Gunner.

Squalus maximus, Gunner, Trondhjem Selskabs. iii., 1765, p. 33. [54-4]

ALOPIAS, Rafinesque, 1810.

8. ALOPIAS VULPINUS, Bonnaterre,

Squalus vulpinus, Bonnaterre, Tableau Encycl., Ichth., 1788, p. 9. [54-3]

Family SCYLIORHINIDÆ.

CEPHALOSCYLLIUM, Gill, 1861.

9. CEPHALOSCYLLIUM LATICEPS, Duméril.

Scyllium laticeps, Duméril, Rev. et Mag. Zool. 1853, p. 84. [54-7]

Family CARCHARIIDÆ.

CARCHARIAS, Rafinesque, 1810.

10. CARCHARIAS LAMIA, Rafinesque.

Carcharias lamia, Rafinesque, Indice d'Ittiol. Sicil., 1810, p. 44. [53-10]

11. CARCHARIAS BRACHYURUS, Günther.

Carcharias brachyurus, Günther, Cat. Fish. viii., 1870, p. 369. [53-11]

GALEUS, Rafinesque, 1810.

12. GALEUS AUSTRALIS, Macleay.

Galeus australis, Macleay, Proc. Linn. Soc. N.S. Wales, vi., 1881, p. 354. [54-1]

MUSTELUS, Linck, 1790.

13. MUSTELUS ANTARCTICUS, Günther.

Mustelus antarcticus, Günther, Cat. Fish. viii., 1870, p. 387. [54-2]

CESTRACION, Walbaum, 1792.

14. CESTRACION ZYGÆNA, Linnæus.

Squalus zygæna, Linnæus, Syst. Nat. ed. x., 1758, p. 234. [53-9]

Division III. Squaloidei.

Family SQUALIDÆ.

ECHINORHINUS, Blainville, 1816.

15. ECHINORHINUS BRUCUS, Bonnaterre.

Squalus brucus, Bonnaterre, Tableau Encycl. Ichth., 1788, p. 11. [54-11]

OXYNOTUS, Rafinesque, 1810.

16. OXYNOTUS BRUNIENSIS, Ogilby.

Centrina bruniensis, Ogilby, Rec. Aust. Mus. ii., 1893, p. 62. [54-8]

SQUALUS, Linnæus, 1758.

17. SQUALUS ACANTHIAS, Linnæus.

Squalus acanthias, Linnæus, Syst. Nat. ed. x., 1758, p. 233. [54-9]

DALATIAS, Rafinesque, 1810.

18. DALATIAS LICHA, Bonnaterre.

Squalus licha, Bonnaterre, Tableau Encycl. Ichth., 1788, p. 12. [54-10]

EUPROTOMICRUS, Gill, 1864.

19. EUPROTOMICRUS LABORDII, Quoy and Gaimard.

Leiche laborde, Quoy and Gaimard, Voy. Uranie, Zool., 1824, p. 197. [— —]

HYPOTREMATA (Rays).

Division I. Narcaciontoidei (Electric Rays).

Family NARCACIONTIDÆ.

NARCACION, Walbaum, 1792.

20. NARCACION FAIRCHILDI, Hutton.

Torpedo fairchildi, Hutton, Cat. Fish. N.Z., 1872, p. 83. [53-6]

21. NARCACION FUSCA, Parker.

Torpedo fusca, Parker, T.N.Z.I. xvi., 1884, p. 281. [53-7]

ASTRAPE, Müller and Henle, 1838.

22. ASTRAPE AYSONI, Hamilton.

Astrape aysoni, Hamilton, T.N.Z.I. xxxiv., 1902, p. 224. [53-8]

Division II. Batoidei.

Family RAJIDÆ.

RAJA, Linnæus, 1758.

23. RAJA NASUTA, Müller and Henle.

Raja nasuta, Müller and Henle, Plagiostomen, 1838, p. 150. [53-9]

Family DASYBATIDÆ.

DASYBATUS, Walbaum, 1792.

24. DASYBATUS BREVICAUDATUS, Hutton.

Trygon brevicaudata, Hutton, T.N.Z.I. viii., 1876, p. 216. [53-5]

MYLIOBATIS, Duméril, 1817.

25. MYLIOBATUS TENUICAUDATUS, Hector.

Myliobatus tenuicaudatus, Hector, T.N.Z.I. ix., 1877, p. 468. [53-4]

Holocephali. (Ghost Sharks).

Family CHIMÆRIDÆ.

CALLORHYNCHUS, Cuvier, 1817.

26. CALLORHYNCHUS CALLORYNCHUS, Linnæus.

Chimæra callorynchus, Linnæus, Syst. Nat. ed. x., 1758, p. 236. [53-2]

CHIMÆRA, Linnæus, 1758.

27. CHIMÆRA AUSTRALIS, Hector.

Chimæra monstrosa, var. *australis*, Hector, T.N.Z.I., xxxiv. 1902, p. 239. [53-3]

Sub-class Teleostomi (True Fishes).

MALACOPTERYGII.

Family CLUPEIDÆ.

ENGRAULIS, Cuvier, 1817.

28. ENGRAULIS ANTIPODUM, Günther.

Engraulis encrasicholus, var. *antipodum*, Günther. [51-20]
Cat. Fish. Brit. Mus. vii., 1868, p. 386.

CLUPEA, Linnæus, 1758.

29. CLUPEA SAGAX, Jenyns.

Clupea sagax, Jenyns, Zool. Voy. Beagle, 1842, p. 134. [51-18]

30. CLUPEA ANTIPODUM, Hector.

Clupea sprattus, var. *antipodum*, Hector, Edible Fish. N.Z., 1872, p. 133. [51-19]

CHANOS, Lacépède, 1803.

31. CHANOS CHANOS, Forskal.

Mugil chanos, Forskal, Descr. Anim., 1775, p. 74. [51-17]

Family SALMONIDÆ.

ARGENTINA, Linnæus, 1758.

32. ARGENTINA DECAGON, Clarke.

Argentina decagon, Clarke, T.N.Z.I. xi., 1879, p. 296. [51-1]

33. ARGENTINA ELONGATA, Hutton.

Argentina elongata, Hutton, Ann. Mag. Nat. Hist. (5), iii., 1879, p. 53. [51-2]

RETROPINNA, Gill, 1862.

34. RETROPINNA RETROPINNA, Richardson.

Argentina retropinna, Richardson, Voy. Ereb. and Terr. 1848, p. 121. [51-3]

Family STOMIATIDÆ.

GONOSTOMA, Rafinesque, 1810.

35. GONOSTOMA MICRODON, Günther.

Gonostoma microdon, Günther, Ann. Mag. Nat. Hist. (5), ii., 1878, p. 187. [50-7]

PHOSICHTHYS, Hutton, 1872.

36. PHOSICHTHYS ARGENTEUS, Hutton.

Phosichthys argenteus, Hutton, Cat. Fish. N.Z., 1872, p. 56. [50-5]

MAUROLICUS, Cocco, 1838.

37. MAUROLICUS AUSTRALIS, Hector.

Maurolicus australis, Hector, T.N.Z.I. vii. 1875, p. 250. [50-6]

ARGYROPELECUS, Cocco, 1829.

38. ARGYROPELECUS INTERMEDIUS, Clarke.

Agryropelecus intermedius, Clarke, T.N.Z.I. x., 1878, p. 244. [50-3]

STERNOPTYX, Hermann, 1781.

39. STERNOPTYX DIAPHANA, Hermann.

Sternoptyx diaphana, Hermann, Naturforscher, xvi., 1781, p. 8. [50-4]

Family GONORHYNCHIDÆ.

GONORHYNCHUS, Cuvier, 1817.

40. GONORHYNCHUS GONORYNCHUS, Linnæus.

Cyprinus gonorynchus, Linnæus, Syst. Nat. ed. xii., 1766, p. 528. [51-16]

Apodes.

Family ANGUILLIDÆ.

ANGUILLA, Shaw, 1804.

41. ANGUILLA AUCKLANDII, Richardson.

Anguilla aucklandii, Richardson, Voy. Ereb. and Terr. 1848, p. 113. [52-1]

42. ANGUILLA AUSTRALIS, Richardson.

Anguilla australis, Richardson, Proc. Zool. Soc. 1841, p. 22. [52-2]

CONGERMURÆNA, Kaup, 1856.

43. CONGERMURÆNA HABENATA, Richardson.

Congrus habenatus, Richardson, Voy. Ereb. and Terr., 1848, p. 109. [52-3]

LEPTOCEPHALUS, Scopoli, 1777.

44. LEPTOCEPHALUS CONGER, Linnæus.

Murœna conger, Linnæus, Syst. Nat. ed. x. 1758, p. 245. [52-4]

OPHISURUS, Lacépède, 1800.

45. OPHISURUS NOVÆ-ZEALANDIÆ, Hector.

Ophisurus novæ-zealandiæ, Hector, T.N.Z.I. ii. 1870, p. 34. [51-22]

Family MURÆNIDÆ.

MURÆNA, Linnæus, 1758.

46. MURÆNA KRULLII, Hector.

Muræna krullii, Hector, T.N.Z.I. ix. 1877, p. 468. [51-21]

Haplomi.

Family GALAXIIDÆ.

GALAXIAS, Cuvier, 1817.

47. GALAXIAS ALEPIDOTUS, Forster.

Esox alepidotus, Forster, Descr. Anim. 1844, p. 142. [51-4]

48. GALAXIAS FASCIATUS, Gray.

Galaxias fasciatus, Gray, Zool. Misc. 1831, p. 73. [51-7]

49. GALAXIAS BREVIPINNIS, Günther.

Galaxias brevipinnis, Günther, Cat. Fish. Brit. Mus. vi. 1866, p. 213. [51-11]

50. GALAXIAS LYNX, Hutton.

Galaxias lynx, Hutton, T.N.Z.I. xxviii. 1896, p. 317. [51-13]

51. GALAXIAS ATTENUATUS, Jenyns.

Mesites attenuatus, Jenyns, Voy. Beagle, 1842, p. 121. [51-14]

52. GALAXIAS HUTTONI, Regan.

Galaxias huttoni, Regan, Proc. Zool. Soc. 1905, ii. (1906), p. 373. [— —]

NEOCHANNA, Günther, 1867.

53. NEOCHANNA APODA, Günther.

Neochanna apoda, Günther, Ann. Mag. Nat. Hist. (3) xx. 1867, p. 306. [51-15]

Family APLOCHITONIDÆ.

PROTOTROCTES, Günther, 1864.

54. PROTOTROCTES OXYRHYNCHUS, Günther.

Prototroctes oxyrhynchus, Günther, Proc. Zool. Soc., 1870, p. 152. [50-17]

Family MYCTOPHIDÆ.

BATHYSAURUS, Günther, 1878.

55. Bathysaurus ferox, Günther.

Bathysaurus ferox, Günther, Ann. Mag. Nat. Hist. (5), ii. 1878, p. 182. [50-14]

BATHYPTEROIS, Günther, 1878.

56. Bathypterois longifilis, Günther.

Bathypterois longifilis, Günther, Ann. Mag. Nat. Hist. (5), ii. 1878, p. 183. [50-16]

CHLOROPHTHALMUS, Bonaparte, 1840.

57. Chlorophthalmus gracilis, Günther.

Chlorophthalmus gracilis, Günther, Ann. Mag. Nat. Hist. (5), ii. 1878, p. 182. [50-15]

MYCTOPHUM, Rafinesque, 1810.

58. Myctophum hectoris, Günther.

Scopelus hectoris, Günther, Ann. Mag. Nat. Hist. (4), xvii., 1876, p. 399. [50-9]

59. Myctophum boops, Richardson.

Myctophum boops, Richardson, Voy. Ereb. and Terr. 1845, p. 39. [50-10]

NEOSCOPELUS, Johnson, 1863.

60. Neoscopelus macrolepidotus, Johnson.

Neoscopelus macrolepidotus, Johnson, Proc. Zool. Soc. 1863, p. 44. [50-12]

RHINOSCOPELUS, Lütken, 1892.

61. Rhinoscopelus coruscans, Richardson.

Myctophum coruscans, Richardson, Voy. Ereb. and Terr. 1845, p. 40. [50-11]

LAMPANYCTUS, Bonaparte, 1840.

62. Lampanyctus parvimanus, Günther.

Scopelus parvimanus, Günther, Cat. Fish. Brit. Mus. v., 1864, p. 406. [50-8]

Family ALEPISAURIDÆ.

ALEPISAURUS, Lowe, 1833.

63. Alepisaurus ferox, Lowe.

Alepisaurus ferox, Lowe, Proc. Zool. Soc., 1833, p. 104. [50-13]

Heteromi.

Family NOTACANTHIDÆ.

NOTACANTHUS, Bloch, 1787.

64. NOTACANTHUS SEXSPINIS, Richardson.

Notacanthus sexspinis, Richardson, Voy. Ereb. and Terr, 1846, p. 54. [47-12]

Hemibranchii.

Family MACRORHAMPHOSIDÆ.

CENTRISCOPS, Gill, 1862.

65. CENTRISCOPS HUMEROSUS, Richardson.

Centriscus humerosus, Richardson, Voy. Ereb. and Terr., 1846, p. 56. [46-20]

Family SYNGNATHIDÆ.

SYNGNATHUS, Linnæus, 1758.

66. SYNGNATHUS PELAGICUS, Linnæus.

Syngnathus pelagicus, Linnæus, Syst. Nat. ed. x., 1758, p. 337. [52-10]

67. SYNGNATHUS BLAINVILLIANUS, Eydoux and Gervais.

Syngnathus blainvillianus, Eydoux and Gervais, in Guérin, Mag. Zool. vii., 1837, pl. xvii. [52-11]

ICHTHYOCAMPUS, Kaup, 1853.

68. ICHTHYOCAMPUS FILUM, Günther.

Ichthyocampus filum, Günther, Cat. Fish. Brit. Mus. viii. 1870, p. 178. [52-8]

DORYRHAMPHUS, Kaup, 1853.

69. DORYRHAMPHUS ELEVATUS, Hutton.

Doryichthys elevatus, Hutton, Cat. Fish. N.Z. 1872, p. 68. [52-9]

STIGMATOPORA, Kaup, 1853.

70. STIGMATOPORA LONGIROSTRIS, Hutton.

Stigmatophora longirostris, Hutton, Cat. Fish. N.Z., 1872, p. 69 [52-7]

SOLEGNATHUS, Swainson, 1839.

71. SOLEGNATHUS SPINOSISSIMUS, Günther.

Solenognathus spinosissimus, Günther, Cat. Fish. Brit. Mus. viii., 1870, p. 195. [52-6]

HIPPOCAMPUS, Rafinesque, 1810.

72. Hippocampus abdominalis, Lesson.

Hippocampus abdominalis, Lesson, in Ferussac, Bull. Sci. Nat. xi., 1827, p. 127. [52-5]

Percesoces.

Family SCOMBRESOCIDÆ.

SCOMBRESOX, Lacépède, 1803.

73. Scombresox forsteri, Cuvier and Valenciennes.

Scombresox forsteri, Cuvier and Valenciennes, Hist. Nat. Poiss. xviii., 1846, p. 481. [50-2]

HYPORHAMPHUS, Gill, 1859.

74. Hyporhamphus intermedius, Cantor..

Hemiramphus intermedius, Cantor, Ann. Mag. Nat. Hist. ix. 1842, p. 485. [50-1]

EVOLANTIA, Snodgrass and Heller, 1903.

75. Evolantia microptera, Cuvier and Valenciennes.

Exocœtus micropterus, Cuvier and Valenciennes, Hist. Nat. Poiss. xix., 1846, p. 127. [49-17]

EXONAUTES, Jordan and Evermann, 1895.

76. Exonautes speculiger, Cuvier and Valenciennes.

Exocœtus speculiger, Cuvier and Valenciennes, Hist. Nat. Poiss. xix., 1846, p. 94. [49-18]

77. Exonautes ilma, Clarke.

Exocœtus ilma, Clarke T.N.Z.I. xxxi., 1899, p. 94. [49-19]

Family ATHERINIDÆ.

ATHERINA, Linnæus, 1758.

78. Atherina lacunosa, Forster.

Atherina lacunosa, Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 112. [46-16]

Family MUGILIDÆ.

MUGIL, Linnæus, 1758.

79. Mugil cephalus, Linnæus.

Mugil cephalus, Linnæus, Syst. Nat. ed. x., 1758, p. 316. [46-18]

AGONOSTOMUS, Bennett, 1830.

80. AGONOSTOMUS FORSTERI, Bloch and Schneider.

Albula forsteri, Bloch and Schneider, Syst. Ichth. 1801, p. 120. [46-19]

Family SPHYRÆNIDÆ.

SPHYRÆNA, Bloch and Schneider, 1801.

81. SPHYRÆNA OBTUSATA, Cuvier and Valenciennes.

Sphyræna obtusata, Cuvier and Valenciennes, Hist. Nat. Poiss. iii., 1829, p. 350. [46-17]

Family STROMATEIDÆ.

CUBICEPS, Lowe, 1843.

82. CUBICEPS GRACILIS, Lowe.

Seriola gracilis, Lowe, Proc. Zool. Soc. 1843, p. 82. [44-7]

SERIOLELLA, Guichenot, 1847.

83. SERIOLELLA POROSA, Guichenot.

Seriolella porosa, Guichenot, in Gay, Fauna Chilena, Pisces, 1847, p. 238. [44-8]

84. SERIOLELLA BILINEATA, Hutton.

Neptomenus bilineatus, Hutton, T.N.Z.I. v., 1873, p. 261. [44-9]

85. SERIOLELLA BRAMA, Günther.

Neptomenus brama, Günther, Cat. Fish. Brit. Mus. ii., 1860, p. 390. [44-10]

CENTROLOPHUS, Lacépède, 1803.

86. CENTROLOPHUS MAORICUS, Ogilby.

Centrolophus maoricus, Ogilby, Rec. Aust. Mus. ii., 1893, p. 64. [44-11]

87. CENTROLOPHUS BRITANNICUS, Günther.

Centrolophus britannicus, Günther, Ann. Mag. Nat. Hist. (3) vi., 1860, p. 46. [341-1]

SCHEDOPHILUS, Cocco, 1834.

88. SCHEDOPHILUS POROSUS, Richardson.

Diagramma porosa, Richardson, Voy. Ereb. and Terr. 1845, p. 26. [41-3 and 44-12]

Anacanthini.

Family MACROURIDÆ.

CŒLORHYNCHUS, Giorna, 1803.

89. Cœlorhynchus kermadecus, Jordan and Starks.

Cœlorhynchus kermadecus, Jordan and Starks, Bull. U.S. Fish. Comm. xxii., 1904, p. 619. [49-7]

90. Cœlorhynchus australis, Richardson.

Lepidoleprus australis, Richardson, Proc. Zool. Soc. 1839, p. 100. [49-8]

MACROURUS, Bloch, 1787.

91. Macrourus rudis, Günther.

Coryphænoides rudis, Günther, Ann. Mag. Nat. Hist. (5) ii., 1878, p. 24. [49-9]

92. Macrourus serrulatus, Günther.

Coryphænoides serrulatus, Günther, Ann. Mag. Nat. Hist. (5) ii., 1878, p. 26. [49-10]

CETONURUS, Günther, 1887.

93. Cetonurus crassiceps, Günther.

Coryphænoides crassiceps, Günther, Ann. Mag. Nat. Hist. (5) ii., 1878, p. 25. [49-11]

CHALINURA, Goode and Bean, 1883.

94. Chalinura murrayi, Günther.

Coryphænoides murrayi, Günther, Ann. Mag. Nat. Hist. (5) ii., 1878, p. 26. [49-12]

OPTONURUS, Günther, 1887.

95. Optonurus denticulatus, Richardson.

Macrourus denticulatus, Richardson, Voy. Ereb. and Terr., 1846, p. 53. [49-13]

NEMATONURUS, Günther, 1887.

96. Nematonurus armatus, Hector.

Macrurus armatus, Hector, Ann. Mag. Nat. Hist. (4) xv., 1875, p. 81. [49-14]

TRACHYRINCUS, Giorna, 1803.

97. Trachyrincus longirostris, Günther.

Macrurus longirostris, Günther, Ann. Mag. Nat. Hist. (5) ii., 1878, p. 23. [49-15]

MACRURONUS, Günther, 1873.

98. Macruronus novæ-zealandiæ, Hector.

Coryphænoides novæ-zealandiæ, Hector, T.N.Z.I. iii., 1871, p. 136. [49-16]

BATHYGADUS, Günther, 1878.

99. Bathygadus cottoides, Günther.

Bathygadus cottoides, Günther, Ann. Mag. Nat. Hist. (5) ii., 1878, p. 23. [49-1]

Family GADIDÆ.

MERLUCCIUS, Rafinesque, 1810.

100. Merluccius gayi, Guichenot.

Merlus gayi, Guichenot, in Gay, Hist. Nat. Chili, Zool. ii., 1847, p. 328. [49-2]

HALARGYREUS, Günther, 1862.

101. Halargyreus johnsonii, Günther.

Halargyreus johnsonii, Günther, Cat. Fish. Brit. Mus. iv., 1862, p. 342. [48-20]

PHYSICULUS, Kaup, 1858.

102. Physiculus bachus, Forster.

Gadus bachus, Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 53. [48-17, 19]

103. Physiculus rhacinus, Forster.

Gadus rhacinus, Forster, Descr. Anim, 1844, p. 304. [48-18]

GAIDROPSARUS, Rafinesque, 1810.

104. Gaidropsarus novæ-zealandiæ, Hector.

Motella novæ-zealandiæ, Hector, T.N.Z.I. vi., 1874, p. 107. [48-21]

AUCHENOCEROS, Günther, 1889.

105. Auchenoceros punctatus, Hutton.

Calloptilum punctatum, Hutton, T.N.Z.I. v., 1873, p. 267. [49-3]

Acanthopterygii.

Family BERYCIDÆ.

BERYX, Cuvier, 1829.

106. Beryx affinis, Günther.

Beryx affinis, Günther, Cat. Fish. Brit. Mus. i., 1859. p. 13. [43-13]

TRACHICHTHYS, Shaw and Nodder, 1799.

107. TRACHICHTHYS ELONGATUS, Günther.

Trachichthys elongatus, Günther, Cat. Fish. Brit. Mus. i., 1859, p. 10. [43-15]

108. TRACHICHTHYS INTERMEDIUS, Hector.

Trachichthys intermedius, Hector, T.N.Z.I. vii., 1875, p. 245. [43-16]

PARATRACHICHTHYS, Waite, 1899.

109. PARATRACHICHTHYS TRAILLI, Hutton.

Trachichthys trailli, Hutton, T.N.Z.I. viii., 1876, p. 212. [43-14]

Family SERRANIDÆ.

POLYPRION, Cuvier, 1817.

110. POLYPRION PROGNATHUS, Forster.

Perca prognatha, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 301. [40-1]

HYPOPLECTRODES, Gill, 1862.

111. HYPOPLECTRODES SEMICINCTUS, Cuvier and Valenciennes.

Plectropoma semicinctum, Cuvier and Valenciennes, Hist. Nat. Poiss. ix., 1833, p. 442. [40-2]

CÆSIOPERCA, Castelnau, 1872.

112. CÆSIOPERCA LEPIDOPTERA, Forster.

Perca lepidoptera, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 302. [41-1]

CAPRODON, Temminck and Schlegel, 1844.

113. CAPRODON LONGIMANUS, Günther.

Anthias longimanus, Günther, Cat. Fish. Brit. Mus. i., 1859, p. 94. [41-2]

PLAGIOGENEION, Forbes, 1890.

114. PLAGIOGENEION RUBIGINOSUS, Hutton.

Therapon rubiginosus, Hutton, T.N.Z.I. viii., 1876, p. 209. [41-4]

PSEUDOPENTACEROS, Gill, 1893.

115. PSEUDOPENTACEROS RICHARDSONII, Smith.

Pentaceros richardsonii, Smith, Ill. Zool. S. Africa, Fishes, 1849, Pl. xxi. [41-5]

HISTIOPTERUS, Temminck and Schlegel, 1844.

116. HISTIOPTERUS LABIOSUS, Günther.

Histiopterus labiosus, Günther, Proc. Zool, Soc. 1871, p. 658. [— —]

Family SCIÆNIDÆ.

ARRIPIS, Jenyns, 1840.

117. ARRIPIS TRUTTA, Forster.

Sciæna trutta, Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 542. [41-6]

Family MÆNIDÆ.

EMMELICHTHYS, Richardson, 1845.

118. EMMELICHTHYS NITIDUS, Richardson.

Emmelichthys nitidus, Richardson, Voy. Ereb. and Terr. 1845, p. 47. [41-7]

Family LATRIDIDÆ.

LATRIS, Richardson, 1840.

119. LATRIS CILIARIS, Forster.

Sciæna ciliaris, Forster, Descr. Anim. 1844, p. 137. [42-6]

120. LATRIS LINEATA, Forster.

Sciæna lineata, Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 342. [42-7]

121. LATRIS ÆROSA, Hutton.

Latris ærosa, Hutton, T.N.Z.I. ix., 1877, p. 353. [42-8]

Family CIRRHITIDÆ.

APLODACTYLUS, Cuvier and Valenciennes, 1831.

122. APLODACTYLUS MEANDRATUS, Richardson.

Aplodactylus meandratus, Richardson, Trans. Zool. Soc. iii. 1849, p. 83. [41-14]

CHEILODACTYLUS, Lacépède, 1803.

123. CHEILODACTYLUS MACROPTERUS, Forster.

Sciæna macroptera, Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 342. [42-3]

124. CHEILODACTYLUS DOUGLASII, Hector.

Cheilodactylus douglasii, Hector, T.N.Z.I. vii., 1875, p. 244. [42-4]

CHIRONEMUS, Cuvier, 1829.

125. CHIRONEMUS FERGUSSONI, Hector.

Haplodactylus fergussoni, Hector, T.N.Z.I. vii., 1875, p. 243. [42-1]

126. CHIRONEMUS SPECTABILIS, Hutton.

Chilodactylus spectabilis, Hutton, Cat. Fish. N.Z., 1872, p. 8. [42-2]

MENDOSOMA, Guichenot, 1847.

127. MENDOSOMA LINEATUM, Guichenot.

Mendosoma lineatum, Guichenot, in Gay, Hist. Chile. Zool. ii., 1847, p. 213. [42-5]

Family SPARIDÆ.

GIRELLA, Gray, 1835.

128. GIRELLA SIMPLEX, Richardson.

Crenidens simplex, Richardson, Voy. Ereb. and Terr., 1848, p. 120. [41-8]

129. GIRELLA MULTILINEATA, Clarke.

Girella multilineata, Clarke, T.N.Z.I. xxxi., 1899, p. 98. [41-9]

PAGROSOMUS, Gill, 1893.

130. PAGROSOMUS AURATUS, Forster.

Labrus auratus, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 266. [41-13]

Family MULLIDÆ.

UPENEICHTHYS, Bleeker, — —.

131. UPENEICHTHYS VLAMINGII, Cuvier and Valenciennes.

Upeneus vlamingii, Cuvier and Valenciennes, Hist. Nat. Poiss. iii., 1829, p. 452. [41-12]

Family SCORPIDIDÆ.

SCORPIS, Cuvier and Valenciennes, 1831.

132. SCORPIS VIOLACEUS, Hutton.

Ditrema violacea, Hutton, T.N.Z.I. v., 1873, p. 261. [41-11]

ATYPICHTHYS, Günther, 1862.

133. ATYPICHTHYS STRIGATUS, Günther.

Atypus strigatus, Günther, Cat. Fish. Brit. Mus. ii., 1860, p. 64. [41-10]

Family LABRIDÆ.

PSEUDOLABRUS, Bleeker, 1861.

134. Pseudolabrus fuscicola, Richardson.

Labrus fuscicola, Richardson, Voy. Ereb. and Terr., 1848, p. 127. [47-15]

135. Pseudolabrus roseipunctatus, Hutton.

Labrichthys roseipunctata, Hutton, T.N.Z.I. xii., 1880, p. 455. [47-16]

136. Pseudolabrus botryocosmus, Richardson.

Labrus botryocosmus, Richardson, Voy. Ereb. and Terr, 1846, p. 53. [47-17]

137. Pseudolabrus coccineus, Forster.

Labrus coccineus, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 264. [47-18]

138. Pseudolabrus celidotus, Forster.

Labrus celidotus, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 265. [47-19]

139. Pseudolabrus cinctus, Hutton.

Labrichthys cincta, Hutton, T.N.Z.I. ix., 1877, p. 354. [47-20]

140. Pseudolabrus laticlavius, Richardson.

Labrus laticlavius, Richardson, Voy. Ereb. and Terr., 1848, p. 128. [48-1]

CYMOLUTES, Günther, 1861.

141. Cymolutes sandeyeri, Hector.

Cymolutes sandeyeri, Hector, T.N.Z.I. xvi., 1884, p. 323. [48-2]

VERREO, Jordan and Snyder, 1902.

142. Verreo oxycephalus, Bleeker.

Cossyphus oxycephalus, Bleeker, Vers. K. Akad. Amsterd. xiv., 1862, p. 129. [48-3]

DUYMÆRIA, Bleeker, 1856.

143. Duymæria flagellifer, Cuvier and Valenciennes.

Ctenolabrus flagellifer, Cuvier and Valenciennes, Hist. Nat. Poiss. xiii., 1839, p. 240. [48-4]

Family SCARIDÆ.

ODAX, Cuvier, 1829.

144. ODAX VITTATUS, Richardson.

Odax vittatus, Richardson, Ann. Mag. Nat. Hist. xi., 1843, p. 426. [47-13]

CORIDODAX, Günther, 1862.

145. CORIDODAX PULLUS, Forster.

Scarus pullus, Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 288. [47-14]

Family CARANGIDÆ.

CARANX, Lacépède, 1802.

146. CARANX GEORGIANUS, Cuvier and Valenciennes.

Caranx georgianus, Cuvier and Valenciennes, Hist. Nat. Poiss. ix., 1833, p. 85. [44-1]

147. CARANX KOHERU, Hector.

Caranx koheru, Hector, T.N.Z.I. vii., 1875, p. 247. [44-2]

148. CARANX TRACHURUS, Linnæus.

Scomber trachurus, Linnæus, Syst. Nat. ed. x., 1758, p. 298. [44-3]

SERIOLA, Cuvier, 1829.

149. SERIOLA LALANDI, Cuvier and Valenciennes.

Seriola lalandi, Cuvier and Valenciennes, Hist. Nat. Poiss. ix., 1833. p. 208. [44-4]

NAUCRATES, Rafinesque, 1810.

150. NAUCRATES DUCTOR, Linnæus.

Gasterosteus ductor, Linnæus, Syst. Nat. ed. x. 1758, p. 295. [44-5]

EVISTIUS, Gill, 1893.

151. EVISTIUS HUTTONII, Günther.

Platystethus huttonii, Günther, Ann. Mag. Nat. Hist. (4) xvii. 1876, p. 395. [44-6]

Family SCOMBRIDÆ.

SCOMBER, Linnæus, 1758.

152. SCOMBER AUSTRALASICUS, Cuvier and Valenciennes.

Scomber australasicus, Cuvier and Valenciennes, Hist. Nat. Poiss. viii., 1831, p. 49. [44-16]

GYMNOSARDA, Gill, 1862.

153. Gymnosarda pelamis, Linnæus.

Scomber pelamis, Linnæus, Syst. Nat. ed. x., 1758, p. 297. [44-17]

SARDA, Cuvier, 1829.

154. Sarda chiliensis, Cuvier and Valenciennes.

Pelamys chiliensis, Cuvier and Valenciennes, Hist. Nat. Poiss. viii., 1831, p. 163. [45-1]

SCOMBEROMORUS, Lacépède, 1802.

155. Scomberomorus guttatus, Bloch and Schneider.

Scomber guttatus, Bloch and Schneider, Syst. Ichth., 1801, p. 23. [45-3]

GASTEROCHISMA, Richardson, 1845.

156. Gasterochisma melampus, Richardson.

Gasterochisma melampus, Richardson, Ann. Mag. Nat. Hist., xv., 1845, p. 346. [45-4]

LEPIDOTHYNNUS, Günther, 1889.

157. Lepidothynnus huttonii, Günther.

Lepidothynnus huttonii, Günther, Voy. Challenger xxxi., 1889, p. 15. [45-2]

Family TRICHIURIDÆ.

THYRSITES, Cuvier, 1829.

158. Thyrsites atun, Euphrasen.

Scomber atun, Euphrasen, K. Vetensk. Acad. Nya Handl. xii., 1791, p. 315. [43-21]

PROMETHICHTHYS, Gill, 1893.

159. Promethichthys prometheus, Cuvier and Valenciennes.

Gempylus prometheus, Cuvier and Valenciennes, Hist. Nat. Poiss. viii., 1831, p. 213. [43-22]

LEPIDOPUS, Gouan, 1770.

160. Lepidopus caudatus, Euphrasen.

Trichiurus caudatus, Euphrasen, K. Vetensk. Acad. Nya Handl. ix., 1788, p. 52. [43-19]

161. Lepidopus elongatus, Clarke.

Lepidopus elongatus, Clarke, T.N.Z.I. xi., 1879, p. 294. [43-20]

Family ISTIOPHORIDÆ.

TETRAPTURUS, Rafinesque, 1810.

162. TETRAPTURUS INDICUS, Cuvier and Valenciennes.

Tetrapturus indicus, Cuvier and Valenciennes, Hist. Nat. Poiss. viii., 1831, p. 286. [43-18]

Family XIPHIIDÆ.

XIPHIAS, Linnæus, 1758.

163. XIPHIAS GLADIUS, Linnæus.

Xiphias gladius, Linnæus, Syst. Nat. ed. x., 1758, p. 248. [43-17]

Family LAMPRIDÆ.

LAMPRIS, Retzius, 1799.

164. LAMPRIS REGIUS, Bonnaterre.

Zeus regius, Bonnaterre, Encycl. Ichth. 1788, p. 72. [44-13]

Family LEPODIDÆ.

LEPODUS, Rafinesque, 1810.

165. LEPODUS SQUAMOSUS, Hutton.

Toxotes squamosus, Hutton, T.N.Z.I. viii., 1876, p. 210. 44-15]

PTERACLIS, Gronovius, 1772.

166. PTERACLIS VELIFERA, Pallas.

Coryphæna velifera, Pallas, Spicil. Zool. viii., 1770, p. 19. [44-14]

Family ZEIDÆ.

ZEUS, Linnæus, 1758.

167. ZEUS FABER, Linnæus.

Zeus faber, Linnæus, Syst. Nat. ed. x., 1758, p. 137. [45-7]

CYTTUS, Günther, 1860.

168 CYTTUS AUSTRALIS, Richardson.

Capros australis, Richardson, Voy. Ereb. and Terr., 1848, p. 137. [45-8]

169. CYTTUS NOVÆ-ZEALANDIÆ, Arthur.

Zeus novæ-zealandiæ, Arthur, T.N.Z.I. xvii., 1885, p. 163. [45-9]

RHOMBOCYTTUS, Gill, 1893.

170. RHOMBOCYTTUS TRAVERSI, Hutton.

Cyttus traversi, Hutton, Cat. Fish. N.Z., 1872, p. 19. [45-10]

DIRETMUS, Johnson, 1863.

171. DIRETMUS AUREUS, Campbell.

Discus aureus, Campbell, T.N.Z.I. xi., 1879, p. 297. [45-11]

CAPROMIMUS, Gill, 1893.

172. CAPROMIMUS ABBREVIATUS, Hector.

Platystethus abbreviatus, Hector, T.N.Z.I. vii., 1875, p. 247. [45-6]

Family PLEURONECTIDÆ.

CAULOPSETTA, Gill, 1893.

173. CAULOPSETTA SCAPHA, Forster,

Pleuronectes scapha, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 163. [48-5]

174. CAULOPSETTA BOOPS, Hector.

Pseudorhombus boops, Hector, T.N.Z.I. vii., 1875, p. 249. [48-6]

175. CAULOPSETTA HECTORIS, Günther.

Pseudorhombus hectoris, Günther, Voy. Challenger, xxii., 1887, p. 163. [48-7]

BRACHYPLEURA, Günther, 1862.

176. BRACHYPLEURA NOVÆ-ZEALANDIÆ, Günther.

Brachypleura novæ-zealandiæ, Günther, Cat. Fish. Brit. Mus. iv., 1862, p. 419. [48-8]

AMMOTRETIS, Günther, 1862.

177. AMMOTRETIS ROSTRATUS, Günther.

Ammotretis rostratus, Günther, Cat. Fish. Brit. Mus. iv., 1862, p. 458. [48-9]

178. AMMOTRETIS GUNTHERI, Hutton.

Ammotretis guntheri, Hutton, T.N.Z.I. v., 1873, p. 267. [48-10]

RHOMBOSOLEA, Günther, 1862.

179. RHOMBOSOLEA PLEBEIA, Richardson.

Rhombus plebeius, Richardson, in Dieffenbach, Travels in N.Z. ii., 1843, p. 222. [48-11]

180. Rhombosolea flesoides, Günther.

Rhombosolea flesoides, Günther, Ann. Mag. Nat. Hist. (3) xi., 1863, p. 117. [48-12]

181. Rhombosolea tapirina, Günther.

Rhombosolea tapirina, Günther, Cat. Fish. Brit. Mus. iv., 1862, p. 459. [48-13]

182. Rhombosolea retiaria, Hutton.

Rhombosolea retiaria, Hutton, T.N.Z.I. vi., 1874, p. 107. [48-14]

APSETTA, Kyle, 1901.

183. Apsetta thompsoni, Kyle.

Apsetta thompsoni, Kyle, Proc. Zool. Soc. 1900, (1901), p. 986. [48-15]

PELTORHAMPHUS, Günther, 1862.

184. Peltorhamphus novæ-zealandiæ, Günther.

Peltorhamphus novæ-zealandiæ, Günther, Cat. Fish. Brit. Mus. iv., 1862, p. 461. [48-16]

Family GOBIIDÆ.

GOBIOMORPHUS, Gill, 1863.

185. Gobiomorphus gobioides, Cuvier and Valenciennes.

Eleotris gobioides, Cuvier and Valenciennes, Hist. Nat. Poiss. xii., 1837, p. 247. [45-16]

ELEOTRIS, Bloch and Schneider, 1801.

186. Eleotris radiata, Quoy and Gaimard.

Eleotris radiata, Quoy and Gainard, in Cuvier and Valenciennes, Hist. Nat. Poiss. xii., 1837, p. 250. [45-17]

187. Eleotris huttoni, Ogilby.

Eleotris huttoni, Ogilby, Proc. Linn. Soc. N.S.W. (2) ix., 1894, p. 369. [45-18]

GOBIUS, Linnæus, 1758.

188. Gobius lentiginosus, Richardson.

Gobius lentiginosus, Richardson, Voy. Ereb. and Terr. 1844. p. 3. [45-19]

Family ECHENEIDÆ.

REMORA, Gill, 1862.

189. REMORA BRACHYPTERA, Lowe.

Echeneis brachyptera, Lowe, Proc. Zool. Soc. 1839, p. 89. [45-5]

Family SCORPÆNIDÆ.

SEBASTAPISTES, Gill, 1877.

190. SEBASTAPISTES PERCOIDES, Richardson.

Sebastes percoides, Richardson, Ann. Mag. Nat. Hist. ix., 1842, p. 384. [42-9]

191. SEBASTAPISTES BARATHRI, Hector.

Scorpæna barathri, Hector, T.N.Z.I. vii., 1875, p. 245. [42-10]

SCORPÆNA, Linnæus, 1758.

192. SCORPÆNA CRUENTA, Richardson.

Scorpæna cruenta, Richardson, Ann. Mag. Nat. Hist. ix., 1842, p. 217. [42-11]

193. SCORPÆNA BYNŒNSIS, Richardson.

Scorpæna bynœnsis, Richardson, Voy. Ereb. and Terr., 1845, p. 22. [42-12]

COTTAPISTUS, Bleeker, 1876.

194. COTTAPISTUS COTTOIDES, Linnæus.

Perca cottoides, Linnæus, Syst. Nat. ed. x., 1758, p. 291. [42-13]

CONGIOPODUS, Perry, 1871.

195. CONGIOPODUS LEUCOPÆCILUS, Richardson.

Agriopus leucopæcilus, Richardson, Voy. Ereb. and Terr., 1846, p. 60. [42-14]

196. CONGIOPODUS PERUVIANUS, Cuvier and Valenciennes.

Agriopus peruvianus, Cuvier and Valenciennes, Hist. Nat. Poiss. iv., 1829, p. 389. [42-15]

Family COTTIDÆ.

NEOPHRYNICHTHYS, Günther, 1876.

197. NEOPHRYNICHTHYS LATUS, Hutton.

Psychrolutes latus, Hutton, T.N.Z.I. viii., 1876, p. 214. [42-16]

Family TRIGLIDÆ.

CHELIDONICHTHYS, Kaup, 1873.

198. CHELIDONICHTHYS KUMU, Lesson and Garnot.

Trigla kumu, Lesson and Garnot, Voy. Coquille, Poiss., 1826, Pl. xix. [45-13]

LEPIDOTRIGLA, Günther, 1860.

199. LEPIDOTRIGLA VANESSA, Richardson.

Trigla vanessa, Richardson, Proc. Zool. Soc., 1839, p. 97. [45-14]

200. LEPIDOTRIGLA BRACHYOPTERA, Hutton.

Lepidotrigla brachyoptera, Hutton, Cat. Fish. N.Z., 1872, p. 27. [45-15]

Family LEPTOSCOPIDÆ.

LEPTOSCOPUS, Gill, 1859.

201. LEPTOSCOPUS MACROPYGUS, Richardson.

Uranoscopus macropygus, Richardson, Voy. Ereb. and Terr., 1846, p. 55. [42-17]

CRAPATALUS, Günther, 1861.

202. CRAPATALUS NOVÆ-ZELANDIÆ, Günther.

Crapatalus novæ-zelandiæ, Günther, Ann. Mag. Nat. Hist. (3) vii., 1861, p. 87. [42-18]

CHEIMARRICHTHYS, Haast, 1874.

203. CHEIMARRICHTHYS FOSTERI, Haast.

Cheimarrichthys fosteri, Haast., T.N.Z.I., vi., 1874, p. 103. [43-10]

PARAPERCIS, Bleeker, 1872.

204. PARAPERCIS COLIAS, Forster.

Gadus colias, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 54. [43-11]

205. PARAPERCIS GILLIESII, Hutton.

Percis gilliesii, Hutton, Ann. Mag. Nat. Hist. (5) iii., 1879, p. 53. [43-12]

Family NOTOTHENIIDÆ.

NOTOTHENIA, Richardson, 1844.

206. NOTOTHENIA MAORIENSIS, Haast.

Notothenia maoriensis, Haast, T.N.Z.I. v., 1873, p. 276. [43-4]

207. NOTOTHENIA ANGUSTATA, Hutton.

Notothenia angustata, Hutton, T.N.Z.I. viii., 1876, p. 213. [43-5]

208. NOTOTHENIA CORNUCOLA, Richardson.

Notothenia cornucola, Richardson, Voy. Ereb. and Terr., 1844, p. 8. [43-6]

209. NOTOTHENIA ARGUTA, Hutton.

Notothena arguta, Hutton, T.N.Z.I. xi., 1879, p. 339. [43-7]

210. NOTOTHENIA MICROLEPIDOTA, Hutton.

Notothenia microlepidota, Hutton, T.N.Z.I. viii., 1876, p. 213. [48-8]

211. NOTOTHENIA PARVA, Hutton.

Notothenia parva, Hutton, T.N.Z.I. xi., 1879, p. 339. [43-9]

212. NOTOTHENIA COLBECKI, Boulenger.

Notothenia colbecki, Boulenger, Voy. "Southern Cross," 1902, p. 185. [— —]

BOVICHTUS, Cuvier and Valenciennes, 1831.

213. BOVICHTUS VARIEGATUS, Richardson.

Bovichtus variegatus, Richardson, Voy. Ereb. and Terr., 1846, p. 56 [43-3]

Family URANOSCOPIDÆ.

KATHETOSTOMA, Günther, 1860.

214. KATHETOSTOMA LÆVE, Bloch and Schneider.

Uranoscopus lævis, Bloch and Schneider, Syst. Ichth., 1801, p. 47. [43-1]

215. KATHETOSTOMA FLUVIATILIS, Hutton.

Kathetostoma fluviatilis, Hutton, Cat. Fish. N.Z., 1872, p. 24. [43-2]

GENIAGNUS, Gill, 1861.

216. GENIAGNUS MACULATUS, Forster.

Uranoscopus maculatus, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 49. [42-19]

Family TRICHONOTIDÆ.

HEMEROCŒTES, Cuvier and Valenciennes.

217. HEMEROCŒTES ACANTHORHYNCHUS, Forster.

Callionymus acanthorhynchus, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 41. [46-2]

Family GOBIESOCIDÆ.

DIPLOCREPIS, Günther, 1861.

218. DIPLOCREPIS PUNICEUS, Richardson.

Lepadogaster puniceus, Richardson, Voy. Ereb. and Terr., 1846, p. 71. [47-1]

TRACHELOCHISMUS, Brisson, 1846.

219. TRACHELOCHISMUS PINNULATUS, Forster.

Lepadogaster pinnulatus, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 2. [47-2]

220. TRACHELOCHISMUS LITTOREUS, Forster.

Cyclopterus littoreus, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 199. [47-3]

ASPASMOGASTER, Waite, 1907.

221. ASPASMOGASTER HECTORIS, Günther.

Crepidogaster hectoris, Günther, Ann. Mag. Nat. Hist. (4) xvii. 1876, p. 396. [47-4]

222. ASPASMOGASTER SIMUS, Hutton.

Crepidogaster simus, Hutton, T.N.Z.I., xxviii., 1896, p.316. [47-5]

Family BLENNIIDÆ.

ACANTHOCLINUS, Jenyns, 1842.

223. ACANTHOCLINUS LITOREUS, Forster.

Blennius litoreus, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 177. [46-14]

224. ACANTHOCLINUS TAUMAKA, Clarke.

Acanthoclinus taumaka, Clarke, T.N.Z.I., xi., 1879, p. 293. [46-15]

ERICENTRUS, Gill, 1893.

225. ERICENTRUS RUBRUS, Hutton.

Sticharium rubrum, Hutton, Cat. Fish. N.Z., 1872, p. 33. [46-3]

COLOGRAMMUS, Gill, 1893.

226. COLOGRAMMUS FLAVESCENS, Hutton.

Sticharium flavescens, Hutton, Cat. Fish. N.Z., 1872, p. 33. [46-4]

CRISTICEPS, Cuvier and Valenciennnes, 1836.

227. Cristiceps australis, Cuvier and Valenciennes.

Cristiceps australis, Cuvier and Valenciennes, Hist. Nat. Poiss. xi., 1836, p. 402. [46-5]

TRIPTERYGION, Risso, 1826.

228. Tripterygion tripenne, Forster.

Blennius tripennis, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 174. [46-6, 7]

229. Tripterygion medium, Günther.

Tripterygium medium, Günther, Cat. Fish. Brit. Mus. iii., 1861, p. 278. [46-8]

230. Tripterygion dorsale, Clarke.

Tripterigium dorsalis, Clarke, T.N.Z.I., xi., 1879, p. 291. [46-9]

231. Tripterygion varium, Forster.

Blennius varius, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 178. [46-10, 12]

232. Tripterygion nigripenne, Cuvier and Valenciennes.

Tripterygium nigripenne, Cuvier and Valenciennes, Hist. Nat. Poiss. xi., 1836, p. 413. [46-11]

NOTOCLINUS, Gill, 1893.

233. Notoclinus fenestratus, Forster.

Blennius fenestratus, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 173. [— —]

AUCHENOPTERUS, Günther, 1861.

234. Auchenopterus aysoni, Hector.

Auchenopterus aysoni, Hector, T.N.Z.I., xxxiv., 1902, p. 240. [46-13]

Family OPHIDIIDÆ.

HYPOLYCODES, Hector, 1881.

235. Hypolycodes haastii, Hector.

Hypolycodes haastii, Hector, T.N.Z.I. xiii., 1881, p. 194. [49-4]

DINEMATICHTHYS, Bleeker, 1854.

236. Dinematichthys consobrinus, Hutton.

Dinematichthys consobrinus, Hutton, T.N.Z.I. viii., 1876, p. 217. [49-5]

GENYPTERUS, Philippi, 1857.

237. GENYPTERUS BLACODES, Bloch and Schneider.

Ophidium blacodes, Bloch and Schneider, Syst. Ichth., 1801, p. 484. [49-6]

238. GENYPTERUS MICROSTOMUS, Regan.

Genypterus microstomus, Regan, Ann. Mag. Nat. Hist. (7) xi., 1903, p. 599. [341-2]

Family TRACHIPTERIDÆ.

TRACHIPTERUS, Gouan, 1770.

239. TRACHIPTERUS ALTIVELIS, Kner.

Trachypterus altivelis, Kner. Sitz. K. Akad. Wiss. Wien. xxxiv., 1859, p. 437. [47-6]

240. TRACHIPTERUS ARAWATÆ, Clarke.

Trachypterus arawatæ, Clarke, T.N.Z.I. xiii., 1881, p. 195. [47-7]

REGALECUS, Brünnich, 1788.

241. REGALECUS PACIFICUS, Haast.

Regalecus pacificus, Haast, T.N.Z.I. x., 1878, p. 247. [47-9]

242. REGALECUS ARGENTEUS, Parker.

Regalecus argenteus, Parker, T.N.Z.I., xvi., 1884, p. 284. [47-10]

243. REGALECUS GLESNE, Ascanius.

Ophidium glesne, Ascanius, Nya Samml. Vid. Selsk. Skr. iii., 1788, p. 419. [47-11]

Family LOPHOTIDÆ.

LOPHOTES, Giorna, 1803.

244. LOPHOTES FISKI, Günther.

Lophotes fiski, Günther, Proc. Zool. Soc., 1890., p. 244. [47-8]

Pediculati.

Family CERATIIDÆ.

ÆGŒONICHTHYS, Clarke, 1878.

245. ÆGŒONICHTHYS APPELII, Clarke.

Ægœonichthys appelii, Clarke, T.N.Z.I. x., 1878, p. 245. [45-12]

Plectognathi.

Family MONACANTHIDÆ.

MONACANTHUS, Oken, 1817.

246. MONACANTHUS SCABER, Forster.

Balistes scaber, Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 477. [52-12]

Family OSTRACIIDÆ.

OSTRACION, Linnæus, 1758.

247. OSTRACION FORNASINI, Bianconi.

Ostracion fornasini, Bianconi, Mem. Acad. Sc. Bologn. vi., 18—, p. 151. [— —]

Family TETRAODONTIDÆ.

SPHEROIDES, Duméril, 1806.

248. SPHEROIDES RICHEI, Fréminville.

Tetrodon richei, Fréminville, Nouv. Bull. Philom. ii., 18—, p. 250. [52-13]

249. SPHEROIDES GILLBANKSII, Clarke.

Tetrodon gillbanksii, Clarke, T.N.Z.I., xxix., 1897, p. 245. [52-14]

250. SPHEROIDES CHEESEMANII, Clarke.

Tetrodon cheesemanii, Clarke, T.N.Z.I. xxix., 1897, p. 248. [52-15]

Family DIODONTIDÆ.

DICOTYLICHTHYS, Kaup, 1855.

251. DICOTYLICHTHYS JACULIFERUS, Cuvier.

Diodon jaculiferus, Cuvier, Mem. Mus. Hist. Nat. iv., 1818, p. 130. [52-16]

Family MOLIDÆ.

MOLA, Linck, 1790.

252. MOLA MOLA, Linnæus.

Tetrodon mola, Linnæus, Syst. Nat. ed. x., 1758, p. 334. [53-1]

NOTES.

Bovichiths (Bovichthys) roseo-pictus, Hutton, T.N.Z.I., xxxvi., 1904, p. 148, is a synonym of No. 213.

The following species, recorded by Steindachner (Denk. Ak. Wiss. Wien. LXX., 1900), from New Zealand waters, do not appear in the "Index":—*Haplodactylus schauinslandii*, p. 487; *Caranx speciosus*, p. 495; *Percis nictymera*, p. 497; *Trigla kumoides*, p. 498; *Pseudolabrus cossyphoides*, p. 503; *Lotella grandis*, p. 509; *Scopelus novae seelandiae*, p. 513; *Muraena thysoidea*, p. 514; *Monacanthus rudis*, p. 517; *Scyllium chilense*, p. 519.

Species occurring in this list, but not in the "Index," are marked thus [— —].

When two numbers follow the page indicated, thus—[46-6, 7], the species denoted by the second one is regarded as a synonym of the first.

When a date has not been ascertained, the omission is denoted thus:—

UPENEICHTHYS, Bleeker, — —, or 18—.

INDEX TO GENERA.

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RECORDS

OF THE

CANTERBURY MUSEUM.

Vol. I. No. 2.

Published by authority of the Board of Governors.

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

CHRISTCHURCH, NEW ZEALAND.

13th July, 1909.

CONTENTS.

Scientific Results of the New Zealand Government Trawling Expedition, 1907.

Records of the Canterbury Museum, Vol. I, No. 2.

Scientific Results

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New Zealand Government

Trawling Expedition,

1907.

Edited by EDGAR R. WAITE, F.L.S.,
Curator.

WELLINGTON:
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NOTE.

As this number is being printed by the Government, and issued simultaneously as an official publication, it is uniform with other Government pamphlets, and not with the preceding number of the "Records of the Canterbury Museum."

PREFATORY.

As the following introduction is written in a more popular manner than is usual in scientific publications, and as it deals with matter of local rather than of general interest, some explanation may be advisable.

The expedition was undertaken by the New Zealand Government purely in the interests of the fishing industry, and all specimens gathered, with the exception of the food-fishes, were, by those responsible for the conduct of the expedition, regarded as by-products.

The object of the present publication is to record the results of the scientific examination of all specimens preserved, and the preparation of the several reports has been kindly undertaken by specialists in their respective subjects.

As, however, the Government is, at the instance of the Hon. the Minister of Marine, financially assisting the publication of the results, and as the report therefore partakes of the nature of an official production, something more than a purely scientific treatise is naturally expected.

While, therefore, the special articles are devoted to a record of the scientific results of the expedition, details of the cruise and the historical or otherwise extraneous matter is assigned to the introduction. This will also explain why much apparently appropriate to the report on the fishes appears in the introductory portion.

After the introduction was written, an interim report was published by the Government, and this is also referred to.

E. R. W.

Canterbury Museum, October, 1908.

SCIENTIFIC RESULTS

OF THE

NEW ZEALAND GOVERNMENT TRAWLING EXPEDITION, 1907.

INTRODUCTION.

By Edgar R. Waite, F.L.S.

Plates I–VI and Chart.*

In my introduction to the "Scientific Results of the Trawling Expedition of H.M.C.S. 'Thetis' off the Coast of New South Wales in 1898"† I gave some account of the various scientific expeditions which had visited the colony, or had been locally organized.

A similar work has since been done for New Zealand, for in 1904 the late Captain F. W. Hutton, F.R.S., published an admirable *résumé* in the introduction to the "Index Faunæ Novæ-Zealandiæ."‡ The work of local naturalists published in the "Transactions of the New Zealand Institute" is referred to, as are also sundry descriptive catalogues.

PREVIOUS EXPEDITIONS.

No mention is made in the "Index" of two Government trawling expeditions which took place in 1900 and 1901 respectively. As these are the only investigations of the nature which have been undertaken in New Zealand, and as they naturally lead up to the trawling expedition of the "Nora Niven," some account of them is here supplied, culled mainly from the official reports.§

* For explanation of plates see p. 63.
† Waite. Mem. Aust. Mus., iv, 1899.
‡ Hutton. Index Faunæ Novæ-Zealandiæ, 1904.
§ Ayson. Reports, Experimental Trawling, 1900 and 1901.

Commercial trawling has been prosecuted in New Zealand waters for a number of years, the principal centres being Napier, Lyttelton, and Dunedin.

With the object of assisting and furthering the fishing industry the New Zealand Government has on three occasions organized and carried out an extensive series of experimental trawling investigations, the objects, as detailed in the official reports, being "to ascertain what extent of trawling-grounds existed, what varieties of marketable fish were obtainable in the different localities; to prove whether the conditions necessary for carrying on successful trawling existed in certain localities within workable distance of the best markets, and, if so, to place the information on record for the guidance of those interested in the trawling industry; and generally to acquire information on the distribution of food-fishes, &c., in the sea surrounding these islands."

The first expedition was undertaken in the "Doto," a small steam-trawler of 28 tons, and extended from the 10th March to the 7th June, 1900. One hundred and fifty-four hauls of the net were made, at depths ranging from 2½ to 50 fathoms. The operations extended from Stewart Island and Foveaux Strait in the south, up the east coast of the South Island to Cook Strait. Hauls were also made in Tasman Bay and South Taranaki Bight.

As this left the waters of the North Island scarcely touched, a second expedition was undertaken in the following year. This was, however, really a continuation of the previous essay, and was confined to the coastal waters of the North Island. The "Doto" was again chartered, and operated from the 9th February to the 2nd May, 1901, from which latter date, until the 20th May, the trawler "Rita" replaced the "Doto." During this cruise 122 hauls were made, between the extremes of 3 and 38 fathoms.

For purposes of the present review the two expeditions may be taken together, and, in case of necessary reference to the respective reports, the dates 1900 and 1901 will sufficiently indicate them.

These reports were written by Mr. L. F. Ayson, Chief Inspector of Fisheries for New Zealand, who was in charge of the investigations, and superintended the operations throughout.

The Government recognised, on the representation of Mr. Ayson, the desirability of having on board some one acquainted with the fishes from a more technical standpoint than that of the commercial fisherman—some one who could specifically identify the catches, instead of merely enumerating them as "sharks," "flounders," &c.

It was not found possible to obtain the services of a recognised ichthyologist for the whole period of the cruise, but at different times Professor W. B. Benham and Messrs. A. Hamilton and G. M. Thomson accompanied the vessel, and supplied preliminary notices, which are printed as appendices to the official reports.

A list of the marketable and otherwise well-known fishes was supplied with each report by Mr. Ayson. Mr. A. Hamilton undertook the examination of the remainder of the fishes preserved on the first expedition, eighteen in number. One of these was recognised as a new species under the name of *Astrape aysoni*, the genus also being an addition to the New Zealand fauna. In this instance only does the specific locality appear to have been recorded.

In printing the list of fishes supplied by Mr. Hamilton, the editor of the report overlooked the fact that, of the species characterized as being additional, four appear in Mr. Ayson's report: these are *Myliobatis aquila*, *Monacanthus convexirostris*, *Chelidonichthys* (*Trigla*) *kumu*, and *Sebastes percoides*.

Very few zoological specimens appear to have been preserved from the takings of the second expedition: all were handed to Professor Benham. Of the fishes he writes, "Amongst the half-dozen of small fish, one, *Scorpæna plebeia*, is a rarity."

Though, as before mentioned, a depth of 50 fathoms was reached by the trawl, this occurred once only. On four other occasions 40 fathoms was touched or exceeded. The following analysis of figures supplied in the reports shows that, generally speaking, operations were conducted in comparatively shallow water, for, while on 255 occasions the trawl operated in 20 fathoms or under, the number of times 20 fathoms was exceeded was sixty-six only. The table indicates the figures for each 10 fathoms:—

	Fathoms.				
	0–10.	11–20.	21–30.	31–40.	41–50.
Hauls, 1900	71	74	15	5	5
Hauls, 1901	52	58	34	7	0
Totals	123	132	49	12	5

THE "NORA NIVEN" EXPEDITION.

It being realised that the deeper waters had not been investigated, a third expedition was organized, advantage being taken of the following circumstance: The Napier Fish-supply Company, having decided to add to their fleet a larger and more powerful vessel, commissioned a Grimsby shipbuilding firm to construct a new trawler suited to their requirements. The Government made arrangements with the company, and as soon as the vessel arrived and was fitted for work she was chartered for three months.

The "Nora Niven," as the trawler was named, is much larger than the "Doto," better adapted for rough weather and prolonged steaming, and is fitted with modern gear, built for powerful haulage. The vessel, which is described as being the largest and most up-to-date trawler which has been seen in Australasian waters,* attracted considerable attention at the various ports of call, and is thus described in the local press :—

"The 'Nora Niven' was built in Selby, and is constructed of steel. She is 96 ft. long, the net register being 56 tons. In ordinary weather she can steam 8½ knots an hour. Among the notable features of the trawler is a complete ice-making plant, capable of turning out about 2 tons of ice every twenty-four hours. There is also an acetylene-gas lighting plant, and the winch for working the trawl is an exceedingly powerful one. The vessel has cost to date £10,600, including £1,400 to equip her with refrigerating machinery."

As on previous occasions, Mr. Ayson was anxious to secure the services of an ichthyologist, and, knowing my interest in the subject, and my association with similar undertakings in New South Wales, recommended that I should be commissioned to undertake the scientific work of the expedition.

Doubtless owing to failure to appreciate the advisability, at least, of the course suggested, the recommendation was not adopted by the Government. By the courtesy of the Hon. J. A. Millar, Minister of Marine, I was invited to accompany the expedition in my capacity as curator of the Canterbury Museum; and I desire to record my thanks for his kindness, also my appreciation of the consideration and sympathetic interest shown by the Chairman and Board of Governors of Canterbury College in permitting my absence from Museum duty for so long a period, especially as it became necessary to appoint a *locum tenens.*

It was, however, only my keen desire to embrace the opportunity afforded for collecting and studying the marine fishes of the Dominion which decided me to accept a passage on the unsatisfactory terms above indicated—namely, those incidental to my being but a guest on board.

During the period of the investigations, any barrier which might have existed in connection with my unofficial association with the expedition was largely removed by Mr. Ayson, for he assisted my work in every possible way.

EQUIPMENT.

Though the expedition was fitted with several scientific appliances, such as sets of thermometers, sounding-apparatus, &c., all of which were regularly and systematically used, the provision for actual trawling was of the ordinary commercial type, designed only to arrest the

* The new Commonwealth trawler "Endeavour," commissioned since the above was written, is probably larger.

larger or marketable fishes. No effort or arrangement was made to secure the smaller species or invertebrates, the presence or absence of which may have an important bearing on the distribution of the economic fishes.

I endeavoured to remedy this omission to a certain extent by obtaining permission to introduce, within the trawl, sections of a smaller-meshed cotton net, the only kind procurable at short notice. This, however, soon went to pieces, and, as some trouble was entailed in fixing a new section, it was only occasionally that the net was introduced for me. When, however, this small net was used, the increased number of species obtained was very marked. I especially regret that, though the trawl was hauled on several occasions in the waters surrounding the Chatham Islands, the small net was not once employed.

Tow-nets were freely used, but I am sorry to have to state that nearly all the takings were washed overboard during heavy weather.

While dealing with the subject of equipment, I may mention that I placed on board various dredges, &c., but had little opportunity of using them. Some dredgings in 100 fathoms or over were conducted on behalf of the Australasian Association for the Advancement of Science, at the instance of its Committee for the Biological and Hydrographical Study of the New Zealand Coast (of which I am a member). The committee placed the necessary apparatus and equipment at my disposal, and, out of five essays, four proved successful. The results of the hauls will be communicated after the material has been investigated; the samples of the bottom obtained having been placed in the hands of Mr. Suter, of Auckland, for report. The following are details of the four successful stations.

Bucket-dredge Stations.

Station.	Date.	Position.	Fathoms.
A ..	June 19 ..	24 miles S.E. of Long Point ..	120
B ..	,, 24 ..	12 miles S.E. of Cape Saunders	100
C ..	July 11 ..	60 miles E. of Lyttelton ..	100
D ..	Aug. 13 ..	20 miles N.E. of Flat Rock ..	105

Scientific Observations.

Mr. L. F. Ayson, who is a member of the Committee of the Australasian Association for the Advancement of Science on Sea-surface Temperatures, has kindly allowed me the use of the observations taken on board the trawler, and the following is a complete record. When Mr. Ayson was, owing to illness, compelled to relinquish control of the expedition, the records of observations were continued by Mr. Thomas Anderton, his successor.

The marine temperatures were taken with the Casella self-recording thermometer.

Date.	Wind.		Barometer.	Temperature.			Fathoms.
	Direction.	Force (0–10).		Air.	Sea.		
					Surface.	Bottom.	
1907.							
June 10 ..	W. ..	6	30·0	..	51·0	52·0	..
,, 11 ..	S.W.	4	29·9	..	51·0	51·0	54
,, 12 ..	S.W.	4	29·8	..	51·0	51·2	37
,, 13 ..	S.W.	4	29·8	54·0	51·5	52·0	65
,, 18 ..	E. ..	3	30·0	48·0	53·0	52·0	26
,, 19 ..	E. ..	2	30·2	47·0	51·0	49·0	43
,, 20 ..	W. ..	2	30·35	42·0	50·0	45·0	50
,, 21 ..	W. ..	4	30·4	46·0	50·5	46·0	20
,, 22 ..	S.W.	4	30·2	53·0	51·0	48·8	27
,, 24 ..	S.W.	6	30·15	50·0	50·0	48·0	44
,, 25 ..	W. ..	1	30·1	49·0	51·0	48·0	55
July 1 ..	S. ..	1	29·9	54·0	49·0	48·2	20
,, 2 ..	N. ..	3	29·6	49·0	49·0	49·3	20
,, 3 ..	N. ..	1	29·66	54·0	50·0	50·3	19
,, 4 ..	N. ..	1	29·68	48·0	49·0	49·0	13
,, 5 ..	N.N.E.	4	29·9	52·0	50·0	49·0	35
,, 6 ..	Calm	..	29·7	50·0	46·0	48·0	28
,, 9 ..	S.S.E.	7	29·72	..	48·0	49·3	21
,, 10 ..	S. ..	8	29·9	..	46·0	48·1	10
,, 11 ..	N. ..	2	29·4	52·0	52·0	49·4	24
,, 12 ..	Calm	..	..	..	48·0	49·3	50
,, 18 ..	E. ..	1	30·52	52·0	50·0	..	38
,, 19 ..	N.W.	1	30·42	50·0	48·0	49·25	10
Aug. 12 ..	E.S.E.	1	29·9	54·0	50·0	50·28	28
,, 13 ..	N.W.	2	29·72	48·0	49·0	50·23	14
,, 14 ..	S.W.	5	29·6	56·0	54·0	..	28
,, 15 ..	N.W.	1	29·7	56·0	55·0	..	24
,, 19 ..	W.S.W.	5	29·7	56·0	55·0	..	68
,, 22 ..	S.W.	2	30·0	58·0	57·0	58·0	105
,, 23 ..	S.W.	3	29·5	56·0	57·0	57·0	57

Accommodation.

Owing to the absorption of all suitable space on board by the net and trawling appliances, my gear had to be placed on deck. On two occasions I lost heavy collecting-tanks well charged with selected specimens, for they broke away from the lashings and were cast overboard.

With the object of providing accommodation for me, Mr. Ayson very considerately cleared a space in the net-store, below deck; but, in the absence of suitable rackwork fixtures, the liveliness of the vessel rendered the situation impossible and even dangerous. Accidents happening while attempting to convey bottles, &c., up or down an iron ladder, normally vertical, and resulting in broken bottles and scattered contents, to say nothing of bruised limbs, decided me to resume my occupation on deck.

Itinerary of the Cruise.

The vessel left Wellington on the 5th June, 1907, and on the day following called at Lyttelton, where I went aboard. We made a southerly course, but, meeting with heavy seas, anchored in Half-moon Bay, Stewart Island, on the evening of the 8th. Several whales were passed on the way, and shoals of penguins (probably *Catarrhactes pachyrhynchus* and *C. chrysocome*) were encountered.

We left shelter on several occasions, returning successively to Port Adventure and Paterson's Inlet, but the sea was too rough to permit us to do more than take soundings, and it was not until the 11th June that the trawl was first lowered. On the 13th, when fifty miles east of Wreck Reef, we passed suddenly over a shelf, the soundings within two miles deepening from 65 to 183 fathoms. As the trawl-warps were nearly run out, we put about, and, steaming nearly two miles, hauled in 67 fathoms.

We finally left Stewart Island (Paterson's Inlet) on the 15th June in a snowstorm, and experienced tremendous seas to Ruapuke Island, thence to the Bluff. On the 18th a course was shaped along the south-east coast of the South Island, hauls being made daily to the 22nd June, and on the 24th and 25th, on which latter date we entered Otago Heads.

On the 19th June the first trial was made with the deep-sea dredge, twenty-four miles south-east of Long Point, in 120 fathoms (Station A), with satisfactory result.

When trawling this section, numbers of mollymawks (*Diomedea melanophrys* and *D. chlororhynchus*) were in close attendance, feeding at the side of the vessel, and devouring the food thrown to them. They are capable of swallowing a full-sized red-cod (*Physiculus bachus*) whole. When one of the birds had the "field" to itself it would pick the fish to pieces as it floated on the water, but, if another bird approached, the fish was quickly gulped down. On the 24th June the dredge was lowered twelve miles south-east of Cape Saunders, in 100 fathoms (Station B), and samples of the bottom obtained.

At Dunedin Mr. Ayson sought medical advice, and as a result most unwillingly relinquished his active connection with the expedition, to the regret of all on board.

On the last day of June we left Port Chalmers, with Mr. Thomas Anderton, Director of the Portobello Marine Fish Hatchery, in charge, and during the anchorage in Blueskin Bay fishing-lines were put over. When the bait was below the sinker we got examples of dog-fish (*Squalus fernandinus*)* only; when above, red-cod (*Physiculus bachus*). The latter bore parasitic copepods in their gill-cavities. Dr. Chilton has identified them as *Chondracanthus lotellæ* G. M. Thomson.

From the 1st to the 12th of July, the 7th excepted, hauls were made daily, fifty stations being charted to date, by which time we had worked the ground northward to Lyttelton Harbour. On this section I got eggs of *Cephaloscyllium laticeps*, previously unknown, and noted that almost every adult *Pinna* taken had its crustacean commensal, *Pinnotheres*. Here also happened the incident with the blind eel, detailed in the account of *Eptatretus forsteri*. On the night of the 9th July we encountered a southerly gale, and I was twice tossed out of my bunk. When morning broke I found nearly all my gear on deck adrift; one large tank had vanished overboard, others were smashed, and the deck was littered with specimens not carried over the bulwarks or washed through the scuppers. Details of all the fishes taken at the various stations had been carefully chronicled. Accompanying labels being solely relied upon in respect to the invertebrates, it is more than probable that the zoologists who are kindly examining the lower orders of animals taken will find some confusion in the records. Only one haul (Station 45) was made on the 10th, under shelter of the northern coast of Banks Peninsula. On the following day the dredge was lowered in 100 fathoms, sixty miles to the eastward (Station C).

Twelve hauls (Stations 52–63) were made between the 15th July (on which date we sailed from Lyttelton) and the 19th (whereon Wellington was reached).

At Stations 55 and 56 thick sticky green mud or clay was encountered, twenty to twenty-four miles east of Motunau Island. At the 55th station we were operating the port net, and on reaching the 40-fathoms line the whole of the "belly" and cod end were dragged out. The starboard net, a new one, was next used, and put over in deeper water—55 fathoms—but when 58 fathoms was reached serious trouble ensued. When the net was hauled to the surface it was found to contain an enormous weight of sticky clay, and, without warning, the whole net went to pieces, little but the head and ground ropes being left attached to the otter-boards. The otters themselves had been half-buried in the clay, masses of which still adhered to them. This dangerous area should be carefully surveyed and charted for the benefit of trawlers.

Owing to a variety of circumstances, the waters to the northward of Wellington were not investigated at this stage. We left the

* Mr. Tate Regan considers (Ann. Mag. Nat. Hist., Ser. 8, ii, 1908, p. 46) that the New Zealand form, identified with *S. acanthias*, is referable to this southern species.

capital on the 20th July, and reached Napier on the 22nd, after a very rough passage, which occupied eighteen hours longer than was anticipated. During this experience I lost a collecting-tank and its contents, and had one of my photographic cameras destroyed.

While at Napier on this and the subsequent visit I was the guest of Messrs. J. J. Niven and Butcher, owners of the trawler, and take this opportunity of recording my appreciation of the kind manner in which they received me.

I am also indebted to Mr. Niven for providing me with a small collection of fishes trawled in the vicinity of Hawke's Bay, principally pleuronectids. These will be useful when the family is under examination.

Napier was left on the 25th July, and on the afternoon of the 28th we anchored in Waitangi Bay, Chatham Islands. During our stay Stations 64 to 70 were charted, but time was principally spent in line-fishing, it being intended to secure a large quantity of fish for the Wellington market—an expectation amply fulfilled. Large catches of hapuku (*Polyprion prognathus*) and blue-cod (*Parapercis colias*) were made from the boats, and moki (*Latris ciliaris*), terakihi (*Cheilodactylus macropterus*), and other fishes were taken in set-nets.

Pitt Island was also visited, and similarly satisfactory catches were made, the blue-cod attaining a weight of 9 lb. Some of the island fishermen were engaged to assist in filling the cold-chamber.

The lines were set with three hooks each, and it was a common occurrence to haul up three fishes at once, generally blue-cod. Though I obtained the heaviest fish (62 lb.) taken during our visit, a member of the crew secured three smaller hapuku on his line at one time. On all other occasions a blue-cod had taken the third hook.

Enormous bags of swimming-crabs (*Platyonichus bipustulatus*) and crayfish (*Jasus edwardsi*) were taken in Petre and Hanson Bays.

Mr. Reuben Cannon, of Whangaroa, described to me a large red fish, numbers of which had been cast on to Topenga Bay, on the northern coast of Chatham Island, and from his description I had not the slightest doubt that he referred to the opah (*Lampris retsius*). As there was a chance of specimens or their remains being still on the beach, Mr. Cannon kindly furnished me with a horse, and himself acted as guide, the route traversed being across dangerous bogs and treacherous watercourses. Our quest was unsuccessful, and after a ride of eighteen miles we reached Mr. Cannon's house, where I became his guest for the night, riding to Port Hutt next morning. Since returning to Christchurch I have seen a photograph of the fish, taken by Mr. Cannon's brother, and it represents, as I had suspected, the opah. It is interesting to learn that several examples of this rare fish had been on the beach at the same time.

Some individuals of the cattle on the island develop a taste for seaweed, and prefer it to grass. We saw several feeding on the shore, all miserably thin, which, Mr. Cannon informs me, is a characteristic of cattle taking to this strange diet, and from which they cannot be weaned.

Leaving the island on the 7th August, Wellington was reached on the 10th, and on the 12th we commenced our northern cruise. On the evening of the following day some lantern-fishes (myctophids) were washed aboard. Parasitic copepods taken from red-cod obtained at Station 75 are identified by Dr. Chilton with *Lernea lotellæ* G. M. Thomson. The dredge, lowered in 105 fathoms, twenty miles north-east of Flat Point (Station D), was hauled aboard full of green mud. On our passage to Napier, reached on the 16th August, we were almost continuously accompanied by porpoises. A school would sight us a mile or more distant, and head straight for the vessel, when the individuals would zigzag from side to side across the bows, revelling in the foam which our passage produced. (Plate VI, fig. 2).

We shot a couple of the mammals with a military rifle, and put the ship about to where the ruddy water showed they had been killed, but the bodies had sunk. Our engineer later harpooned one of the porpoises, and we hauled it on deck. An examination showed it to be *Lagenorhynchus obscurus* Gray. Our captain, who is familiar with the coast, told me that he has never seen the species far from land, and that it is known to the local sailors as the "sand-porpoise."

Having made a dozen hauls since the 12th we reached Napier on the 16th August, leaving again on the 19th. Rough weather interfered with our programme, and sections of the coast were skipped in the hope that calmer conditions would prevail on return from Auckland. The Bay of Plenty therefore received most attention, and here we trawled several species not before taken.

Large hauls of schnapper (*Pagrosomus auratus*) were made, and so great was their buoyancy when drawn from deep water that they not only brought the net and its contents to the surface, but, in addition, supported the weight of Mr. Alward, our chief engineer, who jumped boldly on to the net. It was some time before the fish slipped away from under his feet sufficiently to sink him to the chest, and in this situation I photographed him (Plate VI, fig. 1). Had a plank been placed across the net, I am confident that three men would have been supported. Terakihi were also buoyant, but in this respect no fish equalled the ling (*Genypterus blacodes*), taken chiefly at our southern stations. Normally full-bodied, when the air-bladder and tissues were distended it resembled an elongated barrel, and comparatively few were required in the net to bring the whole to the surface.

At Station 96 (24th August) we trawled the greatest weight of fish taken: the bag, estimated to weigh nearly 2 tons, consisted almost entirely of schnapper and terakihi.

On the following day, while near White Island, the marine volcano, the feed-pump broke down, and we headed for Auckland, arriving on the 26th August. Here I parted company with the "Nora Niven" and returned to Christchurch *via* New Plym th.

The trawler made a few more hauls on her return to Wellington, and some fishes were preserved for me by Mr. Anderton. These prove to be of considerable interest, and will be dealt with in their proper position in the systematic portion of the report.

As above indicated, ninety-six hauls were made to the time Auckland was reached, and the following table shows the relative frequency of the trials at the different depths enumerated :—

Fathoms ..	0–10	11–20	21–30	31–40	41–50	51–60	61–70
Hauls ..	7	32	45	28	21	13	8

Fathoms ..	71–80	81–90	91–100	101 and over.
Hauls	6	3	2	2

Collection and Examination of Results.

Being my own special care, and the only members of the marine fauna with which the expedition was officially concerned, the fishes naturally received the greatest attention.

I am satisfied that of all the fishes brought on deck, not a single species escaped record at any of the ninety-six stations with which I was associated. Had better provision been made for the retention of the smaller specimens and species, many more would certainly have to be recorded. This is no mere opinion, for on several occasions I skimmed off the surface of the water, by means of a hand-net, small fishes which had escaped through the meshes and were not represented in the collection emptied on the deck. One little fish obtained in this way was the only specimen of the species taken during the cruise. When the net was being gathered together at the vessel's side, preparatory to being hoisted on deck, my usual occupation was the wielding of the hand-net, for the trawl was frequently surrounded by small fishes which had escaped through its large meshes.

Considerable time was absorbed in examining the mass and passing under review every individual fish obtained ; then a selection had to be made for future study, and put aside for preparation and preservation.

It is not my present object to write of the economic results of the expedition ; such will doubtless be dealt with in the official reports. Lest, however, my silence be construed as unfavourable, I may say that I am much impressed with the plenitude of edible fishes to be obtained from certain areas.

It was not possible to attempt any serious enumeration of the invertebrata, the larger and, to me, familiar forms only being recorded ; for the rest, as many were collected as possible, and preserved for the benefit of specialists in the several groups.

It is possible that when the invertebrata are studied some interesting species may be found, but it will be understood that the material I have been able to place in other hands is but a portion of that trawled, and, of course, a mere tithe of what could have been taken had suitable appliances been provided, and had the necessary assistance been available.

I know of no other profession in which study and time are so freely and gratuitously rendered, for pure love of research, as that of the biologist, and my best thanks are due, and are hereby gratefully tendered, to those who have so kindly assisted me with reports on their respective subjects.

The full list of contributors is as follows :—

Algæ—R. M. Laing, M.A., B.Sc.
Annelida, Siphunculoidea, Echinoderma—Professor W. B. Benham, M.A., D.Sc., F.R.S.
Mollusca, &c.—Henry Suter.
Nudibranchia—Sir Charles Eliot, K.C.M.G., LL.D.
Cephalopoda—W. E. Hoyle, M.A., D.Sc.
Crustacea—Professor Charles Chilton, M.A., D.Sc., M.B., C.M., F.L.S.
Pisces—Edgar R. Waite, F.L.S.

Official Report.

On the 23rd April, 1908, after the foregoing had been passed in for publication, I received, by courtesy of Mr. Ayson, a copy of the official report, doubtless issued a few days previously.*

This, though styled an "interim report," is very detailed and exhaustive as far as trawling is concerned, and contains interesting *data*, some few particulars of which may be referred to here.

The total weight of marketable fish brought to port by the trawler during the three-months cruise was 46,750 lb. 2,743 blue-cod (*Parapercis colias*) were taken at the Chatham Islands on hand-lines. Mr. Anderton (who supplied the report on the operations at the Chatham Islands) writes, "It was a sight to see the boats returning after a couple of hours' fishing, loaded to the gunwale with blue-cod. Four Pitt-Islanders caught 230 of the largest blue-cod I have ever seen in less than an hour and a half's fishing off the north-west corner of Pitt Island. Six of the crew caught 606 blue-cod and 103 large hapuku (*Polyprion prognathus*) in seven hours off Whangaroa, and on another occasion caught 860 blue-cod in three hours and a half. Almost all the men were inexperienced in the art of blue-cod fishing, making the catch all the more remarkable. It is extremely probable that the Chatham Islands will in the near future become one of the most important sources of our fish-supply." I fully agree with Mr. Ander-

* Ayson. Interim Report, Experimental Trawling, 1907.

ton's remarks, and consider that with the great demand for blue-cod in New Zealand and Australia, and the prodigious supply to be won around the Chathams and neighbouring islets, a very profitable industry could be maintained. Further, it might be hoped that the establishment of such an industry would materially reduce the price of fish, which in New Zealand is an expensive luxury, and not, as it should be in our island community, a cheap and common article of wholesome food.

One of the appendices to the report tabulates the number of each kind of marketable fish taken in the trawl. In point of quantity the following are the most important: Of schnapper (*Pagrosomus auratus*), taken only off the North Island, 8,540 were obtained, the vast majority being secured in the Bay of Plenty. One haul (Station 96) yielded 1,178, another (Station 106) 1,200, and at three hauls (Stations 102–104) 2,250 were netted. These five hauls also produced the largest relative quantity of terakihi (*Cheilodactylus macropterus*), the figures respectively being 720, 1,000, and 1,650. Though taken most numerously in the Bay of Plenty, this species was very generally obtained during the whole cruise, and is without doubt the most ubiquitous food-fish on the New Zealand coast: the total number of examples prepared for market being 8,273. Red-cod (*Physiculus bachus*) were more uniformly taken at the southern trials, the largest nettings being 750 (Station 10), 484 (Station 11), 204 (Station 20), 217 (Station 21), 270 (Station 27), and 300 (Station 39), all southward of Canterbury Bight. Thence catches were meagre until hauls were made south of Hawke's Bay, when 200 examples were taken at each of two hauls (Stations 77 and 81). They were, however, the only important takes off the North Island. The total number secured during the cruise was 3,535.

Though not counted as an edible species, it will be of interest to mention that the elephant-fish (*Callorhynchus callorynchus*) formed no inconsiderable portion of a few of the hauls. At Station 45, off Lyttelton, the trawl was estimated to contain $\frac{1}{4}$ ton weight. At another haul (Station 51), in the same vicinity, 200 examples were secured, and 150 and 306 were successively taken off Otago Heads (Stations 14 and 15). These were, however, the only occasions on which the numbers taken were considered detrimental.

The appendix giving "A List of the Various Species of Fish taken in the Trawl-net, and the Stations where they were obtained," calls for some notice, and I much regret that this was not submitted to me before publication. Both common and scientific names are furnished, but it would have been well had the latter been omitted, for the gravity attending their use has not been understood, and several serious errors exist. Passing by many misspellings, which are, however, evident, and will serve only to cast doubt on the correctness of the application of the names as a whole, one or two cases of serious import may be cited.

Seriola lalandii is recorded from no less than thirty-two stations, but, as a matter of fact, this species was not once taken in the trawl. The records, on the whole, refer to *Promethichthys prometheus*, but several of them apply to *Thyrsites atun* also. These mistakes are capable of explanation, and it will be well for me to correct them here, lest they pass into purely scientific literature. Seeing that my name appears in the report, it might be too readily assumed that the identifications had the authority incidental to my association. *Seriola lalandii* is the name attached to the kingfish in the report, but the common name is applied to two distinct fishes by New Zealand fishermen. Generally speaking, the kingfish of the South Island is *Promethichthys prometheus*, that of the North Island *Seriola lalandii*. The error above alluded to results from the dual use of a popular name, and should serve as an object-lesson to those who, regarding scientific names as pedantic, do not understand the necessity of natural objects being exactly defined and correctly named.

The southern kingfish is a near relative of the barracouta (*Thyrsites atun*), and is of similar appearance. These two fishes were commonly confounded on board. Small examples of the former were almost invariably recorded as barracouta, until I drew attention to an immediate means of identification in the very different contour of the lateral lines in the respective species.

The gurnards are included under the name *Trigla kumu*, but the majority of the records apply to species of *Lepidotrigla*: these are smaller forms, not to be compared, commercially, with the larger *Chelidonichthys* (*Trigla*) *kumu*. The record is thus misleading.

I might mention other discrepancies, but, as my object is to indicate the grave errors which are bound to result in the absence of scientific knowledge, rather than to be hypercritical, I will refer to one other matter only. This, however, is of extreme interest to the ichthyologist and the student of the geographical distribution of species. I point to the records under the name "Shark": in one table this appears under Stations 47, 85, and 91, and in another table under Stations 46, 75, 80, and 91. The occurrences last noticed are recorded under the name *Heterodontus philippi*. Had these records been made at stations subsequent to my severance with the expedition, they would, in the absence of specimens, have been liable to acceptance. Fortunately, all occur within the period of my association; I am therefore able to say that the Port Jackson shark (*Heterodontus*) was not taken; moreover, no species was secured at any of the stations mentioned which could by any chance whatever be mistaken for *Heterodontus*. It is not improbable that the genus may occur in our northern waters; it has, in fact, been recorded from New Zealand—a record, however, open to doubt. This record of *H. philippi* is based on two specimens in the British Museum, presented by Professor Owen, and stated to be from New Zealand. It was accepted by Hutton, who, however, wrote,* "I have seen no specimens." The species was subsequently eliminated, as mentioned by Gill, and has not been reinstated in the New Zealand lists. In a recent private letter Mr. Tate Regan remarks, "We have reputed examples in our (British Museum) collection." These are possibly the ones which formed the basis of the original record. From the foregoing it will be gathered that had the specimens taken by the "Nora Niven" been *Heterodontus philippi*, as reported, the circumstance would have been of very great interest indeed.

It would appear that, in some cases at least, scientific names have been fitted haphazard to the species, and I may be allowed to doubt if any specimens have been subjected to that careful and thorough examination which should precede the application of a scientific name. Such action is, of course, the result of ignorance of the necessity of scientific accuracy, and is not here attributed either to mere carelessness or design.

In closing this cursory, though, as I have indicated, necessary review of the official report, I may further mention that there is considerable discrepancy between the records and those taken by myself. Much of the official *data* was collected in a more or less hasty manner, unavoidable amid the pressure of other duties, and often from the bridge itself. Those intrusted with the compilation will, I believe, freely concede the accuracy of my observations, made by a trained zoologist, with the fishes actually in hand.

Extension of Charter.

A second cruise was commenced on the 9th September, and extended to the 3rd December, 1907.

Mr. Ayson's report† thereon was kindly forwarded to me on the 30th September, 1908, by the Hon. the Minister of Marine, and, though this report is outside the scope of the present publication, it may be briefly referred to.

I shall, however, confine my remarks to the "List of the Various Species of Fish taken in the Trawl-net," as this is the only portion affecting the scientific record. No specimens appear to have been preserved.

The "kingfish (*Seriola lalandii*)" is recorded from sixty-five stations, and though it is possible, seeing that the cruise was a northern one, that this is correct, it must be borne in mind, as before stated, that the species recorded as *S. lalandii* for the period of the first charter was *Promethichthys prometheus*.

The "gurnard (*Trigla kumu*)" is recorded from 104 stations, but there is not the slightest doubt that, as on the previous occasion, the majority of the records apply to some species of *Lepidotrigla*.

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* Hutton. Cat. Fish. N.Z., 1872, p. 80.

† Ayson. Report, Experimental Trawling, 1908.

The "shark (*Heterodontus philippi*)" again appears, and is recorded from seventy-eight stations. A reference to my previous note on this subject will show that the record is without doubt an erroneous one.

Mr. Ayson writes, "Mr. Waite's official duties prevented him from accompanying this cruise; and it is a matter for regret that no marine biologist accompanied the expedition, as it afforded an exceptional opportunity for collecting specimens and studying marine life along a great range of the coast-line of New Zealand."

PARTICULARS OF STATIONS.

Information supplied under "Locality" is approximate only, and refers to the position of the vessel when the trawl was "shot." Accurate bearings will be given in the official report, and this, when published, should be consulted by those interested.

Station.	Date.	Locality.	Depth in Fathoms.	Nature of Bottom.
	1907.			
1	June 11	25m. east of Port Adventure, Stewart Island	54–55	Soft sand.
2	,, 12	10m. north-east of Port Adventure	37–41	Soft sand.
3	,, 12	23½m. north-east of Wreck Reef ..	40–41	Soft sand.
4	,, 12	21½m. north-east of Wreck Reef ..	50–54	Soft sand.
5	,, 13	50m. east of Wreck Reef ..	65, 183, 67	Soft sand.
6	,, 18	Off mainland, 5m. south (Waipapa Point)	26–24	Fine sand.
7	,, 19	5m. south of Chasland's.. ..	43–43	Fine sand.
8	,, 19	16m. south of White Head ..	60–58	Fine to coarse sand.
9	,, 20	5m. off Nugget Point	50–15	Sand and mud.
10	,, 20	3m. off Coal Point, Molyneux Bay..	15–10	Sandy mud.
11	,, 20	4m. off Coal Point, Molyneux Bay..	10–10	Sand and mud.
12	,, 21	Molyneux Bay, 6m. north-west of Nuggets	20–46	Sand.
13	,, 22	Off Cook's Saddle, Molyneux Bay..	27–25	Pebbles.
14	,, 22	East of Green Island, 6m. ..	25–30	Pebbles and gravel.
15	,, 24	8m. east-south-east of Otago Heads	44–38	Coarse sand.
16	,, 24	9m. south-east of Otago Heads ..	38–18	Coarse sand.
17	,, 25	8m. north-east of Cape Saunders ..	55–102	Sand.
18	,, 25	8m. east-north-east of Otago Heads	53–36	Coarse sand.
19	,, 25	14m. north of Otago Heads ..	60–70	Coarse sand.
20	July 1	6m. east of Jones's Head ..	20–22	Fine black sand.
21	,, 1	8m. east of Shag Point	23–27	Fine sand.
22	,, 1	15½m. east of Shag Point ..	30–40	Fine sand.
23	,, 1	4m. south-east of Moeraki ..	24–13	Shell and sand.
24	,, 2	5m. east-north-east of Moeraki ..	20	Fine sand.
25	,, 2	9m. east-by-north of Look-out, Bluff	18–19	Sand and shell.
26	,, 2	19½m. south of Oamaru.. ..	40–43	Fine sand.
27	,, 2	12m. east of Oamaru	23–26	Fine sand and shell.
28	,, 3	6m. east of Oamaru	19–22	Sand.
29	,, 3	10m. east and north of Oamaru ..	25–30	Shell gravel.

Station.	Date.		Locality.	Depth in Fathoms.	Nature of Bottom.
30	July	3	18m. east-north-east of Oamaru ..	35–35	Ooze.
31	,,	3	8m. east of Waitaki River ..	24–21½	Shell sand.
32	,,	4	3½m. east-by-north of Waiho River	13–9	Stones.
33	,,	4	9m. south and east of Jack's Point	17–16	Fine sand and mud.
34	,,	4	7m. south-east of Jack's Point ..	16–21	Fine shell sand.
35	,,	4	12m. south-east and east of Jack's Point	21–29	Mud.
36	,,	5	26m. east of Jack's Point ..	35–42	Mud.
37	,,	5	37m. east of Timaru	38–44	Black mud.
38	,,	5	48m. east of Timaru	58–75	Black mud.
39	,,	6	26m. east of Timaru	28–31	Sand and shell.
40	,,	6	10m. east-north-east of Timaru ..	16–9½	Black mud.
41	,,	8	12m. north-east of Timaru ..	13–16	Black sand.
42	,,	9	31m. north-east of Timaru ..	21–24	Gravel.
43	,,	9	32m. south-west of Akaroa ..	29–30	Sand and shell.
44	,,	9	23m. south-west of Akaroa ..	30–24	Sand and shell.
45	,,	10	2¼m. north and east of Long Look-out	10–14	Sand and shell.
46	,,	11	4½m. north-east of Sail Rocks ..	24–35	Mud.
47	,,	11	16m. north-east and east of Sail Rocks	39–44	Sand and shell.
48	,,	11	21m. north-east of Sail Rocks ..	44–46	Sand and shell.
49	,,	12	28m. north-east of Godley Head ..	50–40	Fine sand.
50	,,	12	29m. north-east of Godley Head ..	40–28	Sand and mud.
51	,,	12	23m. north-east of Godley Head ..	28–18	Soft mud.
52	,,	15	9m. north and east of Godley Head	14–17	Soft mud.
53	,,	16	22m. north-north-east of Godley Head	16–21	Fine black sand.
54	,,	16	27m. north-east of Godley Head ..	21–27	Fine sand and mud.
55	,,	16	24m. east-by-south of Motunau Isld.	38–40	Soft mud.
56	,,	16	20m. east of Motunau Island ..	55–58	Mud and clay.
57	,,	17	4m. east-south-east of Wairau R.	26–43	Gravel and shell.
58	,,	18	11m. north-north-east of Cape Campbell	38–35	Soft sand and shell.
59	,,	18	9m. north-north-east of Cape Campbell	35–25	Gravel and shell.
60	,,	18	5m. east of White Bluff ..	25–20	Fine sand and shell.
61	,,	19	3m. north of White Bluff ..	10–15	Sand and mud.
62	,,	19	5m. north-north-east of Wairau River	15–30	Black sand.
63	,,	19	13m. south-by-west of Wellington Harbour	58–75	Gravel and shell.
64	,,	29	2m. north-west of Waitangi ..	16–24	Sand and shell.
65	,,	29	3m. south-east of Port Hutt ..	24–33	Yellow sand.
66	,,	29	5m. west of Clatchie Point ..	33–42	Fine yellow sand.
67	,,	29	5m. north-west of Durham Point..	42–50	Yellow sand.
68	,,	29	3½m. north-west of Somes Point ..	45	Coarse sand and shell.
69	Aug.	1	Hanson Bay, Chatham Islands ..	16–25	Sand and shell.
70	,,	1	Hanson Bay, 8m. north-east of Cape Fournier	33–45	Fine sand.
71	,,	12	2½m. south-west of Pencarrow Head	28–38	Rock.
72	,,	13	Palliser Bay	14–13	Fine sand.
73	,,	13	Palliser Bay	11–15	Fine sand.
74	,,	13	Palliser Bay	20–29	Fine sand.

Station.	Date.	Locality.	Depth in Fathoms.	Nature of Bottom.
75	Aug. 13	Palliser Bay	29–38	Mud.
76	,, 14	3m. east and south of Castle Point	28–19	Fine sand.
77	,, 14	4m. north-east and east of Aohanga River	23–20	Sand and mud.
78	,, 15	4½m. north-east of Cape Turnagain	24–18	Fine sand.
79	,, 15	Porangahau Bay	9	Fouled.
80	,, 15	Porangahau Bay	16–17	Fine sand.
81	,, 16	2½m. north-east of Bare Island ..	16–21	Fine sand.
82	,, 16	6m. south of Cape Kidnappers ..	21	Fine sand.
83	,, 19	12m. north-east of Cape Kidnappers	68–78	Soft mud.
84	,, 19	25m. north-east of Cape Kidnappers	82–76	Soft mud.
85	,, 20	5½m. north-east of Table Cape ..	42–42	Soft sand and mud.
86	,, 20	11m. south-east of Nick's Head ..	22–24	Sand and shell.
87	,, 20	8m. south-east of Nick's Head ..	24–23	Sand and mud.
88	,, 22	9m. west of Cape Runaway ..	105–105	Sand and mud.
89	,, 22	12m. west-south-west of Cape Runaway	94–66	Sand, shell, mud.
90	,, 22	14m. west-south-west of Cape Runaway	66–58	Mud.
91	,, 22	4m. east and south of Wakana Point	58–55	Hard mud.
92	,, 23	5m. north-west of Kaha Point ..	57–55	Hard mud.
93	,, 23	9m. north-west of Kaha Point ..	55–43	Sand and mud.
94	,, 24	20m. east-south-east of White Isld.	38–34	Sand and mud.
95	,, 24	20m. east-north-east of Whale Isld.	34–25	Sand and mud.
96	,, 24	17m. east-north-east of Whale Isld.	25–16	Sand and mud.

EXPLANATION OF PLATES.

Plate I.

The steam trawler "Nora Niven."

Plate II.

Model of Trawl-net and Otter-boards.

The model from which the photograph was taken was made by Captain C. A. Nielsen, the trawling-master. The ground rope, which sweeps the floor of the ocean, is seen to be greatly bowed, but the head line is stretched by the otter-boards, so that when the fishes are disturbed by the lower rope they are well-covered by the net as it moves forward. Within the small or cod end are two pockets which open backwards, so that if attempting to return to the mouth of the net the fishes are entrapped. The cod-end is tied with a special knot in order that it may be readily opened when suspended over the deck of the trawler.

Plate III

The Otter-board.

Fig. 1. The otter-boards, of which portion of the after one only is seen, have been hauled up from the bottom, and are being secured to the "gallows." The net is being gathered inboard, and one man is taking a dogfish out of the meshes.

Fig. 2. The drawing represents an otter-board of the model before referred to; the chains are adjustable so that the boards may be set to the correct angle. In the drawing, the towing-warp (on the left) is shown parallel to the board; but when in use all four chains are tight, and the board, as it stands nearly upright, is deflected, thus offering the necessary resistance to the water to stretch the mouth of the net. The right side, or "wing," of the net is attached to the shackles shown above and below, the left wing being similarly fixed to the other otter-board.

Plate IV.

Fig. 1. The winches. Each otter-board has its own warp and winding-drum. The winches can be driven forwards, backwards, or stopped independently, so that when the otter-boards near the surface of the water each can be separately got inboard. The net can be shot at either side of the vessel as convenient.

Fig. 2. The net at the surface, buoyed by the expansion of the gases within the fishes themselves. The circular mass in the background is the cod-end, while the two lines of fishes in the foreground represent the examples caught in the pockets.

Plate V.

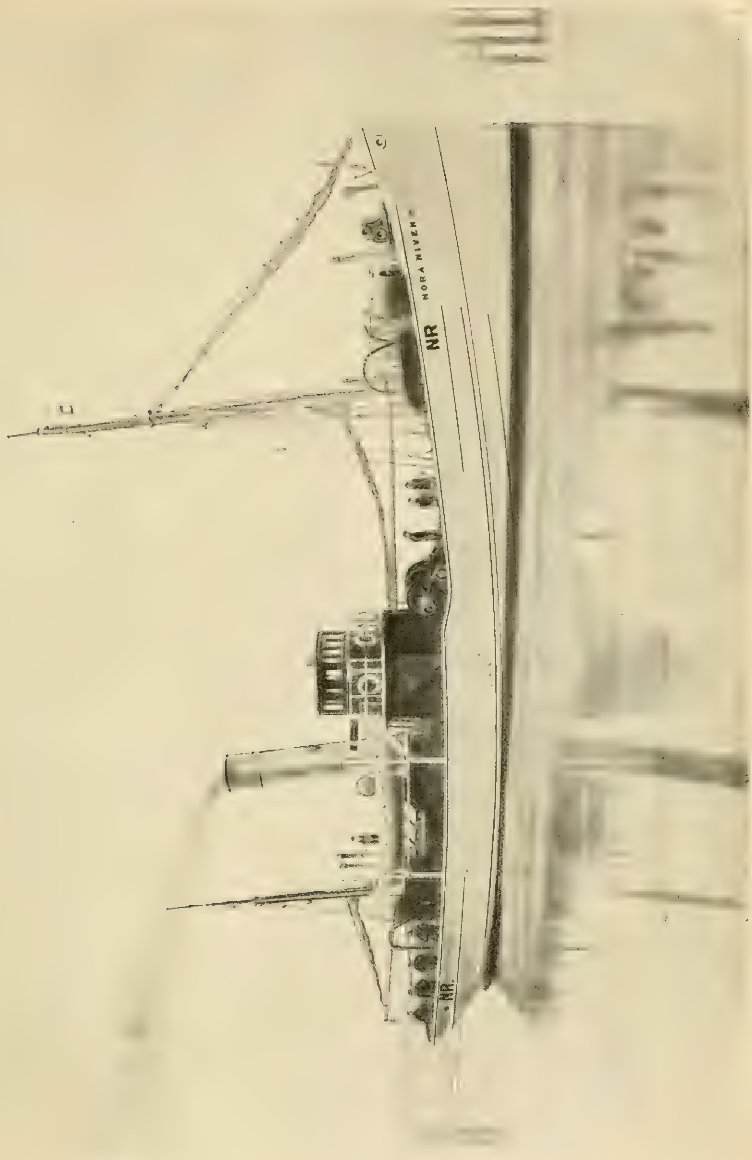
Fig. 1. Opening the net. The net hoisted clear of the deck. The picture was taken just as the cod-end was opened and the enormous catch was falling on to the deck.

Fig. 2. Swimming crabs and crayfish taken at the Chatham Islands. Every haul made at the islands produced enormous bags of these crustaceans, and, as a result, sacksful of crayfish were handed to the Maories and Morioris, who regard them as special delicacies.

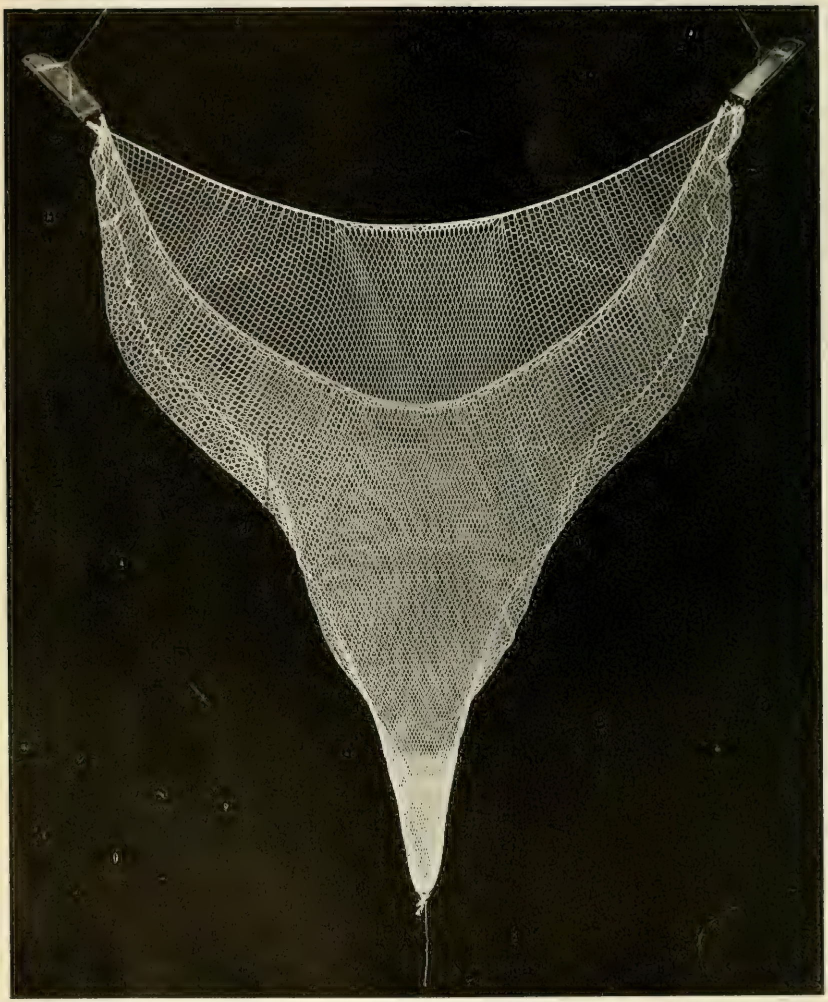
Plate VI.

Fig. 1. So great is the buoyancy of a large haul of schnapper when drawn from deep water that the mass is capable of supporting for some time the weight of a man. An illustration of this fact is afforded by the picture as detailed in the text.

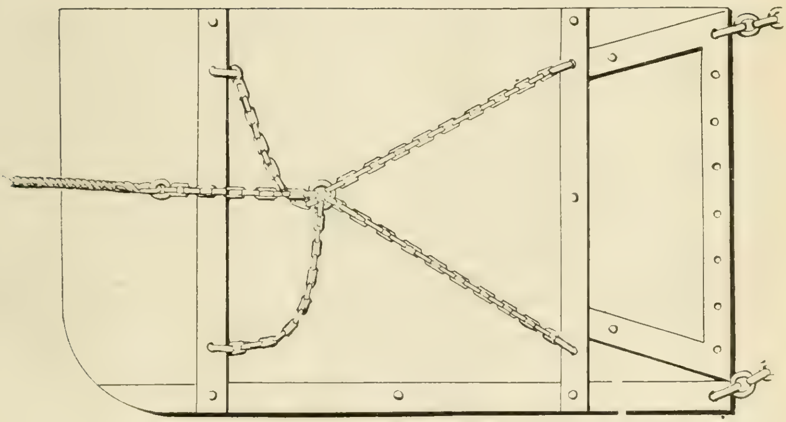
Fig. 2. A few individuals of a shoal of porpoises (*Lagenorhynchus obscurus* Gray) which accompanied the trawler. They were photographed from above, at the prow of the vessel, the white mass being foam thrown up by the bow.



[*From a photograph*



[W. J. Sparkes, photo.



[*Edgar R. Waite, photo.*

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[Edgar R. Waite, photo.

[Edgar R. Waite, photo.


Otago Peninsula
B
DUNEDIN
14
13
Taieri Riv.
12
10
Clutha Riv.
11
9
Nugget Point
Long Point
8
A
INVERCARGILL
7
6
4
3
Ruapuke Island
5
The Bluff
FOVEAUX STRAIT
2
1
Paterson Inlet
STEWART ISLAND


C. Runawa
NEW ZEALAND
Government Trawling Expedition, 1907.
NORTH
SOUTH
ISLAND
TIMARU
CANTERBURY BIGHT
OAMARU
FOVEAUX STRAIT
A
B
C

ALGÆ.*

By Robt. M. Laing, M.A., B.Sc.

These are the first seaweeds that have been dredged at greater depths than 10 fathoms off the New Zealand coast, and they are on that account of considerable interest. It is well known that the depth to which marine algæ descend depends upon the amount of light received, and that those which can grow in the deepest shade near the surface are those which penetrate to the greatest depths. It is a mistake to suppose that new and rarer forms will be found as we collect at greater depths. This may be true to a limited extent in depths between low-tide mark and 5 or 10 fathoms, but, as the following list shows, it is not true of greater depths. All the species in it are common or comparatively common plants on the coast a little below low-tide mark.

Seaweeds are rarely found deeper than 50 fathoms. Kjellman, however, obtained *Ptilota pectinata* off Spitzbergen in 150 fathoms: and there are several other cases recorded of seaweeds being obtained at greater depths than 100 fathoms.

It will be observed that the greatest depth recorded in the accompanying list is from 68 to 78 fathoms. The fact that the trawling was done in midwinter doubtless accounts to some extent for the small number of species.

CAULERPACEÆ.

Caulerpa, Lamouroux, 1809.

Caulerpa Brownii Endlicher.

Caulerpa Brownii Endlicher, Gen. Plant. Suppl., 1837–45; Van Bosse, Monographie des Caulerpes, 1893, p. 306.

Caulerpa furcifolia Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 260.

Station 83, Chatham Islands.

(Australia, Tasmania, New Zealand.)

* Pending the revisal of the rules for the nomenclature of the algæ, the species in this list are assigned to the author that first placed them in their present genus.

DICTYOTACEÆ.

Zonaria, J. Agardh, 1841.

Zonaria Turneriana J. Agardh.

Zonaria interrupta J. Agardh, Sp. Alg., i, 1848, p. 111; Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 218.

Zonaria Turneriana J. Agardh, Till. Alg. Syst., i, 1872, p. 48.

Chatham Islands.

(Australasia, South Africa, Madagascar.)

Glossophora, J. Agardh, 1880.

Glossophora Harveyi J. Agardh.

Dictyota Kunthii J. Agardh, Sp. Alg., i, 1848, p. 94; Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 219.

Glossophora Harveyi J. Agardh, Till. Alg. Syst., i, 1872, p. 48.

Chatham Islands.

(*New Zealand*, Chatham Islands.)

DESMARESTIACEÆ.

Desmarestia, Lamouroux, 1813.

Desmarestia ligulata Lamouroux.

Fucus ligulatus Turn., Hist., ii, 1809, p. 74.

Desmarestia ligulata Lamour., Ess. s. Thalassiophytes, 1813, p. 25; Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 217.

Station 9.

(Australasia, Chili, Fuegia, South Africa, North Atlantic, North Pacific.)

LAMINARIACEÆ.

Macrocystis, C. Agardh, 1823.

Macrocystis pyrifera C. Agardh.

Fucus pyriferus Turn., Hist., ii, 1809, p. 104.

Macrocystis pyrifera C. Agardh, Revision des Alg. Macrocystis, 1835.

Station 2.

Macrocystis is not often found growing in the elittoral zone, but generally forms a belt close to the coast.

(Throughout the Southern Ocean, and along the west coast of North America, as far north as Alaska.)

Ecklonia, Hornemann, 1828.

Ecklonia Richardiana J. Agardh.

Ecklonia Richardiana J. Agardh, Sp. Alg., i, 1848, p. 147.

Ecklonia radiata, var. γ *richardiana*, Hook. f. and Harv., Fl. Nov. Zel., ii, 1855, p. 217.

Station 6.

(The common form on the coast, and possibly confined to New Zealand.)

D'Urvillæa, Bory, 1826.

D'Urvillæa utilis Bory.

D'Urvillæa utilis Bory, Voy. au Pôle Sud, Botan. i, 1845, p. 35.

Station 1.

It may be doubted whether the specimen was growing at the depth at which the trawl was open, 54–55 fathoms. Only a fragment was brought up by the trawl, and, as it has no air-cells, it is denser than water. D'Urvillæa, though sometimes detached from rocks and found floating, is a plant of the intertidal region. Taking these facts into consideration, and the fact that the specimen is considerably decomposed, it seems more reasonable to imagine that this is a piece which has drifted off shore, and perhaps been dropped from a larger floating mass above the spot where it was picked up by the trawl. The absence of air-cells probably shows that it is a fragment broken off from the region of the stem.

(If the rules of the Vienna Congress are adopted for cryptogams, the specific name will have to be changed to *antarctica*, as it was originally described by Chamisso as *Fucus antarcticus*.)

(New Zealand, as far south as Campbell Island, Chili, Fuegia, Falklands, Kerguelen Land.)

Marginaria, A. Richard, 1832.

Marginaria Boryana A. Richard.

Marginaria Boryana A. Richard, Voy. de l'Astrolabe, Botan. i, 1832, p. 9.

Stations 2, 6.

The specimen from Station 2 is without bladders, though otherwise well developed. This is a very interesting modification, probably due to the increased pressure at the depth (32–41 fathoms) at which the plant was growing. I do not remember to have seen a similar modification elsewhere recorded.

(New Zealand.)

CERAMIACEÆ.

Ballia, Harvey, 1843.

Ballia callitricha Montagne.

Ballia callitricha, Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 257.
Spacelaria callitricha C. Agardh, Sp. Alg., ii, 1820–27, p. 23.
Ballia hombroniana Mont., in Voy. au Pôle Sud, Botan., ii, 1845, p. 94.
Ballia brunonia Harv., Fl. Antarct., i, 1845, pp. 78 and 182.

Stations 2, 83, Chatham Islands. Some small sterile specimens from Station 2 are epiphytic on the base of *Marginaria*.
(All south-temperate and subantarctic seas.)

Euptilota, Kützing, 1847.

Euptilota formosissima Kützing.

Euptilota formosissima Kützing, Bot. Zeitg., 1847, p. 36.
Ptilota formosissima Mont., Voy. au Pôle Sud, Botan. i, p. 97 ; Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 257.

Station 6.

(Chatham Islands, New Zealand.)

Griffithsia, C. Agardh, 1817.

Griffithsia Sonderiana J. Agardh.

Griffithsia setacea Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 258.
Griffithsia Sonderiana J. Agardh, Epicr. Florid., 1876, p. 62.

Chatham Islands.

(New Zealand.)

RHODYMENIACEÆ.

Plocamium, Lyngbye.

Plocamium dispermum Harvey.

Plocamium dispermum Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 246.

Station 9.

A fragment of *Plocamium*, probably the same species, was dredged at Station 83.
(New Zealand.)

Plocamium brachiocarpum Kützing.

Plocamium brachiocarpum Kützing, Sp. Alg., 1849, p. 885.
Plocamium coccineum (partim) Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 246.

Chatham Islands.

(New Zealand.)

HYMENOCLADIA, J. Agardh.

Hymenocladia lanceolata J. Agardh, 1852.

Hymenocladia lanceolata J. Agardh, Act. Holm., 1870 (*v.* also Epicr. Florid., 1876, p. 314).

Station 6.

The specimen is well developed, and is remarkable in that it contains both cystocarps and tetraspores.

(New Zealand.)

EPYMENIA, Kützing, 1849.

Epymenia Wilsonis Sonder.

Epymenia Wilsonis Sond., in Linnæa, 1853, p. 516.

Epymenia obtusa Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 249 (*v.* also J. Ag., Analecta Algol. i, 1892, p. 92).

Station 9.

(New Zealand, Chatham Islands, Australia.)

SPHÆROCOCCOIDEÆ.

CURDIÆA, Harvey (Ann. Nat. Hist., Vol. 15).

Curdiæa coriacea J. Agardh.

Curdiæa coriacea J. Agardh, Epicr. Florid., 1876, p. 401.

Rhodymenia (?) *coriacea* Hooker and Harvey, London Journal, iv, p. 545.

Gracilaria coriacea Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 243.

Station 6.

A fragment of *Curdiæa*, from the Chathams, probably also belongs to this species.

(New Zealand.)

GIGARTINACEÆ.

CALLOPHYLLIS, Kützing, 1843.

Callophyllis calliblepharoides J. Agardh.

Callophyllis calliblepharoides J. Ag., Epicr. Florid., 1876, p. 231.

Station 6.

(New Zealand, Chatham Islands.)

GELIDEÆ.

PTEROCLADIA, J. Agardh, 1851.

Pterocladia lucida J. Agardh.

Pterocladia lucida, J. Ag., Spec. Alg., ii, Part 2, 1851, p. 483.

Fucus lucidus Brown, in Turn. Hist., iv, 1819, p. 98.

Stations 79 and 83.

(New Zealand, West and South-west Australia.)

DELESSERIÆ.

NITOPHYLLUM, Greville.

Nitophyllum *sp.*

Stations 79 and 83.

Fragments, scarcely to be determined.

Nitophyllum harveyanum (?) J. Agardh.

Nitophyllum harveyanum J. Agardh, Epicr. Florid., 1876, p. 462.

Nitophyllum palmatum, var. *pinnatifidum*, Hook. f. and Harv., Fl. N.Z., ii, 1855, p. 240.

The New Zealand species of *Nitophyllum* are little known and badly defined, and I refer with hesitation some fragments from the Chatham Islands to this species.

(New Zealand.)

RHODOMELACEÆ.

RHODOMELA, C. Agardh, 1820–27.

Rhodomela Traversiana J. Agardh.

Rhodomela Traversiana J. Agardh, De Alg. Nov. Zel.. Mar., 1877, p. 28 (*v.* also Laing, List of New Zealand Seaweeds, No. 320, Trans. N.Z. Inst., xxxiv, 1901, p. 352).

Station 6.

(New Zealand.)

LENORMANDIA, Sonder, 1845.

Lenormandia angustifolia J. Agardh.

Lenormandia angustifolia J. Agardh, De Alg. Nov. Zel., Mar., 1877, p. 30.

Chatham Islands.

(New Zealand.)

ANNELIDA AND SIPUNCULOIDEA.

By W. B. Benham, D.Sc., F.R.S., University of Otago.

ANNELIDA POLYCHÆTA.

Figs. 1–5.

The collection of annelids is a small one, containing only twenty-two species, of which only three were not represented in my own collection. These are *Sthenelais semitecta*, a comparatively rare species; *Onuphis tenuisetis*, which has not been recorded since the type was obtained by the "Challenger" off the East Cape; and *Goniada eximia*, which is of special interest, as it is a South American and Magellan form, not hitherto obtained from the neighbourhood of New Zealand.

The identification of the series of worms was rendered comparatively easy owing to the fact that I have been for the last eight years or so accumulating in the Otago University Museum annelids from all parts of the coast visited by me, or by my correspondents in other parts of New Zealand; so that it contains nearly all the species which have been recorded from our coastal waters. I had proposed to describe them, but, a few years ago, on hearing from Professor Ehlers, of Göttingen, that he was engaged in the examination of the Polychæta of the "Valdivia" and other expeditions, I forwarded a set of species to him for description, and he has published two illustrated memoirs on our New Zealand annelids. I have also forwarded to the British Museum representatives of a considerable number of our species. In the present report I have added notes on geographical distribution in the case of those species which have been recorded outside the New Zealand area.

It is to be regretted that no polychætes were obtained at Station 88, where a depth of 105 fathoms was reached, nor from other spots off the east coast of the North Island, since the few that appear to have been got off Cape Kidnappers, at a depth of 68-78 fathoms, are very interesting forms.

Family APHRODITIDÆ.

Aphrodita, Linnæus, 1758.

Aphrodita talpa Quatrefages.

Aphrodita talpa Quatrefages, Hist. Nat. d. Anneles, i, 1865, p. 196, pl. vi, figs. 2–4.

Stations 7, 30.

Localities.—South of Chasland's, 43 fathoms, fine sand; off Oamaru, 35 fathoms, ooze.

Aphrodita terræ-reginæ Haswell.

Aphrodita terræ-reginæ Haswell, Proc. Linn. Soc. N.S.W., vii, 1883, p. 271.

Station 30.

Locality.—Off Oamaru, 35 fathoms, ooze. Originally described from New South Wales.

PHYSALIDONOTUS, Ehlers, 1904.

Physalidonotus squamosus Quatrefages.

Aphrodita squamosa Quatrefages, Hist. Nat. d. Anneles, i, 1865, p. 201.

Lepidonotus giganteus Kirk, Trans. N.Z. Inst., xi, 1879, p. 400; Benham and Thomson, P.Z.S., 1900, p. 974, pls. lx, lxi, lxii.

Physalidonotus squamosus Ehlers, Neuseel. Annel., in Abhandl. K. Gesellsch. Wiss., Göttingen (N.S.), iii, 1904, p. 10.

Stations 26, 30, 44.

Localities.—South of Oamaru, 40–43 fathoms, fine sand; E.N.E. of Oamaru, 35 fathoms, ooze; S.W. Akaroa, 24–30 fathoms, sand and shell. This gigantic polynoid is fairly common round our coasts. It is apparently nearly related to two Japanese species described by J. P. Moore in 1903.

LEPIDONOTUS, Leach, s. str. Kinberg, 1857.

Lepidonotus polychroma Schmarda.

Lepidonotus polychroma Schmarda, Neue Wirbellose Thiere, i (ii), 1861, p. 153, pl. xxxvi, fig. 307; Ehlers, Neuseel. Annel., 1904, p. 7, pl. i, figs. 1–6.

Locality.—Chatham Island. It is common under stones all round our coast.

STHENELAIS, Kinberg, 1857.

Sthenelais semitecta Ehlers.

Sthenelais semitecta Ehlers, Neuseel. Annel., 1904, p. 10, pl. i figs. 10–12, pl. ii figs. 1–4.

Stations 83 (? or 30).

Locality.—Probably N.E. of Cape Kidnappers,* 21 fathoms, fine sand. It seems to be a rare worm. It has also been obtained at Lyttelton by Mr. H. Suter.

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* In a bottle containing this and several other worms were two labels—one "83," the other "30." On several occasions I have obtained material dredged off Oamaru, and have not seen the species: hence I conclude that these worms were obtained at Station 83.

Family AMPHINOMIDÆ.

Chloeia, Savigny, 1820.

Chloeia inermis Quatrefages.

Chlocia inermis Quatrefages, Hist. Nat. d. Anneles, i. 1865, p. 389.

Locality.—Stewart Island, "cast ashore after a storm"; two individuals. I have also specimens from Wellington and Otago, also thrown ashore.

Family PHYLLODOCIDÆ.

Carobia, Quatrefages, 1865 (Marenzeller rev. 1874).

Carobia ochracea Ehlers.

Carobia ochracea Ehlers, Neuseel. Annel., 1904, p. 15, pl. ii, figs. 5–7.

Station 83 or 30.

Locality.—Cape Kidnappers* (or off Oamaru).

Family LYCORIDÆ.

Nereis, Cuvier, 1817.

Nereis australis Schmarda.

Heteronereis australis Schmarda, Neue Wirbell. Thiere, i (ii), 1861, p. 101, pl. xxxi, fig. 242.

Nereis australis Ehlers, Neuseel. Annel., 1904, p. 26, pl. iii, figs. 16–20, and pl. iv, figs. 1, 2; and ii, 1907, p. 11.

Locality.—Chatham Islands. It is common, and has not been recorded elsewhere than on the coast of New Zealand.

Nereis vallata Grube.

Nereis vallata Grube, Annulata Oerstediana, 1857, p. 159.

Nereis maculata Schmarda, *loc. cit.*, 1861, 102.

Nereis latipalpa Schmarda, *loc. cit.*, 104.

Nereis pacifica Schmarda, *loc. cit.*, 107.

Nereis brevicirris Grube, Annel. Reise "Novara," 1867, p. 19, pl. ii, fig. 2.

Nereis mictodonta Marenzeller, Sudjapan. Annel., 1879, p. 10, pl. ii, fig. 2.

Nereis vallata Ehlers, Die Polychæten d. magell. u. chilen Strandes, 1901, p. 110; Neuseel. Annel., 1904, p. 26., and ii, 1907, p. 11.

Locality.—Chatham Islands. This is quite the commonest nereid ound in mud under stones along our coast. It occurs also on the coasts of Chili and of South Japan.

* See footnote on previous page.

Nereis amblyodonta Schmarda.

Nereilepas amblyodonta Schmarda, *loc. cit.*, 1861, p. 106, pl. xxxi, fig. 245.

Perinereis novæ-hollandiæ Kinberg, Annulata Nova, Ofvers K. Vet. Akad. Förhandl., 1865, p. 175, pl. xx, fig. 9.

Nereis amblyodonta Ehlers, Neuseel. Annel., 1904, p. 29, and ii, 1907, p. 11.

Locality.—Chatham Islands. It is a large handsome form, of a dark-green colour; not uncommon on our coast. It was originally described from Port Jackson.

Family EUNICIDÆ.

Eunice, Cuvier, 1807.

Eunice australis Quatrefages.

Eunice australis Quatrefages, Hist. Nat. d. Anneles, i, 1865, p. 321.

Eunice paucibranchis Grube, Bericht Schlessisch. Gesellsch., 1866, p. 64, and the same, 1877, p. 56.

Eunice leuconuchalis Benham, Report on Experimental Trawling, 1900, p. 21.

Eunice australis Ehlers, Neuseel. Annel., 1904, p. 30, and ii, 1907, p. 12.

Station 12.

Locality.—Molyneux Bay.

It has been obtained from other parts of the coast, and Grube reports it from Samoa.

Eunice antennata Savigny.

Leodice antennata Savigny, Système des Annelides, 1820, p. 50, pl. v, fig. 1.

Eunice gaimardi Quatrefages, Hist. Nat. des Anneles, i, 1865, p. 321.

Eunice antennata Crossland, P.Z.S., 1904, i, p. 312, pl. xxii, figs. 1–7.

Eunice antennata Ehlers, Neuseel. Annel., ii, 1907, p. 12.

Stations 26, 30.

Localities.—Off Oamaru, 35–43 fathoms, ooze and fine sand. One would scarcely have expected that this species would be found off the shores both of Africa and of New Zealand, but it has been obtained off the coast of Ceylon, and is widely distributed in the Pacific.

Eunice aphroditois Pallas.

Nereis aphroditois Pallas, Nova Acta Acad. Sci. Inst. Petersburg, ii, 1788, p. 229.

Leodice gigantea Savigny, Système des Annelides, 1820, p. 49.

Eunice macrobranchia Schmarda, *loc. cit.*, 1861, p. 130, pl. xxxii, fig. 258.

Eriphyle capensis Kinberg, Ofvers K. Vet. Akad. Forh., 1864, p. 385.

Eunice gigantea Quatrefages, Hist. Nat. des Annel., i, 1865, p. 311.

Eunice aphroditois Ehlers, Die Börstenwürmer, 1868, p. 306; McIntosh, "Challenger" Reports, xii, Annel. Polychæta, p. 282, 1885; Gravier, Nouv. Arch. du Mus. Paris, 1900, p. 224; McIntosh, Polychæta of South Africa (Marine Investigations f South Africa), iii, 1903, p. 42; Crossland, P.Z.S., 1904, i, p. 288; Ehlers, Neuseel. Annel. ii, 1907, p. 12.

Stations 22, 83, 95.

The specimens are in fragments. Although I identify it with this large species, which is already recorded from our shores, the specimen differs in coloration from that usually described, for these specimens are pale-brown (in formalin), with very dark purplish-brown spots and splashes of irregular form, size, and arrangement, not only on the dorsal surface, but, in less numbers and of smaller size, on the ventral surface; nor is there the characteristic white band on the fourth segment. But in all structural characters it agrees with Pallas's species, which has a very wide distribution.

Localities.—East of Shag Point, 30–40 fathoms, fine sand; E.N.E. of Whale Island (North Island), 25–34 fathoms, sand and mud.

Onuphis, Audouin and Milne-Edwards, 1833.

Onuphis tenuisetis McIntosh.

Nothria tenuisetis McIntosh, "Challenger" Reports, xii, 1885, p. 307, pl. xl, figs. 8, 9, pl. xxi*a*, figs. 24–26.

Station 83 ?

It is with some hesitation that I refer the worm described below to this species, from which, indeed, it differs in one character. But, as the species was obtained off the East Cape and nowhere else, it is not improbable that the difference is of little importance; so I will give a full account of the external features of the present worm.

I have come to the same conclusion as Dr. Willey, and am unable to find any justification for the retention of Johnston's genus *Northia* —or, as Malmgren and McIntosh prefer to write it, *Nothria*.

The worm inhabits a thick-walled tube composed of fine grey mud.

A complete individual measures 74 mm. in length, with 170 segments, and 5 mm. across the parapodia.

The anterior third of the worm has a thick body-wall, very pale brown in colour, but posteriorly the wall becomes thin, colourless, and transparent. The prostomium, frontal tentacles, palps, and margins of the mouth, as well as the mid-dorsal region of the first four segments of the body, are tinged with a pale rose-purple.

The five dorsal prostomial tentacles are smooth, and have a well-marked ringed base; the three middle tentacles are of nearly equal size, reaching, when pressed back, to the twentieth segment or further. The laterals are much shorter, touching only the fifth chætigerous segment. Black pigment-masses are visible within the bases of the three middle ones, which may be eyes.

The short nuchal tentacles (peristomial cirri) are only about half as long as the lateral tentacles.

The first, or peristomial, segment is short, but the succeeding five are long, each having a length equal to about one-third of its width; then the segments soon decrease in length, so that at the ninth they are only one-sixth of the width (but at the same time the width has increased); further back they become still shorter.

The first six parapodia are long, widely separated, and the anterior ones are directed somewhat forwards. They measure about half the width of the body. Further back, and rather abruptly, as the segments become shorter, the parapodia become compressed, and lie close together; they also decrease much in length. Thus the first chætigerous segment has a body only 2 mm. across, whilst the distance from tip to tip of the feet is 5 mm. At about the fifteenth segment the total breadth remains the same, but now the body itself is 4 mm. in diameter.

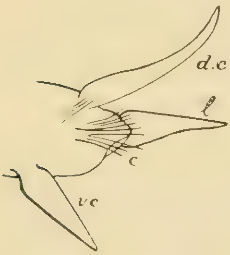
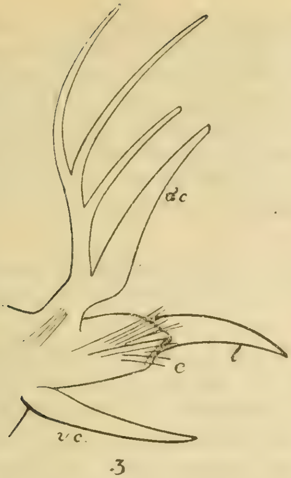


Fig. 1. The first parapodium (enlarged): c, the two hooks below the bundle of chætæ; *dc*, the dorsal cirrus; *l*, the lip-process of the chætophore; *vc*, the ventral cirrus.

The first parapodium carries a long dorsal cirrus, a long slender lip-process, and a long ventral cirrus, which does not reach the tip of the lip-process. There are but few chætæ in this foot; they are fine, simple, and pointed, with a few (3 or 4) stout, yellow, hooded, and hooked bristles, below the terminal hook of which there are numerous shorter denticulations of unequal size. The distal portion of the bristle, some distance from the apex, is semi-articulated at a nearly transverse line. (Fig. 5.)



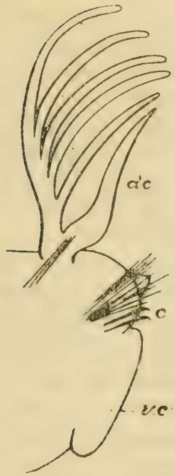


Fig. 2. The fourth parapodium, on the same scale as Fig. 1.

Fig. 3. A parapodium from the mid-body, on the same scale. Letters as in Fig. 1.

The fourth foot is similar in form, and has two similar chætæ. After the sixth foot the ventral cirrus becomes shorter and is reduced to a scale or pad.

But further back the foot exhibits several differences: the dorsal cirrus is smaller, the ventral is represented by a slight pad; the whole foot is less prominent. Below the bundle of chætæ are two stout hooks, stouter than those of the earlier parapodia: they have a shorter but wider hood, and the distal region is not articulated; the tip is curved and bears two prongs, the upper being much smaller than the lower, which is bifid. I did not note exactly where the change in the form of the bristles occurs, but it exists already in the fifteenth foot. (Fig. 4.)

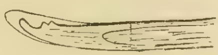


Fig. 4. One of the stout hooks of the mid-body.

Fig. 5. A characteristic hook from the anterior parapodia.

These bristles, both of the anterior and posterior feet, agree closely with those described and figured by McIntosh for *Onuphis* (*Nothria*) *tenuisetis*.

The gills commence on the second foot and extend throughout the body. The first consists of a single slender filament springing from the base of the dorsal cirrus, and nearly equalling it in length, though of less thickness. On the third foot the gill bifurcates, and on the fourth it consists of three filaments, and now overtops the cirrus; by the ninth foot there are four filaments, and the cirrus has gradually decreased in size. Further back, on the twelfth foot, the maximum number of five filaments is attained, and this is retained for a few segments, but then is reduced to four. In the anterior half of the body the gill then consists of four filaments, and then the number gradually decreases.

The gills on the first 20–25 segments are large, and stand upright over the back; they gradually decrease in length, and by the fortieth foot project outwards over the foot.

The Tube presents two regions—(*a*) a thick-walled, mud-coated portion, which no doubt projects into the water; and (*b*) a thin, membranous portion, which is probably imbedded in the sea-floor.

Most of the tubes were broken off below the mud region; but in a complete one, measuring 103 mm., this upper region accounts for 25 mm., and has an external diameter of 6 mm., and the wall is about 1 mm. thick. It consists of a fine grey sandy mud, lined by a thin membrane presenting horizontal streaks of brown colour. Further down the mud ceases, and the membrane gradually loses the brown streaks, becomes colourless and transparent. Examined under a microscope, the membrane is seen to be made up of fibrillæ in horizontal, vertical, and oblique directions.

Externally this tube is exactly like that of *Dasychone serratibranchis*, but in the sabellid the lining-membrane is much thinner—indeed, in the upper mud-covered region it does not exist, for on scraping away the mud nothing is left. But further from the mouth of the tube it makes its appearance as a colourless, smooth, and structureless lining.

Locality.—Probably off Cape Kidnappers.*

Remarks.—I have identified this worm with McIntosh's species on the following grounds: (1) *O. tenuisetis* was obtained off the East Cape; (2) the peculiarity of the anterior bristles, emphasized by McIntosh, is repeated in my specimens; (3) the general agreement of the parapodia. On the other hand, evident differences are presented by the form and extent of the gills, for in the type they do not commence till the tenth segment, do not become bifid till the twentieth, and never attain the complexity seen in our individuals, for they soon reassume the simple form they have in the earlier segments—even before the fortieth foot is reached.

* This is one of the specimens in the bottle which contained two station-numbers; and I attribute it to 83, because it has not been hitherto recorded from the Oamaru region, whereas the species was originally obtained south of the East Cape by the "Challenger."

The question arises, How far is the condition of the gills a specific character: do they increase in their extent of distribution along the body, and in complexity of structure, with age?

It appears that in this case, if I am right in my identification, the size of the worm is not a factor, for the individual described by McIntosh was 105 mm. in length, while the present worms do not exceed 74 mm.

It is only in recent years that zoologists have paid any attention to the matter. Thus, Crossland,* in discussing the variability of characters, usually regarded as being of specific value, says of *Marphysa mossambica*, "The gills begin on different segments in different specimens, increase in size and complexity quite irregularly, and vary in the maximum number of filaments they bear." This opinion agrees with that at which I have arrived as a result of the studying of our native polychætes. And it appears that McIntosh † himself is more inclined to lay stress on this anatomical feature than formerly, for, in speaking of a species of *Onuphis* from the Gulf of St. Lawrence, he says that it "may be *O. holobranchiata* Marenzeller; appears to approach *O. grubei* Marenzeller, a form which comes near *Nothria tenuisetis*, especially in the structure of the bristles, though there are certain differences, such as the origin of the branchiæ."

I may mention that in *O. holobranchiata* the gills commence on the first foot and remain single throughout the body. The species, too, has quite a different tube.

Lumbriconereis (Blainville), Grube, 1851.

Lumbriconereis sphærocephala Schmarda.

Lumbriconereis sphærocephala Schmarda, Neue Wirbell. Thiere, i (ii), 1861, p. 116; Ehlers, Neuseel. Annel., 1904, p. 33, pl. v, figs. 3–11.

Stations 12, 14.

This is pretty common in muddy shores round the coast of New Zealand, and has been obtained from the Chatham Islands.

Localities.—Molyneux Bay, 20–46 fathoms, sand; off Otago Peninsula, 25–27 fathoms, pebbles.

Family GLYCERIDÆ.

Glycera, Savigny, 1820.

Glycera ovigera Schmarda.

Glycera ovigera Schmarda, Neue Wirbell. Thiere, i (ii), 1861, p. 295, pl. xxx, fig. 239; Ehlers, Neuseel. Annel., 1904, p. 37.

* Crossland, P.Z.S., 1903, ii, p. 120.
† McIntosh, Ann. Mag. Nat. Hist. (7), xii, 1903, p. 152.

Stations 12, 14, 26, 30, 89.

Localities.—Molyneux Bay, 20–46 fathoms, sand; Green Island (Otago), 25–30 fathoms, pebbles and gravel; south of Oamaru, 40–43 fathoms, fine sand; E.N.E. of Oamaru, 35 fathoms, ooze; off Cape Runaway (from the stomach of *Zeus faber*). This worm is quite common from Stewart Island to Auckland.

Family GONIADIDÆ.

GONIADA, Audouin and Edwards, 1853.

Goniada eximia Ehlers.

Goniada eximia Ehlers, Die Polychæten d. magell. u. chilen Strandes, 1901, p. 157, pl. xx, figs. 7–17.

Station 83 (or 30).

Locality.—Either off Cape Kidnappers, 68–78 fathoms, soft mud, or off Oamaru.

The specimen differs slightly from Ehler's account of those obtained off Tierra del Fuego, in that, instead of only four angulated micrognaths on each side of the base of the everted pharynx, I find about twenty. It has been suggested by Ehlers that the number may depend upon age, as some of his specimens had none at all. And I do not feel justified in making a new species on such a small difference.

Family TEREBELLIDÆ.

LANICE, Malmgren, 1865.

Lanice conchilega Pallas.

Nereis conchilega Pallas. Miscell. Zool., 1766, p. 131, pl. ix, figs. 14–22.

Terebella conchilega Savigny, Syst. des Annel., 1820, p. 85, pl. i, fig. 3; Johnston, Catalogue of Worms, Brit. Mus., 1865, p. 235; Quatrefages, Hist. Nat. d. Annel., ii, 1865, p. 255, pl. xix, fig. 2.

Lanice conchilega Malmgren, Nordiska Hafs Annulater, 1866, p. 380; St. Joseph, Ann. Sci. Nat. (Zool.), Ser. 7, xvii, 1894, p. 211 (where a complete list of references will be found); Ehlers, Neuseel. Annel. (ii), 1907, p. 27.

Station 12.

Locality.—Molyneux Bay, 20–46 fathoms, sand.

This worm, identified by Ehlers, from specimens forwarded to him by me, as the common terebellid of European shores, is not uncommon on sandy beaches in New Zealand.

Family SABELLIDÆ.

Branchiomma (Kolliker), Claparede, 1868.

Branchiomma suspiciens Ehlers.

Branchiomma suspiciens Ehlers, Neuseel. Annel., 1904, p. 62, pl. ix, figs. 1–6.

A bunch of the characteristic parchment-like horn-coloured tubes, with the animals within, was sent to me, but without indication of the station. It is, however, common round our coasts.

Dasychone, Sars, 1862.

Dasychone serratibranchis Grube.

Dasychone serratibranchis Grube, Annulata Semperiana, 1878, p. 262, pl. xiv, fig. 7; Ehlers, Neuseel. Annel. (ii), 1907, p. 28.

Station 12.

Locality.—Port Molyneux, 20–46 fathoms, sand.

The species was originally described from the Philippines. I have specimens from Auckland Harbour.

Family SERPULIDÆ.

Galeolaria, Lamarck, 1801.

Galeolaria hystrix Mörch.

Galeolaria hystrix Mörch, Revisio Critica Serpulidarum, Naturhist. Tidskr., 3 R., i Bd., 1863.

Eupomatus boltoni Baird, Journ. Linn. Soc. (Zool.), viii, 1864, p. 12, pl. i fig. 2, pl. ii fig. 10.

Vermilia rosea Quatrefages, Hist. Nat. d. Annel., ii, 1865, p. 532, pl. xx, figs. 10, 11; Haswell, Proc. Linn. Soc. N.S.W., ix, 1885, p. 667, pl. xxxii, figs. 2–5.

Galeolaria rosea Ehlers, Neuseel. Annel., 1904, p. 70.

Galeolaria hystrix Ehlers, Neuseel. Annel. ii, 1907, p. 29.

Station 44.

A single tube with the animal was received by me from south-west of Akaroa, 24–30 fathoms, sand and shell. It is very common on rocks round our coast.

Family CHÆTOPTERIDÆ.

(?) Spiochætopterus, Sars, 1859.

Stations 12, 26.

Numerous slender, transparent, horn-coloured, parchment-like tubes, which I refer provisionally to this genus; but, as the animal is imperfectly preserved, I refrain from attempting to identify it more accurately.

SIPUNCULOIDEA.

Family SIPUNCULIDÆ.

PHASCOLOSOMA, Leuckart.

Phascolosoma novæ-zealandiæ Benham.

Phascolosoma novæ-zealandiæ Benham, Trans. N.Z. Inst., xxxvii, 1905, p. 301, pls. xv and xvi.

Station 30.

Locality.—E.N.E. of Oamaru, 35 fathoms, ooze.

The type was obtained from the stomach of the smooth-hound (*Mustelus antarcticus*), which had been trawled off the coast of Otago, no doubt in the neighbourhood of this station.

PHYSCOSOMA, Selenka, 1897.

Physcosoma annulatum Hutton.

Phascolosoma annulata Hutton, Trans. N.Z. Inst., xii, 1879, p. 278.
Physcosoma annulatum Benham, Trans. N.Z. Inst., xxxvi, 1904, p. 173, pl. vii, figs. 1–10.

Three specimens. No locality given. It is widely distributed round our coasts.

ECHINODERMA.

By W. B. Benham, D.Sc., F.R.S., University of Otago.

Plates VII–XI.*

Mr. Waite was good enough to place the echinoderms in my hands for identification, which at first seemed likely to be no serious task, for this Museum has a good collection of native representatives of the group, while the useful lists and notes and descriptive papers by Mr. Farquharson served to simplify the task.

One of the first species that I happened to examine was the so-called *Salmacis globator*, in reality an *Echinus*, an account of which I have recently published. The discovery that this little *Echinus* had for nearly thirty years been masquerading under a name to which it had no shadow of right put me on my guard as to the possibilities of other errors having crept into identifications made in early days of zoological research in New Zealand. Again, I soon found that the generic names of some of our best-known starfishes have in recent years received new interpretations, necessitating the removal of the species to other genera, and that old genera have been broken up as an outcome of new knowledge.

I was thus soon involved in the tedious task of searching the "Zoological Record" for the last twenty years—that is, the period that has elapsed since the publication of the report of the "Challenger" —and during this period several important expeditions have been undertaken by American and European scientific men to all parts of the ocean, which has resulted in a great accession of new material, and has led to repeated revision of the work of earlier naturalists.

Unfortunately, the reports of these expeditions are not available in the libraries in New Zealand, hence I have had to rely on the meagre information contained in such text-books as Bronn's "Thier-reichs," the "Zoological Record," and a few memoirs to which I happen to have access; so that, under the circumstances, it is quite possible that I have fallen into new errors. For example, relying on the "Thier-reichs" and on Yves-Delages' "Zoologie Concrete" as being trustworthy guides in systematic work, I placed *Echinus albocinctus* in Mortensen's genus *Pseudechinus;* but I have since become aware

* For explanation of plates see p. 115.

that his method of work, and the grounds for the rearrangement of the genera, are considered by such authorities as Agassiz and Loriol as injudicious and unscientific. The task of the systematist in a land without modern books or scientific periodicals is a difficult one, but the work has to be done; we have to do our best, and offer our apologies if inaccuracies creep in.

I have to thank Mr. Farquharson for much help and advice contained in letters in reply to my queries, and for the loan of foreign memoirs.

Although the collection is not very extensive, it adds a few genera to our list, and some species new to science.

A total of twenty-six genera and thirty-one species is recorded.

Of thirteen species of asterids, belonging to ten genera, there are three genera which have not hitherto been recorded from our area—viz., *Odontaster*, *Mediaster*, and *Luidia*.

Of ophiurids there are six genera, each represented by one species; of which one genus (*Astrotoma*) has not previously been obtained from so southern a latitude.

The echinids are represented by seven species, belonging to five genera, of which one genus (*Porocidaris*) is new to the New Zealand fauna.

Of the five species of holothurians, representing as many genera, one species of *Molpadia* appears to be new to science.

Amongst the most interesting finds is *Odontaster grayi*, hitherto recorded only from the neighbourhood of Tierra del Fuego—another instance of the subantarctic nature of much of our marine fauna.

The occurrence of a species of *Mediaster*, closely allied to but not identical with *M. arcuatus*, from the Japanese seas, adds another link with the fauna of that region of the Pacific, which is illustrated by the gephyrean *Echiurus novæ-zealandiæ*, by the hemichordate *Dolichoglossus otagoensis*, and by certain annelids. But species of the genus *Mediaster* also occur in the eastern Pacific off the west coast of the American continent, from Vera Cruz, Cocos Island, and Acapulco. The occurrence, then, of a species in the western Pacific marks an important extension of the range of the genus.

Astrotoma waitei is another interesting connection between the species found in the Banda Sea and Sulu Archipelago on the one hand, and that found in the Strait of Magellan on the other; while the presence of *Porocidaris elegans*, hitherto recorded from the neighbourhood of Sydney and the Philippines, represents still another element in our fauna—the tropical one.

Of the holothurians, two deep-water forms occur, of which *Molpadia marenzelleri* had hitherto only been obtained by the "Challenger" from our seas.

Some confusion in the records resulted from accidents happening on board the trawler, during heavy weather, as explained by Mr. Waite in the "Introduction."

LIST OF SPECIES OBTAINED.

Class ASTEROIDEA.

Order PHANEROZONIA.

Family ASTROPECTINIDÆ.

Psilaster, Sladen, 1885.

P. acuminatus Sladen.

Luidia, Forbes, 1839.

L., sp. incert.

Family ARCHASTERIDÆ.*

Odontaster, Verrill, 1880.

O. grayi Bell.

Asterodon, Perrier, 1891.

A. miliaris Gray.

Family PENTAGONASTERIDÆ.

Pentagonaster, Gray, 1840.

P. pulchellus Gray.
P. abnormalis Gray.

Mediaster, Stimpson, 1862.

M. sladeni sp. nov.

Family ASTERINIDÆ.

Asterina, Nardo, 1834.

A. regularis Verrill.

Order CRYPTOZONIA.

Family STICHASTERIDÆ.

Stichaster, Muller and Troschel, 1840.

S. polyplax Muller and Troschel.
S. insignis Farquhar.

Family ECHINASTERIDÆ.

Echinaster, Muller and Troschel, 1840.

E. farquhari sp. nov.

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* I have followed Bell, Hamann, Delages, in placing these two genera in this family instead of in the next.

Family ASTERIDÆ.

Asterias, Linnæus, 1766.

A. calamaria Gray.
A. mollis Hutton.

Class OPHIUROIDEA.

Order STREPTOPHIURIDA.

Family OPHIOMXYIDÆ.

Ophiomyxa, Muller and Troschel, 1842.

O. australis Lutken.

Order CLADOPHIURIDA.

Family ASTRONYCIDÆ.

Astrotoma, Lyman, 1875.

A. waitei sp. nov.

Order ZYGOPHIURIDA.

Family AMPHIURIDÆ.

Amphiura, Forbes, 1842.

A. noræ sp. nov.

Ophionereis, Lutken, 1859.

O. schayeri Muller and Troschel.

Ophiactis, Lutken, 1856.

O. nomentis Farquhar.

Family OPHIODERMATIDÆ.

Pectinura, Forbes, 1842.

P. maculata Verrill.

Class ECHINOIDEA.

Sub-class REGULARIA.

Order CIDARIDA.

Family CIDARIDÆ.

Goniocidaris, Desor, 1846.

G. umbraculum Hutton.

Porocidaris, Desor, 1854.

P. elegans Agassiz.

Order DIADEMOIDA.

Family Echinidæ.

Echinus, Linnæus, 1758.

E. angulosus (?) Leske.
E. albocinctus Hutton.
E. huttoni Benham.

Sub-class IRREGULARIA.

Order CLYPEASTRIDA.

Family Clypeastridæ.

Arachnoides, Agassiz, 1841.

A. placenta Linnæus.

Order SPATANGIDA.

Family Spatangidæ.

Echinocardium, Gray, 1845.

E. australe Gray.

Class HOLOTHUROIDEA.

Order ACTINOPODA.

Family Cucumaridæ.

Phyllophorus, Grube, 1840.

P. longidentis Hutton.

Family Molpadidæ.

Caudina, Stimpson, 1853.

C. chilensis J. Müller.

Molpadia, Cuvier, 1817.

M. marenzelleri Theel.
M. dendyi sp. nov.

Order PARACTINOPODA.

Family Synaptidæ.

Chirodota, Eschscholtz, 1829.

C. gigas Dendy.

DESCRIPTION OF THE SPECIES.

Psilaster acuminatus Sladen.*

Psilaster acuminatus Sladen, "Challenger" Report, Asteroidea, xxx, 1889, p. 225.

Station 7.

Four specimens were obtained, the largest of which measures R. = 70 mm., r. = 15 mm., breadth of arm at base 16 mm. The ratio of r. to R. is rather less than 1 to 4·6. The colour of the dried specimens is pinkish-brown on the upper surface. Of these four, one was obtained off the south coast of the South Island, at a depth of 43 fathoms; the three others had no number attached, but were no doubt obtained off the east coast of the South Island.

[In addition, I have a specimen in the Otago University Museum which shows the characteristic adpressed inframarginal spines better than the above, for it is uninjured.]

Localities.—South of South Island [also (O.U.M.) west coast of North Island: and ("Challenger"), near western entrance to Cook Strait].*

Luidia, sp.

Plate X, figs. 4, 5.

Station 89.

Two arms, or portions of arms, were amongst the material dredged off Cape Runaway, on the east coast of the North Island, from a depth of 66–94 fathoms. The long, slender, tapering form of the arms recalls the figure of *L. africana* Sladen [35, p. 256],† which, however, comes from the Atlantic. I refrain from giving a name to these fragments, but will put on record the description, which may lead to the identification of the species by others who have access to more literature than is available here.

The arm is 35 mm. in length and 6 mm. across the broader end, tapering to a point.

The abactinal surface is densely covered with small paxilli consisting of rough, thorny spines; each plate bears a central rather larger one surrounded by a circle of nearly horizontally disposed spines.

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* I enclose in square brackets New Zealand localities in addition to those at which they were obtained during this expedition. "O.U.M." means that a specimen is in the Otago University Museum, and "F." that Mr. Farquhar has recorded it.

† The figures within square brackets refer to the bibliography at the end of the paper.

The margin of the arm presents only a single row of marginals (identified as inframarginal in this genus); each bears two spines, long and white, which are differently arranged on alternate plates. One series of plates bears a spine close to the upper (abactinal) margin, and a second one of nearly the same length about half-way down the lateral face; on the alternate plates, however, the upper spine arises at a spot about one-quarter of the height of the plate, and the second, which is shorter, near the lower (actinal) margin. So that, looked at lengthwise, the arm has four rows of spines; they are fine-pointed, circular in section, the upper ones being slightly larger than the other, and measure 4 mm.—*i.e.*, they are nearly as long as the width of the arm. The species appears to be characterized by this alternate arrangement of the spines.

In addition, the marginals bear numerous very short delicate spinules in two vertical rows before and behind the large spines: they are covered by a pale reddish-brown skin. I see no pedicellariæ. The adambulacrals carry two spines: one short, geniculate, springs from within the groove, and a larger one from the actinal surface, about 2 mm. in length, or half that of the marginal spines. From around its base spring a few short spines as on the marginals. There is thus a resemblance to *L. longispina* Sladen (p. 254).

Odontaster grayi Bell.

Calliderma grayi Bell, P.Z.S., 1881, p. 95.

Gnasthaster grayi Sladen, "Challenger" Report, xxx, 1889, p. 750.

Odontaster grayi Bell, P.Z.S., 1893, p. 261; Ludwig, Zeit. f. Wiss. Zool., lxxxii, 1905, p. 44.

A single individual was obtained. Unfortunately, no station-number was attached when it reached me, but I suspect it was obtained off the coast of Otago. The colour is uniform pale-brown. In size it is just double that described by Bell in 1881, having R. 30, r. 16; and the ratio is therefore—r. : R. = 1 : 1·87.

In form it is more distinctly a five-rayed star than Bell's figure, and resembles Ludwig's figure of *O. penicillatus* [29, pl. v, fig. 4]; but in the two specific characters on which Ludwig lays stress—viz., (1) the proportion of R. to r., and (2) the number of marginals—my specimen agrees with *O. grayi*. There are ten supramarginals on each side of the arm, the terminals being quite small; so that, with the interbrachial, there are twenty-one from tip to tip of the neighbouring arms. Most of the granules on these plates have been rubbed off, so the condition of those along the contiguous edges of the plates is not satisfactorily determinable; but the few that remain allow one to recognise that the suture would be readily seen—a feature which, according to Ludwig, is more or less characteristic of *O. penicillatus*, though he lays less stress on this character than on the two referred to above.

The abactinal plates on the arms exhibit a differentiation into median slightly larger plates, and lateral or intermediate plates. The abactinals cease at the level of the last three or four marginals, so that these are in contact across the arm (which, Ludwig states, is never the case in *O. penicillatus*).

I have in the Otago Museum a specimen which was obtained in 1900, which in form is more nearly pentagonal than that represented in Bell's figure, and more like Ludwig's figure (pl. v, fig. 6). In it the marginals are in a better state of preservation than in the "Nora Niven" specimen, and the marginal tubercles have distinctly this *penicillatus* arrangement—*i.e.*, a smooth groove is visible between contiguous marginals: the tubercles do not interdigitate over this groove. The abactinal plates are continued, in three arms, to the apex; in the other two arms the last pair of marginals meet dorsally.

The measurements in this specimen are R. 33, r. 21; and r. : R. = 1 : 1·57. The last feature is characteristic of *O. grayi*, and the existence of only eight marginals on each side is confirmatory, though the other two characters might point to *penicillatus*.

Locality.—[East of Otago Heads, 20–40 fathoms (O.U.M.).]

Remarks.—This little starfish is readily distinguished from *Asterodon miliaris*, apart from its smaller size, by the distinctly spinous character of the plates, and by the single glassy-tipped dental spine at each angle of the mouth.

The occurrence of this species in our waters is an extremely interesting geographical fact, as hitherto it has only been found in the Magellan Straits, off Tierra del Fuego, and at the Falkland Islands, in a depth of from 10 to 105 fathoms.

Asterodon miliaris, Gray.

Astrogonium rugosum Hutton, 1872.

Gnathaster miliaris Farquhar, Trans. N.Z. Inst., xxxix, 1906, p. 126. In this paper Farquhar gives the earlier synonymy.

Stations 15, 16, 22, 26, 29.

I had, independently of Mr. Farquhar, arrived at the conclusion that Hutton's *A. rugosum* is identical with Gray's species, as a result of an examination of the type in the Dominion Museum, which Mr. Hamilton, the Director, was good enough to lend me for the purpose in March, 1907.

In placing it in the Archasteridæ instead of the Pentagonasteridæ I follow Bell, Bronn, Delage, and others. In deciding on its title to be placed in the genus *Asterodon* I am influenced by the following considerations: This family contains several sub-families, of which the Gnathasterinæ consist of starfishes with well-developed oral angles, which may bear one or two dental spines, glassy-tipped and aborally directed. There are, according to Delage, five genera: *Asterodon*, Perrier; *Odontaster*, Verrill; *Acodontaster*, Verrill; *Goniodon*, Perrier;

and *Hoplaster*, Perrier. The last may be omitted from the discussion; and both Bell [6] and Ludwig [29] regard *Acodontaster* as having no generic value. It is with some diffidence that I place our species in Perrier's genus *Asterodon*, for I have only Hamann's brief diagnosis [21] and Ludwig's figure of *Asterodon singularis* to enable me to arrive at this conclusion. Bell [6] quotes from Perrier's (1891) diagnosis of *Asterodon*, from which it appears that some species may have one dental spine on each angle, and some species two such spines; and he regards *Odontaster*, *Gnathaster*, and *Asterodon* as synonymous, the former having priority of nine years. But in 1894 Perrier established the genus *Goniodon* for the New Zealand *G. dilatatus*, which appears from the diagnosis in Bronn, &c., to differ from *Asterodon* and *Odontaster* only in the great dilatation of the marginals before their sudden decrease in size at the tip of the arm; but, as Loriol showed (1895), there are two dental spines at each oral angle. Ludwig (1905, p. 42) uses *Odontaster* for all those forms which possess only a single dental spine, and thus includes Verrill's *Acodontaster* and Sladen's *Gnathaster* as synonymous. In the same memoir Ludwig gives an excellent photogravure of the lower surface of *Asterodon singularis*, from which it appears that this genus has two dental spines: our species has these two spines, as Farquhar noted in 1897. Hence we may, as it appears, place our *miliaris* either in *Asterodon* or *Goniodon*;* but in order to include it in the latter genus it would be necessary to emend the diagnosis: I therefore prefer to adopt the other alternative. And, so far as I can judge, *Goniodon* is not worthy of generic distinction from *Asterodon*; but into that matter I am insufficiently equipped to enter.

Although *Asterodon miliaris* is quite abundant off our coasts, yet it has never received an adequate description, and the difficulty of placing it has arisen from the fact that Gray's type is so badly damaged in the neighbourhood of the mouth that Bell (1893, p. 262) was unable to ascertain whether it is armed with five or ten dental spines. I have sent specimens to the British Museum, so that we may look forward to an authoritative pronouncement as to its generic position in the near future.

General Description.

The general shape is known from Gray's figure. Form, a 5-rayed star, with large disc, short arms, and rounded concave interbrachial areas. The colour is a yellowish-brown. The abactinal plates have rounded platforms covered with small, short, rounded tubercles; the plates are slightly separated from one another by papular areas. Those plates along the median line of the rays are slightly larger than the rest, though this difference is more marked in some specimens than in others. This median row extends to the tip, and is separated

* W. K. Fisher, in Anat. Anz., 1908, p. 358, states that "*Goniodon* is invalidated by its earlier use for a mollusc"; and proposes *Diplodontias*, with *D. dilatatus* as type.

from the supramarginals, except the last three or four, by intermediate plates, of which there are at the base of the arms 4 or 5 longitudinal rows, or, in large specimens, even 6 or 7 such plates. The madreporite, which varies in size and shape, is situated about $\frac{1}{3}$ r. from the centre. The marginals are covered with small, short, rounded tubercles similar to those on the abactinal plates.

In each interbrachial area is an unpaired marginal plate, rather larger, as seen from above, than its immediate neighbours.

The marginals are approximately of equal size throughout the length of the row, but very gradually decrease towards the tip. The number of supramarginals varies with the size; the inframarginals agree in number with them. In the largest (R. = 76) there are 32 marginals from the tip of one arm to the tip of the next. In the smallest specimen measured (R. = 58) there are 24.

The actinal plates are in contact, there being no papulæ; they are more or less polygonal in outline, and bear tubercles of the same character as the abactinals. The number of plates in the interbrachial area varies with the size from 7 to 10 between the oral angle-piece and the inframarginal.

The adambulacrals carry 6 spines in 3 pairs (sometimes a fourth pair is present near the mouth): these are stout, cylindrical, or somewhat prismatic, with rounded ends; the innermost are the largest, and arch over the groove like the rafters of a roof; the outermost are shortest. These last are longer than the tubercles of the disc, and so stand up above the general level of the lower surface.

The oral angle bears a couple of long, cylindrical, glassy-tipped dental spines, directed aborally, and in all the specimens lie prone on the parent plate (see Farquhar, 1897, pl. xiv, fig. 6).

Localities.—Off the east coast of the South Island, between Otago Heads and Oamaru; depths, from 18–44 fathoms. It is confined to New Zealand, and apparently to the east coast and Cook Strait. [Farquhar has also noted it from Tasman Bay, Hawke's Bay, Cape Farewell; and specimens from Stewart Island are in the O.U. Museum.]

Variability.

It is somewhat variable in shape, owing to the greater or less amount of interbrachial excavation, so that the relative diameter of ray and disc varies; some individuals, also, are much flatter than others. The variations affect the following structures:—

(*a*.) The proportion of R. to r. (*i.e.*, of the length of the arm or ray to the length of the interbrachial region of the disc) is ± 2 : 1. In dried specimens it is usually less than 2; in alcoholic specimens more than 2. In a series of five dried ones the lowest proportion is R. : r. = 1·7 : 1, and the highest is 2·06 : 1. In alcoholic specimens, of which four were measured, the lowest is R. : r. = 2 : 1, and the highest is 2·29 : 1. This comparison also indicates that, in drying, the arms shrink more than do the interbrachial areas, which is the reverse of what one would expect. The absolute diameters in millimeters range from R. 58, r. 30, to R. 72, r. 37, dry; and, in alcohol, R. 66, r. 33, to R. 76, r. 34. This variation results in slight differences in outline, the arms being longer or shorter, and the interbrachial less or more excavated.

(*b*.) The arms are sometimes narrow at the base, sometimes broader; in some cases more pointed, in others more rounded at the apex.

(*c*.) The number of supramarginal plates increases with the size: in the smallest (R. = 58) there are 10 supramarginals on each side of an arm, omitting the odd interbrachial plate; the highest number is 16, in a specimen in which R. = 76 mm.

(*d*.) The madreporite is in some but little larger than a neighbouring abactinal plate; in other cases, more than twice the size: it may be circular, or irregularly pentagonal. In the largest individual it measures 10 mm. in diameter.

Pentagonaster pulchellus Gray.

Astrogonium pulchellum Sladen, 1889. Farquhar, Proc. Linn. Soc. N.S.W., xxiii, 1898, p. 310.*

Station 29.

A single specimen was obtained off Oamaru.

R. 40, r. 25 (which is smaller than some other specimens in this Museum, one of which has R. 50, r. 30).

It has the swollen marginals at the ends of the arms, typical of the species, the tip of the arm measuring 15 mm. across.

The abactinal plates are flat, except along the middle of each arm, where each is slightly convex.

Although this species has usually been referred to the genus *Astrogonium* Müller and Troschel (1842), yet, as Verrill (1899) pointed out, Gray (1840) had already placed the species in the genus *Pentagonaster*, of which it stands as the geno-type.

This species is described and figured by Gray [20, p. 11, pl. viii, fig. 3.]

Localities.—Off Oamaru, at a depth of 25–30 fathoms, shell gravel. [Foveaux Strait, Cook Strait, Chatham Islands (F.).]

Pentagonaster abnormalis Gray.

Astrogonium abnormale, auct. Farquhar, *loc. cit.*, 1898, p. 310, for synonymy.

Plate VIII, fig. 5.

Stations 15, 16, 22.

This is a common species off the east coast of Otago, for, in addition to the ten specimens obtained by the "Nora Niven" between Otago

* Instead of repeating under each species its full synonymy and references it will suffice to refer to this paper of Mr. Farquhar's.

Heads and Oamaru, at depths of 18 to 44 fathoms, a considerable number were obtained by me in 1899 during trips in s.s. "Doto" and "Plucky" in the same locality. [Also, Nelson, Wellington (F.); Pegasus Bay, and Stewart Island (O.U.M.).]

It was first recorded from New Zealand by Hutton (1872), who refers to a form in the Dominion Museum, Wellington, which differs from *P. pulchellus* in having the apical plates of the arm "very little swollen." He called it "var. B." Farquhar (1895, p. 200) refers to the same specimen, and gives a description of another one obtained by a fisherman at the Bluff. In 1897 he suggested (p. 195) the possibility that this "var. B." is the "*Astrogonium abnormale*" described and figured by Gray [20, pl. viii, figs. 1, 2], the locality of which was unknown. Farquhar [16], in his List of New Zealand Echinoderms, definitely identifies it with Gray's species.

The species presents a good deal of variation, which affects (*a*) the number of supramarginal plates, (*b*) the character of the abactinal plates, which are sometimes quite flat, at other times distinctly convex and even mammilliform, especially along the median line of the rays; (*c*) but the most interesting variation is that which is presented by the supramarginal plates at the apex of the arm, for in some instances these are sufficiently enlarged as to approach the condition which characterizes *P. pulchellus*, and which alone distinguishes that species from *P. abnormalis.*

From an examination of a series of about twenty individuals, I am inclined to think that the rarer *P. pulchellus* is merely a very abnormal variation of the common *P. abnormalis*, but for the present I leave this open, for there is a distinct gap in my series between the most swollen plates of *P. abnormalis* and those of *P. pulchellus.*

Mediaster sladeni, sp. nov.

Plate VII, figs. 1–5.

Station 29.

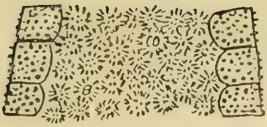
A single specimen, dried; pale buff-brown. The general outline is not unlike that of *A. miliaris.*

Measurements: R. 75, r. 35. r : R = 1 : 2·14.

The upper surface is formed of round-topped subcircular plates bearing numerous rounded tubercles, the plates being separated by papular areas. The large disc plates support a marginal series or circle of sixteen to eighteen more or less prismatic tubercles of unequal thickness, surrounding a circle of eight or ten similar but smaller ones, and, centrally, one, two, or three others, according to whether the plate itself is circular or oval in shape.

These plates are continued on to the rays, where they are rather smaller than on the disc; and as the tip is approached the tubercles become shorter, and the tabulæ more convex, so as to appear almost hemispherical.

Plate VII.



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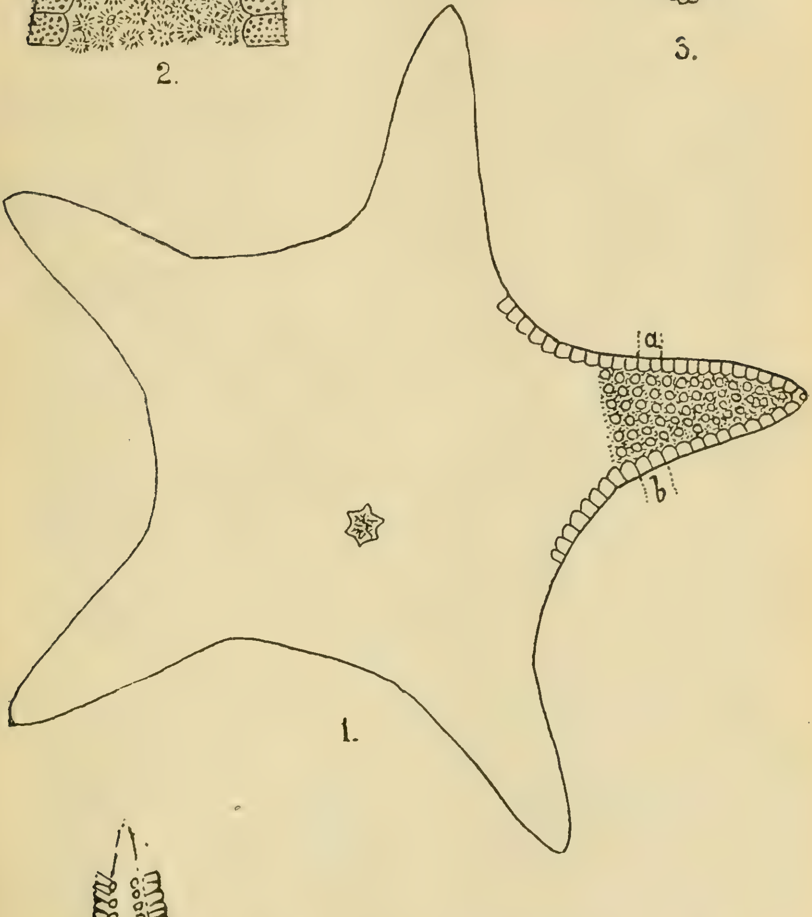

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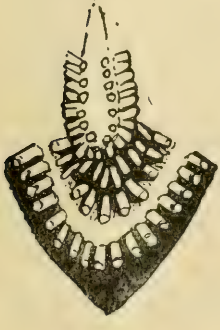

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The supramarginals, of which there are 50 from the tip of one arm to the tip of the next (or twenty-five on each side of an arm), diminish in breadth as the apex is approached, but less markedly so than in *M. arcuatus* Sladen. The breadth now exceeds the length.

Valvate pedicellariæ are few, but in fair number irregularly scattered on the abactinal surface. The madreporite is rather large, about 2½ times the diameter of the neighbouring plates; is six-rayed; and lies near the centre of the disc, from which it is separated by its own diameter, whilst it is about six of its diameters from the margin.

The marginals are covered with low rounded tubercles, of which those on the edges of the plates are rather larger (not smaller as in *M. arcuatus*) than those on the face.

A few large valvate pedicellariæ occur on the supramarginals, varying in number on the five "sides" of the starfish (*i.e.*, between tip and tip of the two arms): on two sides, none; on the third side, 1; on the fourth side, 3; on the fifth side, 5. The inframarginals alternate with the supramarginals, except the odd interbrachial plate, and sometimes the one on each side of it. I see no pedicellariæ on these plates.

The adambulacrals carry 4 longitudinal rows of stout, prismatic, round-topped spines; the innermost row, overhanging the groove, consists of 4 or 5 spines: if the former, one is much stouter than the other three. They stand closely side by side, looking like a thick-toothed comb, and have brown tips. The second row contains 3 or 4, the third only 3 spines. The 3 or 4 of the outermost row are, as usual, much smaller than the preceding, and only a little larger than those on the actinal plates. Sometimes this row is irregular, so that an imperfect fifth row is apparently present.

The angle of the mouth bears on the margin about 16 to 18 stout prismatic spines, similar to and of the same length as the innermost adambulacrals, directed towards the centre. On the actinal surface of each of the angle-pieces is a row of 6 or 7 similar but rather smaller spines, like those of the second row but slightly stouter; and also a few small tubercles are present. The actinal plates are continued from the interbrachial areas along the arm to the level of the fifth or fourth marginal from the tip. All these plates are similar to those on the upper surface, and I see no pedicellariæ.

Locality.—Off Oamaru, on shell gravel, at a depth of 25–30 fathoms.

Remarks.—The leading difference between this starfish and *Asterodon miliaris*, to which it bears a considerable superficial resemblance, is in the character of the oral armature; for, in place of the two reflexed dental spines at each oral angle, this species bears a number of small spines similar to those of the adambulacrals.

I have had access only to Sladen's description of *M. arcuatus*, of which a single individual was during the "Challenger" expedition obtained from the Japan Sea. From it mine differs chiefly in numerical proportions—(*a*) size, (*b*) number of adambulacral spines, (*c*) number of oral spines, (*d*) number of spines on the abactinal plates, (*e*) number of marginals, &c. Several other species have since been described, from the eastern shores of the Pacific, but I am unable to make any comparisons with them.

Asterina regularis, Verrill.

Farquhar, *loc. cit.*, 1898, p. 312, for synonymy.

Specimens were obtained at several stations. It is by far the commonest of the littoral starfishes on, at any rate, the South Island, and Mr. Farquhar has published some interesting notes on it [15].

Localities.—Coast of Otago [and generally round the South Island, and Wellington].

Stichaster polyplax Muller and Troschel.

Tarsaster neozealanicus Farquhar, 1895. Farquhar, *loc. cit.*, 1898 p. 313.

A single small specimen was collected, but was without indication of station when it reached me. It is fairly common on the shores of both Islands, having been recorded from Auckland, Wellington, Nelson, Sumner, Otago, as well as from the Chatham Islands.

Stichaster insignis Farquhar.

Farquhar, *loc. cit.*, p. 314, for synonymy.

Stations 24, 29.

Two bright-red starfishes, which I refer to this species, differ slightly from one another and from the account of the species given by Farquhar in 1895.

In the first place they are considerably larger. One of them, with six arms, has R. 88, r. 12 mm.; r. : R. = 1 : 6·33, with the greatest width of arm 18 mm., which is at a short distance from the base. I cannot detect any definite madreporite, though at two spots the abactinal plates are crowded.

The other, with five arms, one of which has evidently been regenerated, measures R. 71, r. 7 mm.; so that r. : R. = 1 : 10·14. This one shows the characteristic four madreporites, though the spines on the abactinal surface are less numerous than in typical specimens in this Museum. In the larger specimen the arrangement of plates and spines agrees with these individuals which I received from Mr. Farquhar.

The greater size of the specimens may be related to the greater depth at which they were obtained.

Localities.—Off the east coast of Otago, on sand, shell, and gravel, 18 to 38 fathoms.* [Taylor's Mistake; Wellington (F.).]

Echinaster farquhari, sp. nov.

Plate VIII, figs. 1–4.

Station 15.

A single specimen; in a dried state orange in colour when first received, but is now faded. It measures R. 55, r. 13 mm.—thus R. $>$ 4 r.; breadth of arm, 17 mm. The five arms are blunt at the tips, which are upturned; the base of each is somewhat swollen, so that a well-marked interradial furrow traverses the disc for nearly half its radius.

The madreporite, which is situated about midway between the centre and margin, is circular, very prominent, projecting above the general surface; is coarsely furrowed, and not surrounded by spines.

The abactinal skeleton consists of an irregular network of short ossicles leaving larger and smaller meshes: the former are often partially occupied by small irregular ossicles, which nearly subdivide the mesh. On the disc the meshes are smaller, the main ossicles being closer together than on the arms. In the larger meshes on the latter some 6 or 8 papulæ occur; on the smaller, only a single papula.

On the abactinal surface of the disc spines are practically absent, and are few and widely scattered on the upper surface of the arm. Here and there an isolated, short, blunt, apparently immovable spine springs from a node in the network; they become relatively more numerous, but still few and widely spaced, as the tip of the arm is approached. At the sides of the arm, however, they are more definitely arranged, as also are the ossicles.

I see no pedicellariæ anywhere.

The ambulacral grooves are very narrow and deep, the podia being, of course, in two series; the groove is concealed by adambulacral spines, which are long enough to reach across it. Each adambulacral ossicle carries 4 stout, nearly cylindrical, blunt spines, arranged in a transverse row in regard to the groove. The innermost is rather shorter than the next, which is the stoutest and longest of

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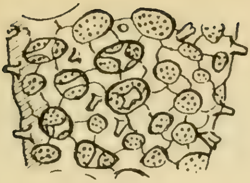
* During the examination of these specimens I endeavoured to trace the starfish which Hutton identified as *Uniophora granifera* (Trans. N.Z. Inst., xi (1878), 306), and which was at that time in the Otago Museum. I failed to find any that agrees with Muller and Troschel's description and figure, and I have come to the conclusion that Hutton must have been mistaken in his identification; perhaps he confused it with *Stichaster australis*, especially as the above authors, in a footnote (p. 20), state that *Uniophora* includes species which they had formerly placed in that genus. I communicated with Mr. Farquhar asking him whether he had ever met with the species; he replied that he had not, and that he had likewise come to the conclusion that the genus had been included in our list in error.

PLATE VIII.



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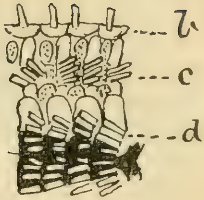

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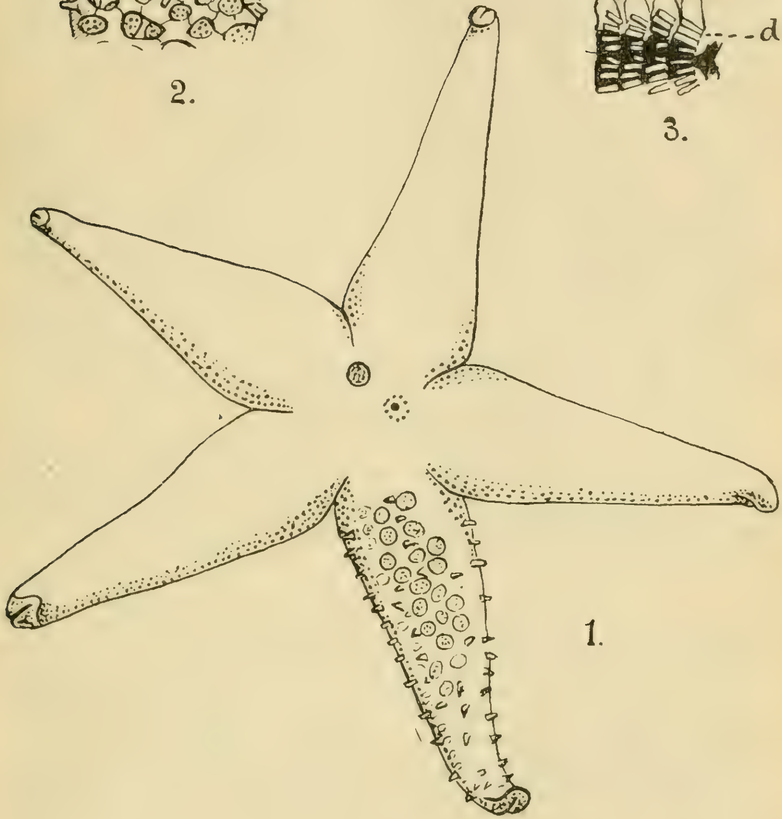

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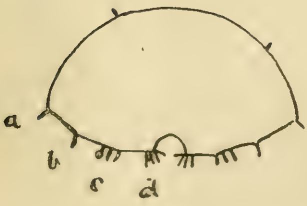

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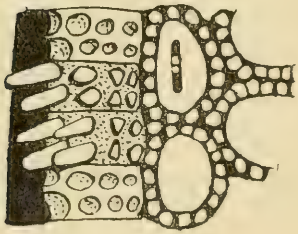


5.

the four. This innermost springs from the edge of the plate and extends almost horizontally across the groove; the remainder project vertically and are divergent.

Outside the adambulacrals is a continuous series of small intermediate ossicles, each with a spine somewhat smaller than the adambulacrals: these intermediates are present for only about half-way along the arm. Outside these is a row of rather closely set, vertically elongated ossicles (figs. 3, 4, *c*), separated from one another by a papular space. These ossicles are connected at their upper ends by a series of horizontal, slightly keeled ossicles (*b*), which gives rise to a continuous slight ridge along the ventral margin of the arm, as seen from below. These vertical ossicles bear groups of spines, each group consisting of 2, 3, or 4 spines, shorter than the adambulacrals, disposed vertically above one another. Above these ossicles again there is another row of vertical ones, succeeded by a second ridge formed of horizontally arranged ossicles (*a*), which form the lower margin of the curved edge of the arms, as seen from above. (*Cf.* transverse section of arm, fig. 4.) This ridge bears pairs of spines of the same size as those of the lower ridge. Above the second ridge the irregular network of the abactinal surface commences—somewhat denser at the sides, looser above, with rare, isolated spines.

Locality.—Off Otago Heads, 18–38 fathoms.

Remarks.—This species is very different from *E. purpureus*, of which there is a specimen in this Museum. It is not unlike *E. eridanella* M. and T., from the Admiralty Islands and Thursday Island; but this seems to have constantly six arms and two madreporites, according to Perrier (Ann. Sci. Nat. Zool. (5), xii, p. 250).

Asterias calamaria Gray.

Farquhar, *loc. cit.*, 1898.

Stations 16, 20.

This, one of our commonest long-armed, many-rayed littoral starfishes, was obtained only at two stations off the east coast of Otago. Sladen (1889, p. 563), placed this and the following species in his sub-genus *Stolasterias*, characterized by the definitely arranged spinelets, large and isolated, surrounded by dense wreaths of pedicellariæ. But in 1867, Verrill [37] had described the species under the name of *Coscinasterias muricata*, which he did not then recognise as being Gray's *A. calamaria*. Verrill's generic or subgeneric name ought, then, to have precedence of Sladen's so far as this species is concerned (see Fisher, 1906, A.M.N. Hist. (7), xvii, p. 574). But I have preferred to leave both the species under the generic title of *Asterias*. Various other subgeneric names have been proposed by Perrier; but even Hamann [21] omits them in his lists.

Mr. Farquhar [14 and 16] has given a valuable and interesting account of certain bionomic facts relating to this species.

Asterias mollis Hutton.

Farquhar, *loc. cit.*, 1898, p. 316.

Stations 9, 16.

This species was obtained off the east coast of Otago. It does not appear to be so widely distributed as the preceding. Farquhar refers only to Lyttelton as its provenance, but it occurs, though not very abundantly, at Dunedin.

OPHIUROIDEA.

Ophiomyxa australis Muller and Troschel.

Farquhar, *loc. cit.*, 1898, p. 309.

This is a very common denizen of the rock-pools of the southern portion of New Zealand; indeed, it appears to be the commonest of our ophiurids. It has, too, a very wide distribution outside the limits of our area. (See also Farquhar [18].)

Astrotoma waitei, sp. nov.

Plate IX, figs. 1–6.

Stations 15, 16, 22.

Astrotoma is one of the few genera in which the arms can be rolled inwards towards the mouth; and these arms are unbranched.

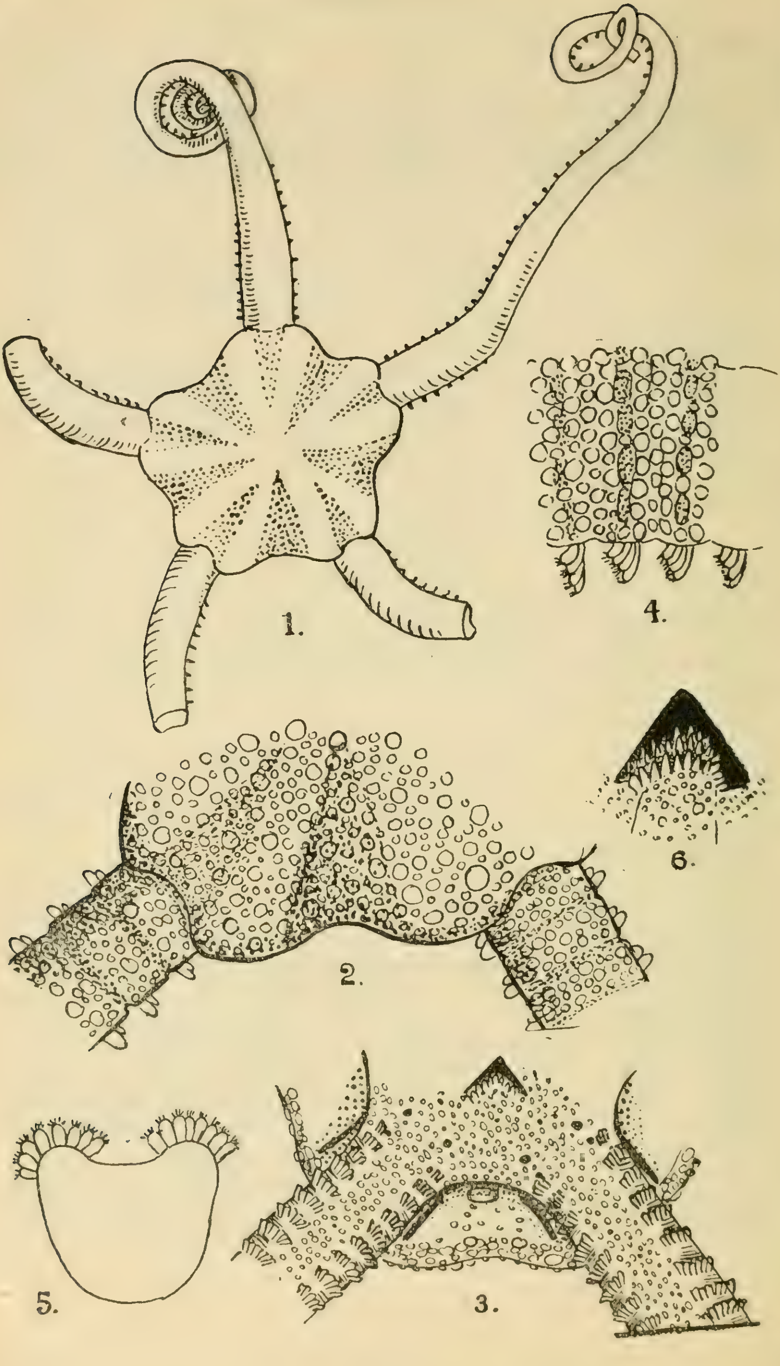
This is the first recorded occurrence of the genus in New Zealand waters. Three specimens were received by me; when dried they are a dirty white in colour.

The diameter of the disc is 33 mm.; the height in the centre is 20 mm.; the length of the arm is $\pm$ 130 mm.; the width of the arm at base is 9 mm.; height of the arm is 7 mm. As the tips of the arms were more or less coiled, it is difficult to determine accurately their lengths; but the above is an approximation.

The upper surface of the disc is covered by closely set, rounded scales of two chief sizes, though others of intermediate size occur; the smaller ones filling the gaps between the larger, which are about 1 mm. in diameter. They have no definite arrangement. In the interbrachial spaces the small ones decrease in size as the margin is approached, and here the larger ones become fewer, so that the intergenital areas are finely granulated, the granules being rather more inclined to be spinous than elsewhere. The adradial plates, which are about 5 mm. broad near the edge of the disc, and are covered by the scales, form marked ridges extending to the centre of the disc, which is, in the dried specimens at any rate, slightly raised above the general surface.

The actinal or oral surface is tesselated with closely set, flattened, and nearly uniform granules, smaller than those on the lower surface of the arms.

PLATE IX.



1. 2. 3. 4. 5. 6.

The mouth-angles are covered with even smaller scales; each carries near its apex several long conical spines, which are not confined to the apex, but extend along the sides of the mouth-angles, and also within the buccal cavity, in two or three tiers, so as to appear almost like buccal or oral papillæ. They are more numerous and more slender than the tooth papillæ of *Astrotoma agassizii* Lyman.

A small oval madreporite lies at the edge of the horizontal circumoral region, just below the ridge or fold connecting two neighbouring arms, and which separates the intergenital area from the oral area. It measures 1·5 mm. in length which is horizontal or tangential, and 1 mm. in length which is vertical or radial. The genital clefts are 4 mm. in length—two in each interbrachial space.

The arms are high, strongly arched abactinally and flattened below, tapering gradually; and the ends are coiled, to a greater or less degree, in all the specimens. The sides and upper surface are covered with granulated scales, and in the dried specimens the skin is depressed between the vertebral ossicles, so that the arm appears segmented—that is, it is surrounded by narrow grooves alternating with broader raised areas: in the grooves the scales are not perceptibly smaller than elsewhere. On each side of the arm, on each of the raised areas, there are about twelve groups of minute glassy hooklets, forming an interrupted ring round the lateral and upper surfaces of the arm: each group is borne on a flattish plate, a little sunken, surrounded by a more or less evident circle of the larger granules of the skin.

The under-surface of the arm is covered by uniform rounded granules, rather larger than those on the under-surface of the disc, but smaller than those on the sides of the arm. Each "segment" of the arm carries 8–10 short, cylindrical, blunt spines, terminating in a tuft of glassy spicules, so that the tips are distinctly rough. At about three-quarters of the length of the arm they begin to decrease in number, till only 1 or 2 long, slender, clawlike spines remain: this reduction is effected by the disappearance of the spines outside or above the pore.

It is clear that these claws, as well as the roughened tips of the spine, serve admirably for grasping objects round which the arms may be coiled: and it happens that in most of the specimens these hooks have been broken away on removing the animals from the net in which they were captured. These "arm spines" or "tentacle spines" are set on a granulated ridge.

The tentacle pore is on a level with the third spine from below, so that there are from 5–7 spines above, or outside, the pore. The first tentacle pore, situated on the disc, is without a spine; the second, which is on the base of the arm, just where it joins the disc, is provided with 3 or 4 spines; the third pore has 5 spines on a ridge; the next, 6 or 7, and the full number is soon attained.

Locality.—East coast of Otago.

Remarks.—Only four species of *Astrotoma* have hitherto been described: *A. murrayi* Lyman, 1882, obtained by the "Challenger" at Banda Islands, 200 fathoms; *A. agassizii* Lyman, 1875, from the Straits of Magellan, 135 fathoms: from both of which our species differs in various respects. The descriptions of *A. bellator* Koehler, and *A. vecors* Koehler, got during the "Siboga" expedition (1904) from the Sulu Archipelago and Banda Sea respectively, are not accessible to me, so it may turn out that ours is synonymous with one of them.

Amphiura noræ, sp. nov.

Plate X, figs. 1–3.

Station 83.

The colour of the solitary specimen is, in alcohol, and later when dried, pale greenish-grey, with whitish arms. The disc, which is 9 mm. in diameter, is deeply notched interbrachially. The arms are more than 45 mm. in length (the tips are broken); each is about 1·5 mm. across the base. The upper surface is covered with small, flat, round, overlapping scales; a central and 5 radially situated scales, a little distance from the centre, are circular and distinctly larger than the rest. The scales decrease in size towards the margin, though those immediately bordering the adradial plates are rather larger than their neighbours.

The adradials are narrow, convex externally, slightly concave internally, extend about half-way towards the centre of the disc, and do not quite reach the margin. They measure 2 mm. in breadth by 5 mm. in length. The two adradials of a pair are separated by a row of 3 long plates, and their proximal ends by 2 or 3 rounded ones.

The mouth-shields are somewhat oval, with the slightly longer axis radial. The proximal margin is slightly peaked; the distal convex, with two very slight notches dividing the margin into three nearly equal portions, of which the middle is rather more pronounced.

The side mouth-plates are broader distally than orally where they touch; the lateral margin is slightly excavated.

There are 3 buccal papillæ on each side of each mouth-angle—one at the apex of each jawpiece forming the angle, a second smaller one laterally, while the third is very large, oval, and plate-like, nearly as long as the side mouth-plate, and resembling a "tentacle scale."

The actinal interbrachial area is almost naked; there is at the margin a very narrow band of small scales, continuous with those of the upper surface of the disc, another narrow band along the side of each genital cleft, and a few small, isolated scales in the intergenital area. This naked interbrachial area, and the presence of the middle of the three buccal papillæ, serve to distinguish this species from *A. rosea* Farquhar [13], to which it bears, otherwise, a general resemblance.

The upper arm-plates are transversely oval, with a slight peak in the middle of the distal border; between them the side arm-plates are visible reaching nearly to the middle line. The under arm-plates are approximately square, nearly as broad as they are long, with the lateral and distal margins slightly excavated, and the proximal slightly produced and angulated. The side arm-plates support four comparatively long, slender, pointed, conical arm-spines, the second of which is longest, and the uppermost the shortest. Further along the arm the upper one disappears.

Locality.—Off Cape Kidnappers, east coast of the North Island.

Remarks.—This species seems to be near *A. koreœ* Duncan [12], in which, however, the intergenital area is plated.

Ophionereis schayeri Muller and Troschel.

Farquhar, *loc. cit.*, 1898, p. 307.

A few specimens of this very common littoral species were included. It appears to be distributed all along our coast. (See remarks by Farquhar [18].)

Ophiactis nomentis Farquhar.

Ophiactis nomentis Farquhar, Trans. N.Z. Inst., xxxix, 1906, p. 125.

Unfortunately the station-number of this species is not recorded. It was obtained by Farquhar in 4 fathoms of water at Cape Maria van Diemen, but our specimens must have been got south of this, and on a sandy bottom, for sand still adheres to them. Their colour is now grey, mottled with white, especially on lateral portions of the upper arm-plates.

Pectinura maculata Verrill.

Farquhar, *loc. cit.*, 1898, p. 306, gives synonymy. Koehler, Bull. Sci. de la France, xli, 1907, p. 285, pl. x, fig. 34.

Stations 6, 9, 15, 24.

This handsome and not uncommon species, described so long ago as 1869, has only recently been figured by Koehler.

Localities.—Stewart Island, south and east coast of South Island. [D'Urville Island, in Cook Strait; Wellington; Auckland; Chatham Islands (Farquhar).]

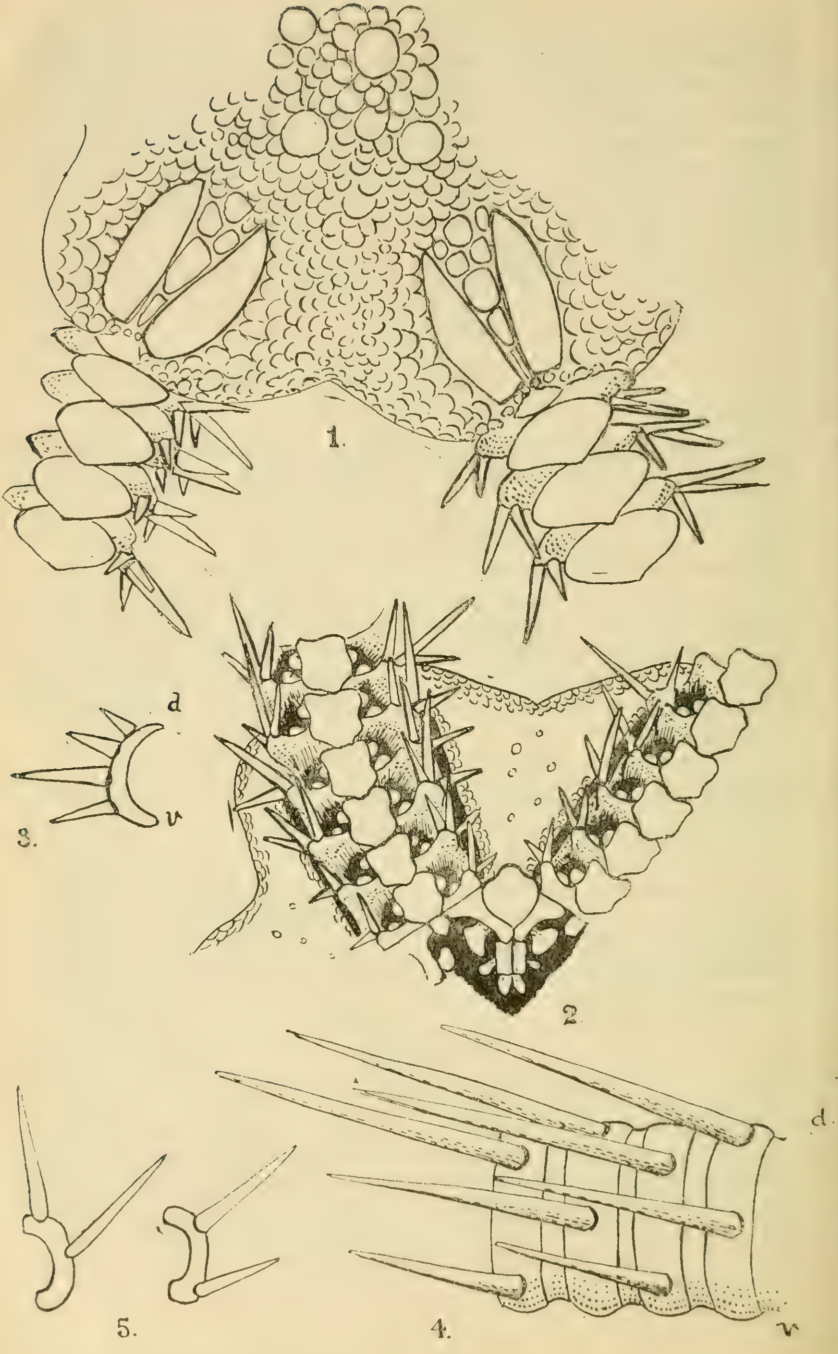
ECHINOIDEA.

Goniocidaris umbraculum Hutton.

Farquhar, *loc. cit.*, 1898, p. 316.

Several examples of this curious little cidaris were obtained. The characteristic spines, dilated at the tip to form a flattened or concave terminal disc, are unmistakable. Hitherto it has only been obtained from the shores of Stewart Island, and doubtless these present specimens came from that neighbourhood.

Plate X.



Porocidaris elegans Agassiz.

Porocidaris elegans Agissiz, Proc. Amer. Acad., xiv, 1879, p. 198; "Challenger" Reports, iii, 1881, p. 40.

Histocidaris elegans Mortensen, Danish Ingolf Exped. 1903, pp. 21, 30.

Stations 83, 89.

This little cidarid has hitherto been obtained off Sydney and the Philippines, and its discovery in considerable numbers off New Zealand has much interest.

The only difference that I can detect, from the abbreviated account in the "Challenger" report (for I have not access to the earlier description), is the fact that there is in our specimens no crenulation on the boss of the tubercles. Wyville Thomson [36] pointed out, and Agassiz gives further evidence, that cases are known in which some individuals of a species usually having crenulated tubercles have smooth bosses. Also, both in *P. purpurata* Thomson and *P. elegans*, only some of the tubercles exhibit this feature. As our specimens are all smaller than those obtained by the "Challenger," their absence may be due to immaturity. In all other respects, however, the agreement is so close that I do not feel justified in making a new species.

This little cidarid is readily distinguished from our other member of the family, not only by the greater length and delicacy of the spines, the length of which is 2 to 3 times the diameter of the corona, but by the peculiar flattened pectinate spines around the mouth. Our specimens are smaller than those described by Agassiz. Height, 10 mm.; diameter, 19 mm.; plates, 6 in a vertical row.

I have followed Agassiz in rejecting Mortensen's generic name.

Localities.—Cape Kidnappers, 76–82 fathoms, soft mud; Cape Runaway, 105 fathoms, sand and mud: both on the east coast of the North Island.

Echinus angulosus Leske.

Farquhar, *loc. cit.*, 1898, p. 319.

Parechinus angulosus Mortensen, *loc. cit.*, 1903, p. 108.

Plate XI, fig. 5.

Station 29.

There are two specimens of an echinid which I attribute, with some hesitation, to this species, for the following reasons: (*a.*) The species is already recorded from New Zealand by Agassiz (1872, p. 490). (*b.*) There are several examples from Stewart Island in this Museum, so labelled by Captain Hutton. (*c.*) There is a fairly close resemblance between them and the photograph of *Echinus angulosus* given in Agassiz's "Revision," pl. vii *a*.

At the same time I feel doubtful as to the correctness of this identification, for—(1.) A detailed comparison with Agassiz's account of the arrangement of the tubercles in *E. angulosus* shows several differences;

indeed, the figure recalls that of *E. albocinctus*, but the colour of the test is quite different. (2.) The measurements do not yield the same proportions as those given by Agassiz, in which the number of interambulacral tubercles in a vertical row is less for a given height, and the spines are rather larger for a given diameter, than in our specimens. (3.) Filhol (1885) states, on the authority of Perrier, that the common *Echinus* which he collected on Stewart Island and in Cook Strait is *E. margaritaceus*, and makes no mention of *E. angulosus*.

Unfortunately I have not access to any detailed account of the former, but Agassiz refers (p. 493) to the large pedicellariæ and large miliaries as being characteristic; he also states that the primary spines are white and the secondaries yellow; while the photographs given by Agassiz and Pourtates (1874) show a very different type of tuberculation. Hence I conclude that our specimens are not *E. margaritaceus*. Moreover, Koehler's *E. antarcticus* (1901)—which Mortensen has suggested may be a synonym of *E. margaritaceus*—has a distinct centro-dorsal surrounded by quite small periproct plates; the coronal plates are few and high; and the general appearance and details are different. As Mortensen made the above suggestion (although disallowed by Loriol), there must be similarities between the two species, and, if so, it is evident that our urchin is not *E. margaritaceus*. At the same time it is curious that this species, which Filhol found so common, is not represented in any of our museums here.

In view of this doubt, and as no description of our *E. angulosus* has appeared in publications readily accessible to naturalists in New Zealand, I give the following brief account.

Measurements were taken of our largest and smallest denuded individuals.

	A, 25 interambulacral tubercles.	B, 18 tubercles.
	Mm.	Mm.
Diameter	42	30
Height	27	18
Width of abactinal area	7	6
,, actinal area	13·5	11
,, poriferous zone	3·3	2
Spines (longest)	6–8	5–7

The poriferous zone was measured at the ambitus. The largest tubercles are below the ambitus.

The colour of the (dried) test is a light greenish-grey with pale-brown poriferous zone, and a line of the same tint in the middle of each ambulacrum; the spines are pale-green, tipped with white; those around the mouth in recently obtained specimens are very pale violet below the tips; the secondary spines are olive brown.

In the interambulacral area each plate bears a moderately large tubercle, outside which are two smaller tubercles in a horizontal row; or in plates near the ambitus two rows of such tubercles, and on the inner side a single tubercle of about the same size. The arrangement reminds one of that occurring in *E. albocinctus.* The miliaries are not very numerous, and are somewhat large.

In the ambulacral area each plate bears a single tubercle only a little smaller than those of the main vertical row in the interambulacrum, and throughout the greater part of the area there is a smaller tubercle on the inner side ; those in the poriferous zone are quite small.

Poriferous zone narrow ; pores trigeminate, in short curved rows, wider than in *E. albocinctus.*

In the apical ring none, or only one, of the oculars in our specimens reach the periproct, the external plates of which are rather large, centrals small. The genital plates bear 3 or 4 tubercles in a row near the inner margin, which are not much smaller than small ones in the neighbouring interambulacra.

The peristomial area is naked, except for small buccal plates close to the mouth.

Locality.—Off Oamaru, 25–35 fathoms. [Stewart Island, Dunedin (O.U.M.) ; Cape Campbell, Kaikoura (Farquhar).]

Echinus albocinctus Hutton.

Echinus albocinctus Hutton, 1872, Cat. Ech. N.Z., p. 12.

Echinus magellanicus Hutton, 1876, non Philippi ; Farquhar, *loc. cit.*, 1898, p. 320.

Pseudechinus albocinctus Mortensen, 1903, p. 106.

Echinus albocinctus Loriol, 1904, p. 18, pl. i.

Pseudechinus albocinctus Benham, Ann. Mag. Nat. Hist. (8), i, 1908, p. 107.

Stations 22, 24.

Eight specimens of this brightly coloured urchin were obtained off Shag Point and Moeraki, at depths of 20–40 fathoms, in a bottom of fine sand. [Also Stewart Island (O.U.M.).]

In the present article I have refrained from using Mortensen's generic names, for I gather from an abstract from Agassiz's introduction to his account of Panamic Deep-sea Echini (kindly made for me by Mr. Farquhar) that he is unable to accept them, owing to the insufficient basis on which they are founded, and that other echinologists also hesitate to use them.

Echinus huttoni Benham.

Salmacis globator Hutton, 1878, non Agassiz.

Pseudechinus huttoni Benham, Ann. Mag. Nat. Hist. (8), i, 1908, p. 104.

Stations 15, 16, 22, 24.

Five individuals of this species, which has for so long been known but has been concealed under an erroneous pseudonym, were obtained off Otago Heads, Shag Point, and Moeraki, at depths of 18–44 fathoms, on a bottom of fine sand. [Also Stewart Island, Preservation Inlet (O.U.M.).]

Arachnoides placenta Linnæus.

Farquhar, *loc. cit.*, 1898, p. 321.

This "cake-urchin," or, rather, "biscuit-urchin," is common on sandy beaches. Only one specimen was received, without indications of locality; but, as it is widely distributed, this omission is immaterial.

Echinocardium australe Gray.

Farquhar, *loc. cit.*, 1898, p. 322.

Station 30.

Only three individuals were preserved; they are quite immature. Probably, living as they do imbedded in the sand, the trawl missed many other specimens, for they must be fairly abundant.

Localities.—Off Oamaru. [It is very common round the South Island. It would be interesting to ascertain how far north it occurs.]

HOLOTHUROIDEA.

Phyllophorus longidentis Hutton.

Thyone longidentis Hutton, Cat. Ech. N.Z., 1872, p. 16.

Phyllophorus longidentis, Dendy and Hindle, Journ. Linn. Soc. (Zool.), xxx, 1907, p. 101, gives literature and synonyms.

Station 95.

One complete small individual and many, more or less digested, specimens were obtained from the stomach of the fish *Pagrosomus*. This suggests the desirability of examining the contents of various species of ground-feeding fishes for these and other mud-loving animals.

Locality.—Off Whale Island, Bay of Plenty, 25–34 fathoms, sand and mud.

Caudina chilensis J. Muller.

Caudina coriacea Hutton, 1872; Dendy and Hindle, *loc. cit.*, 1907, p. 108.

Caudina chilensis, Clark, Smithsonian Contributions, xxx, 1907, p. 175 (full synonymy).

Station 7.

A single specimen.

Locality.—South of Chasland's, 43 fathoms, fine sand.

Dr. Lyman Clark, in "Apodous Holothurians," 1907, p. 175, states that the specific name "*chilensis*" has priority over "*coriacea*." The species also occurs off Chili, Australia, East Indies, China, and Japan.

Molpadia marenzelleri Théel.

Ankyroderma marenzelleri Théel, "Challenger" Reports, xiv, 1886, p. 41, pl. iii, fig. 1.

Molpadia marenzelleri, Clark, Smithsonian Contributions, xxx, 1907, p. 171, pl. xi, fig. 4.

Station 83 (?)

Only one specimen of this rare deep-sea species was received by me.

The ovoid body is speckled with pale-red dots, due to the coloured phosphatic bodies in the skin; the body towards the posterior end is abruptly narrowed and prolonged backwards as a white tail.

The total length is 28 mm., of which the tail occupies 7 mm.; the greatest breadth of the body is 18 mm.

The only essential difference between this and Théel's type specimen, which was imperfect, and was captured off the East Cape at a depth of 700 fathoms, appears to be that the majority of the calcareous plates (or "tables") present only 3 or 4 perforations instead of 6.

Locality.—Cape Kidnappers, 68–78 fathoms, soft mud.*

Clark (see pp. 17–21) goes fully into the reasons for merging both *Ankyroderma* and *Trochostoma* in Cuvier's genus *Molpadia*. On page 143 the chemical analysis of the curious coloured bodies in the skin is given: they consist chiefly of phosphate of iron, with a little lime, and perhaps magnesium.

Molpadia dendyi sp. nov.

Plate XI, figs. 1–3.

A single specimen; colour, deep maroon-red with a purplish tinge. Length, 65 mm., of which the white tail measures 15 mm.; diameter of body, which is rather shrunken, is 20 mm.; the tail is 2 mm. across. The oral region, which was not retracted, measures 4·5 mm. The tentacles, of which there are, I think, 15, are withdrawn, and, as far as I can make out, are short and rounded, and possess only one pair of minute processes near the tip.

The purplish skin, which is a good deal wrinkled, and covered with a fine grey mud in the folds, is s en when viewed under a dissecting-lens to be dotted with more or less distant pale spots where the vertical spines of the calcareous "tables" project through the layer of coloured ovoid concretions. On one surface of the body, which is the more convex, these spines project further beyond the surface.

The deposits in the integument are of two kinds—(*a*) orange-brown concentrically-marked ovoid or spherical phosphatic bodies, and (*b*) calcareous "tables" of the usual form. Over the greater part of the body the former constitute the chief feature, being densely massed, the tables being more or less isolated. On the tail, however, matters are reversed: the calcareous perforated plates are larger

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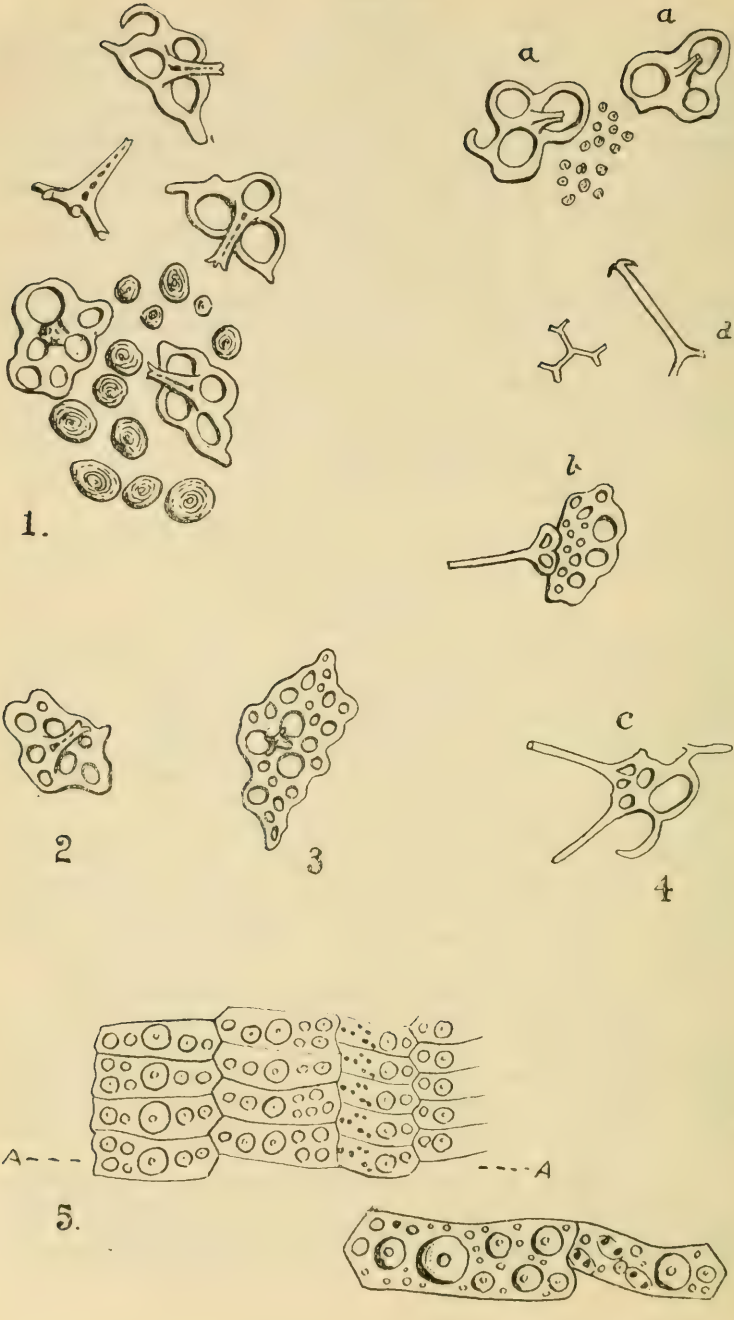
* This probably came from Station 83, though both this number and "30" were on labels in the jar; but, as this species has never been obtained off Oamaru (Station 30) in the various dredgings, whereas it, like all its allies, does occur in deep water, and a deeper sounding was at Station 83, I have placed it as above

PLATE XI.



than elsewhere ; are close together, often overlapping ; are less regular and more varied in form ; while the brown bodies are fewer, and grouped to form large irregular compact masses.

The plates on the body have generally 3 or 4 large circular holes, occasionally 2 or 3 additional smaller ones ; and from the centre rises a vertical column composed apparently of three rods united by several short transverse bars : it terminates in a trifid point.

These plates measure about 0·2 mm. across ; the spines are 0·1 mm. high. On the tail the number and size of the perforations in the plates vary much, but are usually much more numerous than in the body-plates.

Locality.—(?)South of Chasland's (South Island), 43 fathoms, fine sand.*

Remarks.—Two species of "*Trochostoma*" (which Lyman Clark merges into *Molpadia*) have been dredged off the East Cape of New Zealand by the "Challenger": from each of them our present species differs. *T. violaceum* has spicules of quite a different form—great three-armed plates that are almost solid. From *T. albicans* the presence of coloured ovoids sufficiently distinguishes it. The plates in our species rather recall those of *T. antarcticum* from Kerguelen, which, however, has no coloured bodies in the skin.

I am unable to identify it with any of the species of *Molpadia* enumerated by Dr. Lyman Clark, 1907.

Chirodota gigas Dendy.

Chirodota gigas, Dendy and Hindle, Journ. Linn. Soc. (Zool.), xxx, 1907, p. 110.

Station 12.

Several badly preserved specimens, whose very dark violet integument was nearly wholly macerated away, fragments only being left here and there with the groups of characteristic wheels.

The longest individual measures 230 mm. by 12 mm. This is more than twice the length of the type of the species obtained from Chatham Islands.

Dendy says nothing of the colour of his specimen, and possibly my identification is erroneous.

Locality.—Molyneux Bay, 20–46 fathoms, sand.

[I have others, collected many years ago by Mr. G. M. Thomson off Stewart Island. These measure from 130 mm. to 170 mm. by 39 mm. across the widest part of the body, which is the anterior end. They are, however, very soft, so that the above figures exaggerate the true size.]

* The vial in which this and *Caudina* were enclosed bore the number "7," but I am inclined to think that this species came from deeper water off the coast of the North Island.

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EXPLANATION OF PLATES.

Plate VII.

Mediaster sladeni Benham.

Fig. 1. Outline of entire animal (× ½). Only a portion of an arm is filled in.

Fig. 2. Upper surface of a portion of the arm (× 2).

Fig. 3. One of the paxilliform plates (× 4).

Fig. 4. Under-surface of a portion of an arm (× 2), showing the adambulacrals of one side of the groove, and the neighbouring ossicles.

Fig. 5. An oral angle (× 4).

Plate VIII.

Echinaster farquhari Benham.

Fig. 1. Entire animal (natural size); details shown only in part of the arm.

Fig. 2. A portion of the upper surface of an arm about midway along its length (× 2).

Fig. 3. Under-surface of the distal region of an arm (× 2). A little more than half of the diameter is shown; unfortunately, the relative sizes of the adambulacral spines are not accurately drawn. *b*, *c*, *d*, rows of spines. (*Cf.* fig. 4.)

Fig. 4. Outline of a transverse section of an arm, showing the disposition of the spines on the longitudinal ridges. *a*, *b*, *c*, *d*, the four rows of spines along the arm.

Pentagonaster abnormalis Gray.

Fig. 5. The adambulacral ossicles and neighbouring region (× 4). The spines have been removed from two of the ossicles, the articular cups being shown. A pedicellaria is carried in the slit-like furrow of one of the abactinal plates.

Plate IX.

Astrotoma waitei Benham.

Fig. 1. Entire animal (natural size), with three arms cut short.

Fig. 2. Portion of the upper surface (× 2).

Fig. 3. Portion of the lower surface (× 2), showing the small madreporite in this interradius.

Fig. 4. Lateral view of a portion of an arm (× 4), showing the groups of hooklets.

Fig. 5. Transverse section of an arm (× 4), showing the arm-spines and their spicules.

Fig. 6. A mouth-angle (× 4), showing the arrangement of the " papillæ."

PLATE X.

Amphiura noræ Benham.

Fig. 1. Portion of the upper surface (× 12, camera), showing the essential characters of the species.

Fig. 2. Portion of the under-surface (× 12, camera).

Fig. 3. A side arm-plate, with spines (not to scale).

Luidia sp.

Fig. 4. Portion of a side of an arm, showing the characteristic alternate arrangement of the spines. *d*, the upper, *v*, the lower, surface.

Fig. 5. Two successive marginal plates with spines.

PLATE XI.

Molpadia dendyi Benham.

Fig. 1. A group of plates and phosphatic spherules from the middle of the body, only a few of which are indicated, though they fill the spaces between the plates (× 60, camera).

Fig. 2. A calcareous plate from the tail region (× 60, camera).

Fig. 3. Another plate from the tail (not to scale), showing numerous small perforations in addition to three larger holes.

Molpadia marenzelleri Théel.

Fig. 4. Spicules (× 60, camera). A portion of an " anchor," is shown at *d*, and the base of another at *b*. The small circles represent the size of the phosphatic spherules. At *c* is one of the sub-anchor plates with radiating processes. A young plate is also shown.

Echinus angulosus Leske.

Fig. 5. A portion of the test (× 1), showing ambulacral and interambulacral areas. *A* is the ambitus ; below is one plate for each area (× 2)

MOLLUSCA.

PART I.—AMPHINEURA, GASTROPODA, AND SCAPHOPODA.

By Henry Suter.

Plate XII.

The Nudibranchia are omitted. All specimens have been sent to Sir Charles Eliot, K.C.M.G., Sheffield, who has kindly consented to supply a report. Specimens from Stations 26 and 30 were mixed when received, hence the uncertainty expressed.

Class AMPHINEURA.

Family ISCHNOCHITONIDÆ.

Ischnochiton, Gray, 1847.

Ischnochiton longicymba Q. and G.

Chiton longicymba Q. and G., Voy. " Astrolabe," Zool., iii, 1835, p. 390, pl. lxxv, figs. 1–18.

Ischnochiton longicymba Q. and G., Man. Conch. (1), xiv, 1892, p. 87, pl. xxii, figs. 58–66.

Chatham Islands.

Family ACANTHOCHITIDÆ.

Acanthochites, Risso, 1826.

Acanthochites zelandicus Q. and G.

Chiton zelandicus Q. and G., Voy. " Astrolabe," Zool., iii, 1835, p. 400, pl. lxxiii, figs. 5–8.

Acanthochites zelandicus Q. and G., Man. Conch. (1), xv, 1893, p. 16, pl. xiv, figs. 9–10.

Station 12.

Acanthochites porosus Burrow.

Chiton porosus Burrow, Elements of Conchology, 1815, p. 189, pl. xxviii, fig. 1.

Acanthochites (*Cryptoconchus*) *porosus* Burrow, Man. Conch. (1), xv, 1893, p. 36, pl. iii, figs. 57–62.

Stations 22, 74.

Family CHITONIDÆ.

Chiton, Linné, 1758.

Chiton canaliculatus Q. and G.

Chiton canaliculatus Q. and G., Voy. "Astrolabe," Zool., iii, 1835, p. 394, pl. lxxv, figs. 37–42; Man. Conch. (1), xiv, 1892, p. 177, pl. xxxvi, figs. 4–6.

Station 12.

Chiton pellisserpentis Q. and G.

Chiton pellisserpentis Q. and G., Voy. "Astrolabe," Zool., iii, 1835, p. 381, pl. lxxiv, figs. 17–22; Man. Conch. (1), xiv, 1892, p. 173, pl. xxxvii, figs. 14–17.

Chatham Islands.

Onithochiton, Gray, 1847.

Onithochiton semisculptus Pilsbry.

Onithochiton semisculptus Pilsbry, Man. Conch. (1), xiv, 1893, p. 247, pl. lv, figs. 10–11.

Chatham Islands.

Class GASTROPODA.

Family PATELLIDÆ.

Helcioniscus, Dall, 1870.

Helcioniscus strigilis Hombr. and Jacq.

Patella strigilis H. and J., Ann. Sci. Nat. (2), xvi, 1841, p. 190; Man. Conch. (1), xiii, 1891, p. 137; Suter, Proc. Mal. Soc., vi, 1905, p. 351.

Chatham Islands.

Family FISSURELLIDÆ.

Fissuridea, Swainson, 1840.

Fissuridea monilifera Hutton.

Lucapina monilifera Hutton, Cat. Mar. Moll. N.Z., 1873, p. 42.

Megatebennus moniliferus Hutton, Plioc. Moll. N.Z., 1893, p. 72, pl. viii, fig. 76.

Station 26 or 30.

Emarginula, Lamarck, 1801.

Emarginula striatula Q. and G.

Emarginula striatula Q. and G., Voy. "Astrolabe," Zool., iii, 1834, p. 332, pl. lxviii, figs. 21–22; Man. Conch. (1), xii, 1890, p. 259, pl. lxiv, fig. 2.

Station 6.

Family TROCHIDÆ.

Trochus, Linné, 1758.

Trochus tiaratus Q. and G.

Trochus tiaratus Q. and G., Voy. "Astrolabe," Zool., iii, 1834, p. 256 pl. lxiv, figs. 6–11; Man. Conch. (1), xi, 1889, p. 42, pl. xii, figs. 72–74, pl. i fig. 4; Suter, Proc. Mal. Soc., ii, 1897, p. 260.

Station 6.

Monodonta, Lamarck, 1799.

Monodonta æthiops Gmelin.

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Chatham Islands.

Monodonta lugubris Gmelin.

Trochus lugubris Gmel., Syst. Nat., ed. 13, 1790, p. 3583.
Monodonta lugubris Gmel., Man. Conch. (1), xi, 1889, p. 100, pl. xix fig. 93, pl. xxxv figs. 24–25.

Chatham Islands.

Cantharidus, Montfort, 1810.

Cantharidus pupillus Hutton.

Cantharidus pupillus Hutton, Proc. Linn. Soc. New South Wales, ix, 1884, p. 362 (not *Trochus pupillus* Gould); Suter, Proc. Mal. Soc., ii, 1897, p. 270, fig. in text.

Dredge Station C.

Gibbula, Risso, 1826.

Gibbula fulminata Hutton.

Chrysostoma fulminata Hutt., Cat. Mar. Moll., 1873, p. 36.
Gibbula fulminata Hutt., Man. Conch. (1), xi, 1889, p. 216, pl. xliii, figs. 14–16.

Chatham Islands.

Monilea, Swainson, 1840.

Monilea semireticulata Suter.

Monilea (Minolia) semireticulata Sut., Proc. Mal. Soc., viii, 1908, p. 22, pl. ii, fig. 1.

Station 4.

CALLIOSTOMA, Swainson, 1840.

Calliostoma tigris Martyn.

Trochus tigris Martyn, Univ. Conch., ii, 1784, pl. lxxv.

Calliostoma tigris Mart., Man. Conch. (1), xi, 1889, p. 333, pl. xli, fig. 30.

Station 26 or 30.

Family TURBINIDÆ.

LEPTOTHYRA, Dall, 1871.

Leptothyra fluctuata Hutton.

Cyclostrema fluctuata Hutt., N.Z. Journ. Sci., i, 1883, p. 477.

Leptothyra fluctuata Hutt., Man. Conch. (1), xi, 1888, p. 259, pl. lxiv, figs. 47–48; Murdoch, Trans. N.Z. Inst., xxxvii, 1904, p. 222, pl. vii, fig. 10.

Dredge Stations B, C.

ASTRÆA, Bolten, 1798.

Astræa heliotropium Martyn.

Trochus heliotropium, Mart., Univ. Conch., i, 1784 (not 1769), fig. 30.

Astralium heliotropium, Mart., Man. Conch. (1), xi, 1888, p. 228, pl. lvi, fig. 87.

Stations 6, 9, 20, 44.

Family UMBONIIDÆ.

ETHALIA, Adams, 1863.

Ethalia zelandica Hombron and Jacquinot.

Rotella zelandica H. and J., Voy. Pôle Sud., Zool., v, 1854, p. 53, pl. xiv, figs. 5–6.

Ethalia zelandica H. and J., Man. Conch. (1), xi, 1889, p. 459, pl. lviii figs. 9, 32–33, pl. lix fig. 66.

Stations 5, 44.

Family COCCULINIDÆ.

COCCULINA, Dall, 1882.

Cocculina tasmanica Pilsbry.

Acmæa parva var. *tasmanica* Pilsbry, "Nautilus," ix, 1895, p. 128.

Cocculina tasmanica Pils., Murdoch and Suter, Trans. N.Z. Inst., xxxviii, 1905, p. 301.

Cocculina meridionalis Hedley, Mem. Aust. Mus., iv, 1903, p. 331, fig. 64.

Station 4; Dredge Stations B, C.

Family RISSOIDÆ.

Rissoa, Fréminville, 1814.

Rissoa rufoapicata Suter.

Rissoa rufoapicata Sut., Proc. Mal. Soc., viii, 1908, p. 28, pl. ii, fig. 21.

Station 4; Dredge Stations A, B, C.

Rissoa (Cingula) subfusca micronema Suter.

Rissoa (Cingula) subfusca micronema Sut., Proc. Mal. Soc., iii, 1898, p. 4.

Station 4; Dredge Station A.

Anabathron, Frauenfeld, 1867.

Anabathron gradatum Suter.

Anabathron gradatum Sut., Proc. Mal. Soc., viii, 1908, p. 32, pl. iii, fig. 33.

Station 4.

Family CERITHIIDÆ.

Cerithidea, Swainson, 1840.

Cerithidea tricarinata Hutton.

Cerithidea tricarinata Hutt., N.Z. Journ. Sci., i, 1883, p. 477.

Chatham Islands.

Family CERITHIOPSIDÆ.

Cerithiopsis, Forbes and Hanley, 1853.

Cerithiopsis crenistria Suter.

Cerithiopsis crenistria Sut., Trans. N.Z. Inst., xxxix, 1907, p. 256, pl. ix, fig. 4.

Dredge Station C.

Family TRIFORIDÆ.

Triphora, Blainville, 1828.

Triphora lutea Suter.

Triphora lutea Sut., Proc. Mal. Soc., viii, 1908, p. 39, pl. iii, fig. 50.

Dredge Station A.

Family VERMETIDÆ.

Siliquaria, Lamarck, 1799.

Siliquaria weldii Tenison-Woods.

Siliquaria weldii T.-Woods, Proc. Roy. Soc. Tasm., 1875 (1876) p. 44.

4—Trawling.

Siliquaria (*Pyxipoma*) *weldii* T.-Woods, Man. Conch. (1), viii, 1886, p. 191, pl. lviii, fig. 28.

Station 6.

A cluster of dead shells in a sponge.

Family TURRITELLIDÆ.

Turritella, Lamarck, 1799.

Turritella rosea Q. and G.

Turritella rosea Q. and G., Voy. "Astrolabe," Zool., iii, 1834, p. 136, pl. lv, figs. 24–26.

Stations 5, 6, 12, 20, 22, 26 or 30.

Turritella symmetrica Hutton.

Turritella (*Eglisia*) *symmetrica* Hutt., Cat. Mar. Moll., 1873, p. 30.
T. tricincta Hutt., Cat. Tert. Moll., 1873, p. 13 (not of Borson et auct.).
T. kanieriensis Harris, Cat. Tert. Moll. Brit. Mus., pt. i, 1897, p. 241.

Stations 2, 5, 12, 20, 26, or 30; Dredge Stations A, B, C, D.

Family STRUTHIOLARIIDÆ.

Struthiolaria, Lamarck, 1812.

Struthiolaria papulosa Martyn.

Buccinum papulosum Mart., Univ. Conch., ii, 1784, fig. 54.
Struthiolaria papulosa Mart., Man. Conch. (1), vii, 1885, p. 133, pl. 12, fig. 34.

Station 20.

Family CAPULIDÆ.

Capulus, Montfort, 1810.

Capulus calcareus, sp. nov.

Plate XII, figs. 1, 2.

Stations 20, 88; Dredge Station C.

Shell small, fairly solid, somewhat irregularly ovate, very little asymmetrical. Sculpture consisting of fine radiate striæ, crossed by distinct concentric growth-lines; most specimens I have seen had partly lost the epidermis and the radial sculpture, the surface being quite smooth and chalky. Colour yellowish-brown, white after having lost the epidermis, which is thin, horny, and peeling off very easily. Apex projecting far past the base. Protoconch well defined, of $1\frac{1}{4}$ smooth and convex whorls. Whorls $1\frac{3}{4}$, the last half large, convex, expanded towards the aperture; posterior slope below the apex short, concave. Aperture oval to subcircular, expanded, margin uneven, sharp, inside white, polished.

Breadth, 8·5 mm.; length, 11·5 mm.; height, 5 mm.

Dentition.—Formula of radula, 2-1-1-1-2. Central tooth trapezoidal, with a large median and 4 smaller cusps on each side. Lateral teeth with a large triangular reflection bearing 5 denticles on the inner side. Marginals unciform, the inner teeth with sharply pointed denticles on the posterior edge, outer marginals smooth.

Type in the Canterbury Museum, Christchurch.

Specimens from both trawling stations were fixed to shells of *Syrinx maximus.*

Family CALYPTRÆIDÆ.

CALYPTRÆA, Lamarck, 1799.

Calyptræa maculata Q. and G.

Crepidula maculata Q. and G., Voy. "Astrolabe," Zool., iii, 1835, p. 422, pl. 72, figs. 6–9.

Calyptræa calyptræformis Lamarck, Man. Conch. (1), viii, 1886, 122, pl. 35, fig. 99 (not of Lamarck).

Dredge Station A.

CREPIDULA, Lamarck, 1799.

Crepidula contorta Q. and G.

Crepidula contorta Q. and G., Voy. Astrol., Zool., iii, 1835, p. 418, pl. lxxii, figs. 15, 16.

C. monoxyla Lesson, Man. Conch. (1), viii, 1886, p. 128, pl. xxxvii, figs. 35, 36.

Stations 5, 20.

Family NATICIDÆ.

NATICA, Scopoli, 1777.

Natica zelandica Q. and G.

Natica zelandica Q. and G., Voy. Astrol., Zool., ii, 1832, p. 237, pl. lxvi, figs. 11–12. Man. Conch. (1), viii, 1886, p. 22, pl. iv, fig. 70.

Station 26 or 30.

POLINICES, Montfort, 1810.

Polinices amphialus Watson.

Natica amphiala Wats., "Challenger" Rep., xv, 1886, p. 437, pl. 27, fig. 6.

N. vitrea Hutton, Cat. Mar. Moll., 1873, p. 21.

Station 4; Dredge Stations A, C.

Family SEPTIDÆ.

ARGOBUCCINUM, Herrmansen, 1846.

Argobuccinum argus Gmelin.

Murex argus Gmelin, Syst. Nat., ed. 13, 1790, p. 3547.

Ranella (Argobuccinum) argus Gmel., Man. Conch. (1), iii, 1881, p. 44, pl. xxiv, figs. 61–65.

Stations 20, 26 or 30.

Family TONNIDÆ

Tonna, Brünnich, 1772.

Tonna variegata Lamarck.

Dolium variegatum Lam., Anim. s. Vert., vii, 1822, p. 261; Man. Conch. (1), vii, 1885, p. 262, pl. iii, figs. 13, 14.

Stations 20, 88.

Family EPITONIIDÆ.

Epitonium, Bolten, 1798.

Epitonium zelebori Dunker.

Scalaria zelebori Dkr., Verh. Zool. Bot. Gesell. Wien, xvi, 1866, p. 912; Man. Conch. (1), ix, 1887, p. 78, pl. xv, fig. 75.

Dredge Stations C, D.

Family PYRAMIDELLIDÆ.

Odostomia, Fleming, 1828.

Odostomia inornata Suter.

Odostomia inornata Sut., Trans. N.Z. Inst., xl, 1908, p. 364, pl. 28, fig. 8.

Dredge Station B.

The specimen is large, having 7 whorls. Diam., 2·5 mm.; height, 6·8 mm.

Family TURBINELLIDÆ.

Syrinx, Bolten, 1798.

Syrinx maximus Tryon.

Siphonalia maxima Tryon, Man. Conch. (1), iii, 1881, p. 135, pl. liv, fig. 355. Hedley, Mem. Aust. Mus., iv, 1903, p. 374, pl. xxxviii.

Stations 20, 88, 89.

Family MITRIDÆ.

Vexillum, Bolten, 1798.

Vexillum biconicum Murdoch and Suter.

Vulpecula (*Pusia*) *biconica* M. and S., Trans. N.Z. Inst., xxxviii, 1905 (1906), p. 289, pl. xxxiii, fig. 22.

Station 4.

Vexillum waitei, sp. nov.

Plate XII, fig. 3.

Station 4; Dredge Stations A, B.

Shell small, fusiform, turreted, with strong axial ribs rendered slightly nodulous, spiral liræ; with only 3 columellar folds. Sculpture consisting of strong and sharp spiral threads, 4 on the penultimate whorl, the interstices somewhat broader than the threads, a small and flat thread below the suture; they are crossed by distant, broadly rounded axial ribs, 10 to 11 on a whorl, and they are cut up into broad nodules by the spirals, they vanish on approaching the base; growth-lines very fine and crowded. Colour white. Spire elevated conic, turreted, about the same height as the aperture; outlines slightly convex. Protoconch small, of $1\frac{1}{2}$ smooth turns. Whorls 5 to 6, distinctly shouldered, lightly rounded below the keel; base somewhat contracted. Suture not much impressed, margined. Aperture high and narrow, angled above, with an open, short, and slightly recurved canal below, its base not notched. Outer lip convex, indistinctly angled above, and somewhat contracted below. Columella slightly oblique, with 3 plaits, the lowest a little smaller; inner lip thin and narrow, forming a very thin layer on the concave parietal wall, drawn out to a long and fine point along the inner edge of the canal.

Diam., 2·7 mm.; height, 6·5 mm.

Type in the Canterbury Museum, Christchurch.

The type specimens were taken at Station 4.

Named in honour of Mr. Edgar R. Waite, F.L.S., Curator of the Canterbury Museum, the discoverer of the species.

Family BUCCINIDÆ.

Cominella, Gray, 1857.

Cominella maculata Martyn.

Buccinum maculatum Mart., Univ. Conch., ii, 1784, fig. 49.

Cominella maculata Mart., Man. Conch. (1), iii, 1881, p. 204, pl. lxxxi, figs. 421–424.

Chatham Islands.

Cominella maculosa Martyn.

Buccinum maculosum Mart., Univ. Conch., i, 1784, fig. 8.

Cominella testudinea Chemn., Man. Conch. (1), iii, 1881, p. 203, pl. lxxx, figs. 414, 415.

Chatham Islands.

Cominella nassoides Reeve.

Buccinum nassoides Rve., Conch. Icon., Buccinum, 1846, sp. 12.

Cominella nassoides Rve., Man. Conch. (1), iii, 1881, p. 206, pl. lxxxi, figs. 442, 443.

Station 26 or 30.

Family MURICIDÆ.

Murex, Linné, 1758.

Murex zelandicus Q. and G.

Murex zelandicus, Q. and G., Voy. Astrol., Zool., ii, 1833, p. 529, pl. xxxvi, figs. 5–7; Man. Conch. (1), ii, 1880, p. 108, pl. xxix, fig. 268.

Station 89.

Trophon, Montfort, 1810.

Trophon ambiguus Philippi.

Fusus ambiguus Phil., Abbild. and Beschr. neuer Conch., Fusus, 1844, pl. i, fig. 2.

Trophon ambiguus Phil., Man. Conch. (1), ii, 1880, pl. xxxiii, fig. 365.

Stations 4, 5, 6, 29, 44; Dredge Station C.

Trophon aucklandicus E. A. Smith.

Euthria aucklandica E. A. Smith, Voy. "Southern Cross," Moll., 1902, p. 203, pl. xxiv, figs. 12, 13.

Station 5.

Trophon bonneti Cossman.

Trophon (*Trophonopsis*) *bonneti* Cossm., Essais de Paléoconch. Comp., v, 1903, p. 200, pl. iii, fig. 7.

T. ambiguus pumilus Suter, Journ. of Mal., vii, 1899, p. 55.

Station 20.

Trophon convexus, sp. nov.

Plate XII, fig. 4.

Dredge Station B.

Shell very small, fusiform, thin, axially costate and spirally lirate. Sculpture consisting of strong, broadly rounded axial costæ, about 10 on a whorl, extending from suture to suture, but absent on the base, crossed by distant and prominent spiral cords, with a few intercalated fine threads upon the neck of the canal, produced into oval nodules upon the axial ribs; the spire-whorls with a fine thread below the suture, margining it, and 3 distant strong spirals below it; body-whorl with 14–15 cinguli, those upon the base not nodulous. Fasciole hardly discernible. Colour yellowish-brown, neck of canal and inner lip whitish, interior of aperture light brown. Spire acuminate, conic, of the same height as the aperture with canal. Protoconch papillate, of 1½ smooth and convex whorls, the globular nucleus slightly lateral. Whorls 5, regularly increasing, convex; base contracted towards the canal. Suture but little impressed, undulating, margined below.

Aperture subvertical, ovate, angled above, produced below into a moderately long, oblique and slightly recurved, widely open canal. Outer lip thin and sharp, convex, crenulated by the spiral sculpture, smooth inside. Columella vertical, straight, twisted and narrowed below; inner lip thin and narrow, extending over the excavated parietal wall, drawn out to a narrow ridge towards the inner margin of the canal. Operculum unknown.

Diam., 3·5 mm.; height, 7 mm.

Type in the Canterbury Museum, Christchurch.

Remarks.—This species is nearly allied to *T. curtus* Murdoch, but it is larger, has the whorls not shouldered, no colour-bands, and the strong spiral on the neck of the canal is also wanting; the protoconch has convex, not carinated whorls.

Trophon corticatus Hutton.

Fusus corticatus Hutt., Cat. Mar. Moll. 1873, p. 9.

Trophon duodecimus Gray, Hutton, Plioc. Moll. N.Z., 1893, p. 39, pl. vi, fig. 7 (not of Gray).

Station 26 or 30.

Trophon crispulatus Suter.

Trophon (*Trophonopsis*) *crispulatus* Sut., Proc. Mal. Soc., viii, 1908, p. 178, pl. vii, fig. 2.

Station 4; Dredge Station A.

Trophon plebeius Hutton.

Fusus plebeius Hutt., Cat. Mar. Moll., 1873, p. 9.

Trophon plebeius Hutt., Plioc. Moll. N.Z., 1893, p. 39, pl. vi, fig. 6.

Station 20.

Family THAISIDÆ.

Thais, Bolten, 1798.

Thais scobina albomarginata Deshayes.

Purpura albomarginata Desh., Rev. Zool. Soc. Cuv., 1839, p. 360.

P. scobina albomarginata Desh., Man. Conch. (1), ii, 1880, p. 170, pl. 51, figs. 121–124.

Chatham Islands.

Family CANCELLARIIDÆ.

Admete, Kröyer, 1842.

Admete trailli Hutton.

Cancellaria trailli Hutt., Cat. Mar. Moll., 1873, p. 26; Plioc. Moll. N.Z., 1893, p. 58, pl. vii, fig. 52.

Dredge Station C.

Family PYRENIDÆ.

Alcira, H. Adams, 1860.

Alcira sulcata Hutton.

Lachesis sulcata Hutton, Cat. Mar. Moll., 1873, p. 12.

Columbella huttoni Sut., Index Faunæ N.Z., 1904, p. 72, for *C. sulcata*, Hutt., preoccupied; Murdoch, Trans. N.Z. Inst., xxxvii, 1904, p. 223, pl. vii, fig. 12.

Station 4; Dredge Station C.

Family VOLUTIDÆ.

Fulguraria, Schumacher, 1817.

Fulguraria arabica elongata Swainson.

Voluta elongata Swains., Exot. Conch., 1821, pl. xx, xxi.

Voluta pacifica elongata Hutton, Man. N.Z. Moll., 1880, p. 62.

Stations 3, 5, 20.

Family OLIVIDÆ.

Ancilla, Lamarck, 1801.

Ancilla mucronata Sowerby.

Ancillaria mucronata Sow., Spec. Conchyl., 1830, p. 8, figs. 47, 48; Reeve, Conch. Icon., Ancillaria, 1864, pl. iv, fig. 10.

Station 89; Dredge Station D.

Family MARGINELLIDÆ.

Marginella, Lamarck, 1799.

Marginella albescens Hutton.

Marginella albescens Hutt., Cat. Mar. Moll. 1873, p. 19. Man. N.Z. Moll., p. 62.

Station 4; Dredge Station B.

Cryptospira, Hinds, 1844.

Cryptospira (Closia) profunda, sp. nov.

Plate XII, fig. 5.

Dredge Station B.

Shell small, ovoid, smooth and polished, white, with four columellar plaits. The only sculpture consists of very faint, rounded growth-periods. Colour white. Spire involute, flat, covered by enamel. The last whorl occupies the whole height of the shell; it is lightly convex, narrowed below, with a light basal limb. Aperture high and narrow, arched, narrowly rounded above, slightly emarginate below. Outer lip convex, thickened, with a light varix, extending above beyond the spire and concealing it, inside lightly crenate. Columella oblique, straight, with 4 almost transverse plaits, the lower two stronger than the others.

Diam., 3·8 mm.; height, 5·8 mm.

Type in the Canterbury Museum, Christchurch.

Family TURRITIDÆ.

Mitromorpha, A. Adams, 1865.

Mitromorpha gemmata Suter.

Mitromorpha gemmata Sut., Proc. Mal. Soc., viii, 1908, p. 186, pl. vii, fig. 18.

Dredge Stations A, B.

Mangilia, Risso, 1826.

Mangilia munda, sp. nov.

Plate XII, fig. 6.

Dredge Station D.

Shell small, elongate fusiform, thin and fragile, white, turreted, axially costate and spirally striated. Sculpture consisting of narrowly rounded, slightly oblique axial riblets, about 16 on the last whorl, nearly continuous over the whorls, obsolete on the base, the interstices slightly broader than the riblets; they are crossed by spiral threads, 4 fine and close together on the shoulder, 1 on the carina of the whorl and 3 below it, the uppermost of these at some distance from the keel; the crossing-points produced into small oval gemmules; the base is spirally striate, all the striæ in front of the aperture being smooth. Colour white. Spire elevated conic, turriculate, nearly $1\frac{1}{2}$ times the height of the aperture. Protoconch globular, of $1\frac{1}{2}$ smooth whorls, the nucleus broadly rounded. Whorls 6, regularly increasing, with a high sloping shoulder, the keel on the spire-whorls near the middle, flat above and below the keel; base contracted. Suture somewhat impressed, lightly margined below. Aperture pyriform, broadly angled above, with a short, broad, oblique, and truncated canal below. Outer lip convex, thickened by an axial rib, slightly angled above and somewhat contracted below, with a shallow broad sinus at the suture. Columella slightly oblique, lightly excavated towards the straight parietal wall, curved below, and extending to the left margin of the canal; inner lip thin, narrow, smooth.

Diam., 3·2 mm.; height, 7·5 mm.

Type in the Canterbury Museum, Christchurch.

Remarks.—The species is closely related to *M. dictyota*, Hutt., which, however, has less axial riblets, the angle of the shoulder is above the middle of the spire-whorls, and the protoconch is much smaller, with a minutely pointed nucleus.

Daphnella, Hinds, 1845.

Daphnella crassilirata Suter.

Daphnella crassilirata Sut., Proc. Mal. Soc., viii, 1908, p. 190, pl. vii, fig. 27.

Station 4.

Family SCAPHANDRIDÆ.

Cylichnella, Gabb, 1873.

Cylichnella striata Hutton.

Cylichna striata Hutt., Cat. Mar. Moll., 1873, p. 52; Murdoch, Trans. N.Z. Inst., xxxvii, 1904, p. 218, pl. vii, figs. 1, 2.

Station 4.

Family ONCHIDIDÆ.

Onchidella, Gray, 1850.

Onchidella nigricans Q. and G.

Onchidium nigricans Q. and G., Voy. Astrol., Zool., ii, 1832, p. 214, pl. xv, figs. 24–26.

Onchidella nigricans Q. and G., Hutton, Man. N.Z. Moll., 1880, p. 28.

Chatham Islands.

Class SCAPHOPODA.

Family DENTALIIDÆ.

Dentalium, Linné, 1758.

Dentalium nanum Hutton.

Dentalium nanum Hutt., Cat. Tert. Moll., 1873, p. 1; Plioc. Moll. N.Z., 1893, p. 73, pl. viii, fig. 78.

Stations 2, 79; Dredge Station D.

Dentalium huttoni T. W. Kirk.

Dentalium huttoni T. W. Kirk, Trans. N.Z. Inst., xii, 1880, p. 306.

Station C.

Dentalium zelandicum Sowerby.

Dentalium zelandicum Sow., Thes. Conch. iii, 1860, p. 101, pl. ccxxiii, fig. 13; Man. Conch. (1), xvii, 1904, p. 70, pl. vi, fig. 81.

Station 2.

EXPLANATION OF PLATE XII.

Figs. 1, 2. *Capulus calcareus* Suter, 8·5 mm. by 11·5 mm. by 5 mm.
Fig. 3. *Vexillum waitei* Suter, 2·7 mm. by 6·5 mm.
Fig. 4. *Trophon convexus* Suter, 3·5 mm. by 7 mm.
Fig. 5. *Cryptospira profunda* Suter, 3·8 mm. by 5·8 mm.
Fig. 6. *Mangilia munda* Suter, 3·2 mm. by 7·5 mm.

[H. Suter, del.

PISCES.

By Edgar R. Waite, F.L.S.

PART I.

Plates XIII–XXIII.*

The present instalment deals only with the Cyclostomata, Selachii, and Holocephali, the following species having been taken :—

Cyclostomata.

Eptatretus cirrhatus Forster.

Selachii.

Cephaloscyllium laticeps Duméril.
Galeus australis Macleay.
Mustelus antarcticus Günther.
Squalus fernandinus Molina.
Narcacion fairchildi Hutton.
Typhlonarke aysoni Hamilton.
Raja nasuta Müller and Henle.
Arhynchobatis asperrimus Waite.
Dasybatus brevicaudatus Hutton.
Myliobatis tenuicaudatus Hector.

Holocephali.

Callorhynchus callorynchus Linnæus.

Typhlonarke is a new generic name proposed for *Astrape aysoni* Hamilton. The genus differs from *Narke* (*Astrape*), in addition to other peculiarities, by its only representative being blind. *Arhynchobatis asperrimus* is the type of a new genus and species of the Rajidæ allied to *Psammobatis*.

In addition to a detailed description, some interesting habits of *Eptatretus cirrhatus* are supplied, illustrated by photographs of the lingual teeth and their effect on the body of another individual of the same species.

The egg-cases of *Cephaloscyllium laticeps* and *Raja nasuta* are figured, those of the former species being for the first time made known.

* For explanation of plates see p. 155.

An examination of the numb-fishes (*Narcacion*) results in the removal of a nominal species from the list, one only being now admitted.

The species are illustrated by reproductions from photographs kindly taken for me by Mr. Rudolf Hülsen, and Mr. W. J. Sparkes, taxidermist of the Museum.

Hitherto the illustrations of many of the species, where such have been figured, are in outline only, while the original descriptions are not generally accessible in New Zealand.

CLYCLOSTOMATA.

Eptatretus, Duméril, 1819.

Eptatretus cirrhatus Forster.

Blind-eel.

Plate XIII.

Petromyzon cirrhatus Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 532.

Bdellostoma cirrhatum Günth., Cat. Fish. Brit. Mus., viii, 1870, p. 511.

Heptatrema cirrata Hutton, Index Faunæ N.Z., 1904, p. 55.

Station 35.

The gill-openings appear to be normally seven in number, but I have seen an example in which there were but six openings on one side, though seven were present on the other. They are situated at a great distance from the head, the first opening being one-fourth the length of the entire animal from the snout. The last aperture is frequently much larger than the others. They lie rather low down on the body, the posterior ones being deflected still lower, so that the whole series forms a curve.

The eyes are situated towards the upper part of the head, though a long way apart, and removed from the tip of the snout about one-third its distance to the first gill-opening. The position of the eyes is indicated by a clear area in the skin, though the eyes themselves cannot be seen. On removing the skin, however, they are very apparent, imbedded in the muscles of the head; they are elliptical in shape, and are placed obliquely, the axes being from above backwards and downwards, and more vertical than horizontal; in adult specimens the diameter of the pupil is 2·5 mm.

It is probable that sight is very imperfect, and, in common with many blind or partially blind animals, tactile adjuncts in the form of feelers or barbels are well developed. The single nostril is a wide tube opening forward, quite in front of the head, and forming its upper anterior border: two barbels are situated on each side of the nostril. The mouth is very large, but closes to a longitudinal slit with many plications or wrinkles. It has two pairs of barbels towards its front portion, a long widely spaced pair before, and a shorter blunt pair nearer the margin of the mouth and further back.

To a fisherman the chief peculiarity of the blind-eel is its faculty of secreting an apparently unlimited quantity of thick slime. This product is exuded from two rows of glands running one on each side of the animal. The external apertures are below the middle of the body in the same line as the anterior gill-openings, and, where these latter occur, the mucous pores are situated each close below a breathing-opening but somewhat posterior to it. As the posterior gill-openings are deflected downwards, as before described, the hinder slime-pores are also thrown out of line, but the original line is resumed by the pore following the last gill-opening: it is therefore placed considerably higher than the one immediately preceding it. The mucous or slime pores commence on the head, and are continued at regular intervals to nearly the end of the tail, a short break occurring over the vent, corresponding to the omission of two pores: here also the regular line is broken, the post-ventral pores occupying a higher position. There are about seventy-five pores on the body, of which fourteen to sixteen are anterior to the gill-openings and thirteen on the tail. The position of the mucous-pores corresponds to the myotomes or muscle-bands.

There is a low fold of skin on the lower surface of the body arising posterior to its middle length, and continued to the vent: there is no fold on the upper surface. The vent lies at the base of the tail, its distance from the extremity being little more than half that of the first gill-opening from the tip of the snout: this latter distance is one-fourth of the entire length or three times the space between the first and last gill-openings.

Anteriorly the body is circular in section, but towards the middle becomes compressed and deeper, its depth being about one-tenth its length; the compression increases towards the tail, which has an eel-like form: it does not taper, however, its extremity being subtruncate.

The teeth are very peculiar, but well adapted to their function: there is a single tooth in the mid-line above, directed backwards, but capable of being erected; it is rather long and spine-like. The lower series of teeth, situated on the tongue, are much more complicated: they comprise two pairs of longitudinal flexible plates, set combwise, the anterior ones being confluent at the base. The teeth are directed inwards and backwards, and there are twelve in each of the series in the specimen examined—that is, forty-eight in all. All the teeth, including the single upper one, are deep-yellow in colour.

When in repose the teeth lie a long way down the throat, and it would seem impossible for the creature to seize its prey. When, however, a fish is attacked, the whole of the lower series of teeth is everted, thrown forward out of the mouth, and each set of two rows widely separated on the mid-line; they then present an apparatus much like a grappling-devil used in dredging, and are illustrated on Plate XIII, fig. 2.

Describing the American *Polistotrema stouti*, Jordan and Evermann write:* "The hagfish fastens itself usually on the gills or isthmus (throat) of large fishes, sometimes on the eyes, whence it works its way very rapidly into the inside of the body. It then devours all the flesh of the body without breaking the skin, so that the fish is left a living hulk of head, skin, and bones. It is especially destructive to fishes taken in gill-nets. In every gill-net in summer, at Monterey, more or less of these empty shells of fishes are obtained. When these are taken from the water the hagfish scrambles out with great alacrity. It is thought that the hags enter the fishes after they are caught. A fish of 10 lb. to 15 lb. weight will be devoured by them in a single night. Large fishes of even 30 lb. weight are often brought up without flesh and without viscera, and they certainly do not swim into a gill-net in this condition."

When trawling in the neighbourhood of Otago Heads, and particularly in Blueskin Bay (which, from the many diseased fishes obtained there, is dubbed "the Hospital" by local fishermen), quite a number of fishes were obtained, chiefly terakihi (*Cheilodactylus macropterus*) and red-cod (*Physiculus bachus*), with large wounds in their sides: these wounds, I am convinced, were the work of blind-eels; and, as the fishes were still alive, there can be no doubt that these parasites were feeding when enclosed by the net, or attacked the fishes already enclosed, and, being disturbed when hauling the trawl, left their victims and escaped through the meshes. In no instance did I observe that the gills had been attacked, though it is quite possible that ingress may be also obtained in that way. What seems worthy of emphasis is the circumstance that the blind-eel can actually hold on to the side of a fish, rasp off the scales, and bore into the flesh. Whether this is possible only when the victim is netted, or whether a free fish can be so attacked, we have not sufficient evidence to show. It is well known that fishes caught in a meshing or gill net are particularly liable to attack: one such instance was afforded at the Chatham Islands. A meshing-net set for moki (*Latris ciliaris*) on being raised was seen to have a large tangled knot in it. On clearing the knot it was found to contain a terakihi and a blind-eel, both dead; the former with a large wound in its side, the latter almost inextricably threaded through the meshes, and in one place almost cut in two by the twine. The one surpassing circumstance was the fact that the blind-eel was meshed at all, considering its eel-like shape and slimy coat.

* Jordan and Evermann, Bull. U.S. Nat. Mus., 47, i, 1896, p. 6.

The blind-eel is well known to the line fishermen, and when one is hooked it at once rolls itself round and round, and tangles the line most hopelessly. The only procedure is to cut the line and drop the creature back into the sea. Expressions of disgust when one is hooked are universal. As an instance I am tempted to relate the following episode. The only time blind-eels were taken in the trawl occurred off Timaru, when three examples were hauled aboard from a depth of 21–29 fathoms. They were covered with the characteristic slime, which adhered to everything, and it was with difficulty that I prevented the men from shovelling them overboard. I placed the three into a bucket, and had considerable trouble in keeping them there. First one and then another would glide out, sometimes head sometimes tail first, and I could not induce any one else to touch them. I next introduced formalin and water, and in a very short time the whole became a thick, viscid, sickening mass. The creatures, being irritated by the formalin acting on the skin or entering their gill-openings, made savage attacks on each other, drawing blood freely, which coloured the slimy mass as they writhed through it. It was on such occasions that I was able to witness the eversion of the lingual teeth, and to ascertain exactly how the creatures seized and ate their prey. All the animals had received scars, and one of them shows that it had been bitten no less than fifteen times by the other two. Not only did they attack each other in the slime-mass, but they would raise their heads above the surface, open their mouths, and protrude their teeth-studded tongues; the two lateral halves would then be widely separated and gnashed together again, possibly in agony. By the time the creatures were dead it was nearly dark, and I placed the bucket with its thick slimy contents in a position usually occupied by another bucket, wherein I kept clean water for the purpose of rinsing my hands after immersion in formalin. It appears that, in the dim light, the captain, thinking to similarly rinse his hands, plunged them among the blind-eels. The disgusting and loathsome sensation proved too much for the peace of his stomach, and a visit to the vessel's side was the immediate result. By the following morning the slime had lost all its viscosity, and I lifted out the blind-eels in a very clean state. I then discovered a number of parasitic leeches attached to them: these have been provisionally determined, by Professor Benham, as species of *Trachelobdella* Diesing (*Calliobdella* Van Beneden).

The average length of an adult specimen is 680 mm. (27 in.), and the colour varies from blue to bluish violet. Some examples show irregular white spots and markings; the ventral fold and the margin of the tail may also be white.

Taken at Station 35, off Timaru, at a depth of 21–29 fathoms; also in a meshing-net at the Chatham Islands, where the Maori name is "tuere."

Since writing the foregoing I have referred to Dr. Bashford Dean's magnificent work "On the Embryology of *Bdellostoma stouti*,* with a copy of which I have been kindly favoured by the author. Of the American hagfishes Dr. Dean says that when placed in pails they exhibit constant movements, writhing from top to bottom, sometimes lifting their nostrils out of water, but he has never seen the tongue everted naturally. I am fortunate, therefore, in having repeatedly witnessed this action on the part of the New Zealand blind-eel. In order to show more clearly the precise nature of the scar left by the teeth, I furnish a photograph of one natural size (pl. xiii. fig. 3), from the creature figured in full, on the skin of which several such scars will be noticed.

SELACHII.

Family SCYLIORHINIDÆ.

Cephaloscyllium, Gill, 1861.

Cephaloscyllium laticeps Duméril.

Carpet-shark.

Plate XIV, fig. 1, and XXI, fig. 1.

Scyllium laticeps Duméril, Rev. et Mag. Zool. 1853, p. 84, pl. iii. fig. 2.
Cephaloscyllium laticeps Gill, Ann. Lyc. Nat. Hist. New York, vii. 1861, p. 412; Hutton, Index Faunæ N.Z., 1904, p. 54.

Stations 22, 23, 26, 27, 28, 30 (egg), 36, 37, 89, 90, 93, 94, 95, 96.

Head extremely broad and depressed, its breadth equal to its length, which is 5·6 in the total. Interocular breadth half the width of the head, eyes on upper surface but directed laterally. Spiracle rather large, behind and below the eye. The gill-slits regularly decrease in size; the two last are situated over the base of the pectoral. Snout short, rounded, its margins sinuous. Mouth very large, without distinct labial fold. Teeth similar in both jaws, small, with broad base and three cusps, the lateral ones small; about six series of teeth in use, seventy rows in the upper and sixty in the lower jaw. Nostrils close to the margin of the snout, and widely separated; in addition to the usual anterior valve, the posterior margin is also provided with a lobe of skin.

The first dorsal fin arises a little behind the middle of the length and above the middle of the ventrals. The anterior and posterior insertion of the second dorsal is behind the corresponding situation of the anal respectively. The second dorsal is smaller than either the first dorsal or the anal.

* Dean, Festschrift C. V. Kupffer, 1899, p. 224.

The skin is very rough, especially on the back, where the prickles are large. Scales on the upper surface of the tail not enlarged. A row of isolated large scales arises on each side in the occipital region, and is traceable as far as the second dorsal, where it merges into a low ridge continued along the caudal. These two rows of enlarged scales are most pronounced, as usual in the Scyliorhinidæ, &c., in young examples.

The colour is brown above and white below, the upper part with black transverse blotches disposed alternately wider and narrower; the wide bands occur on the occiput, between it and the first dorsal, below both dorsals, one at the base and another towards the middle of the caudal lobe. There is also a black mark below the eye, another below the occipital patch and connected with the first narrow band, and others along the sides of the body. In the young, patches occur also on the ventrals, anal and lower caudal lobe, but all the markings become confused in the adult and tend to break up into spots. One remarkable example is varied with cream-coloured markings most irregularly disposed.

Length, 1,010 mm.

A young example which escaped from the egg as soon as it was placed in formalin measures 162 mm., and was evidently just on the point of emergence: the yolk-sac is all but absorbed, but the caudal membrane has not completely surrounded the termination of the notochord. In young examples the caudal is relatively shorter than in the adult, the origin of the first dorsal then lies in the anterior half of the body; in such also three gill-slits are above the pectoral fin.

When taken from the net the carpet-sharks were of relatively enormous girth, due to the inflation of the stomach with water. When the abdomen was pierced with a penknife-blade a jet of water spurted out to a distance of several feet, due to the elasticity of the stomach.

This inflation is common to members of the genus, and American and Japanese species are described as inflating their stomachs with air, when they float belly upwards. This recalls the toados or puffers (Tetraodontidæ), which possess a precisely similar habit when disturbed. The boys around Port Jackson take advantage of this peculiarity, and roll examples of *Tetraodon hamiltoni* and *T. hypselogenion* between their hands until they attain ludicrous dimensions.

It is more than probable that the carpet-sharks taken in the trawl, being unable to reach the surface and so imbibe air, filled their stomachs with water instead, and it is to be expected that other species would act in the same way under similar conditions.

The carpet-shark was trawled on fourteen occasions, at depths ranging from 13 to 94 fathoms, and from Molyneux Bay in the south to Whale Island in the Bay of Plenty. The "Doto" obtained *Scyllium laticeps* off Bream Bay, S. lat. 36°. At Stations 27 and 28 fully formed eggs enclosed within their cases, ready for extrusion, were taken from the bodies of females. I was thus able to identify egg-cases taken *in situ* among the weed at Station 30 in 35 fathoms. Apart from this, however, the young shark previously mentioned escaped from the egg the moment it was immersed in the preservative, and swam about most actively for a long time.

The egg-case, which has not before been described, is long and narrow in shape, strongly compressed above, where its margin is straight and very wide, about 1·3 in the greatest width, which occurs near the second third of the length; the lower end is much more contracted, the angles bent inwards. Each of the four angles is furnished with long tendrils which are twisted among seaweed, &c. The lateral edges of the egg-case are conspicuously flattened, the thickness of the edge being about 3 mm. When viewed in the hand the efferent slits are on the left side, one in the upper and the other in the lower third. On turning the egg-case round, a similar aspect is, of course, presented.

The cases—in all instances two in number—taken from the oviducts of the female were of very pale creamy-white colour, with yellow tendrils; these latter are formed quite straight in the shell-gland, but become twisted by being forced into a narrow space as produced. The deposited eggs are of darker hue, but are much lighter in colour than those I have seen of other members of the family, or of the Rajidæ. The egg-case is illustrated on Plate XXI, fig 1.

The egg-cases vary in size: four measured yield the following dimensions:—

——	(*a*.)	(*b*.)	(*c*.)	(*d*.)
	mm.	mm.	mm.	mm.
Length of body (median)	127	123	114	102
Width of body	45	45	43	44
Thickness of body	28	25	29	26
Width of upper (exit) end	32	31	33	33

Three species of *Cephaloscyllium* are known, namely:—

C. laticeps Duméril, 1853 (the type); Australia, Tasmania, and New Zealand.

C. ventriosum Garman, 1880; American Pacific Coast, California to Chili.

C. umbratile Jordan and Fowler, 1903; Japan.

Mr. C. Tate Regan* regards *C. uter* Jordan and Gilbert as a synonym of *C. ventriosum*, and places all species in the genus *Scyliorhinus*.

* Regan, Ann. Mag. Nat. Hist. (8), i, 1908, p. 458.

Family CARCHARIIDÆ.

Galeus, Rafinesque, 1810.

Galeus australis Macleay.

TOPE.

Plate XV.

Galeus australis Macleay, Proc. Linn. Soc. N.S.W., vi, 1881, p. 354.
Galeorhinus australis Hutton, Index Faunæ N.Z., 1904, p. 54.

Stations 3, 14, 63, 72, 80, 88, 91, 95.

Length of head 5·3, of tail 4·3, in the total length; width of head, 1·55; interorbital space, 2·3, equals length of snout and width of mouth; pectoral fin, 1·4 in the length of the head; eye, 2·7 in the interorbital space.

Head much depressed. Snout, viewed from above, acute with the tip rounded, pointed in profile; eye elongate, lateral, nictitating membrane wholly covers the eye when lifted; the mouth forms nearly a half-circle, rami of mandible slightly flattened. A large labial fold on the upper and a smaller one on the lower jaw, teeth alike in both jaws, very oblique, the front edge straight and smooth, the hinder one notched, with strong serrations on the lower limb. Nostrils close to but just below the lateral margin, nearer the mouth than tip of snout. Spiracle a small horizontal fissure on a level with the middle of the eye, but half a diameter behind it. Gill-openings subequal in size, the fourth in line with the anterior edge of the pectoral.

Body elongate, slightly compressed in front, rounded on caudal portion. Shagreen very fine.

First dorsal large, a little nearer the end of the snout than the second dorsal, which is small, its origin and termination being in advance of respective positions of anal. Anal slightly smaller than the second dorsal, its origin nearer to the caudal than to the posterior insertion of the ventrals. Pectorals large, reaching to beneath middle of first dorsal base, origin of ventrals nearer to second than to origin of first dorsal. Caudal but little bent upwards; the base of the lower lobe very little longer than the terminal portion. Peduncle without pits, deeper than broad, its length above 2·4 in that of the caudal.

Colour, bluish grey above and white beneath.

Length of specimen described, 940 mm. The largest taken measured 1,670 mm. (= $5\frac{1}{2}$ ft.).

This shark was taken on eight occasions, at depths ranging from 13 to 105 fathoms, and up to the extreme limits of the course. One example was caught in a set-net at the Chatham Islands. All the adult females were found to contain well-developed young in large numbers, each in a separate thin membranous envelope within the uteri. One example contained thirty-four young, seventeen in each uterus. They measure 230 mm. in length, and differ from the adults in having the spiracle larger and almost circular, by the shagreen being not developed to the hinder margin of any of the fins. The dorsals and pectorals are dark grey, the posterior aspects excepted; there is also an unclouded triangular space in the lower half of the first dorsal. The tip of the caudal and the concavity of its lower lobe are nearly black. (Plate XV).

The stomachs of the adults contained an assortment of fishes of different species, chiefly those taken in the trawl at the same station, including *Promethichthys prometheus* and much-digested pleuronectids.

The foregoing description is drawn up from an immature specimen, the adult which I had prepared and preserved having unfortunately been washed overboard during a storm, together with many other specimens, and some collecting-gear.

There can be little doubt that the New Zealand *Galeus* has been correctly referred to *G. australis*, though what are the distinguishing characters of that species is not clear. Macleay wrote, "This fish has generally been regarded as identical with *Galeus canis*, the 'tope' of English fishermen. I think I am justified in separating them."

In the report for 1900, the "tiger-shark (*Lamna glauca*)" is recorded as having been taken in the trawl on fifteen occasions, and in the 1901 report it is stated to have been thrice obtained. This is a very palpable error of identification, or, rather, naming; and it is almost certain that the shark trawled was *Galeus australis*, more especially as this species, not recorded, was taken so often during our cruise. In the latter report, unspecified "sharks" were netted at eight stations. I have no means of knowing what species may have been taken, but it is probable that all were examples of *Galeus australis*.

The trivial names of this and other species have been adopted by early writers from British representatives, but these names are not necessarily in use. As, however, the differences between, say, *Galeus* and *Mustelus* are scarcely appreciated by the colonists, the book-names applied are here retained.

Mustelus, Linck, 1790.

Mustelus antarcticus Günther.

SMOOTH-HOUND.

Plate XIV, fig. 2.

Mustelus antarcticus Günther, Cat. Fish. Brit. Mus., viii, 1870, p. 387.

Galeus antarcticus Waite, Rec. Aust. Mus., iv, 1902, p. 175, fig. 19.

Stations 2, 7 9, 12–24, 28, 29, 31, 34, 36, 37, 42–44, 47, 48, 50, 53, 54, 57, 58, 61, 63, 71–78, 80, 81, 83–88, 94, 96.

Length of head 6·1, of tail 5·0, in the total; width of head, 1·4; interorbital space, 2·2, and equal to the length of the snout; width of mouth 3·1, and length of pectoral 1·2, in the length of the head eye, 2·5 in the interorbital space.

Head depressed before, raised behind. Snout pointed in profile. Nostrils large, wholly below and not approaching the lateral margins, much nearer the mouth than the tip of the snout. Mouth small, obtusely angular; a long fold at the corner of the upper, and a short one on the lower, lip. Teeth small, smooth, arranged pavement-like in about thirty very oblique rows. Spiracle longitudinally oval, half the length of the pupil, its own length behind the eye. Nictitating membrane merely an extension of the lower eyelid, with scarcely trace of fold when drawn. The two posterior gill-openings above base of pectoral, the last one small.

Body compressed; a prominent ridge runs from the occiput to the upper base of the tail, and another along each side of the body. Shagreen very fine.

Fins.—First dorsal a little nearer the insertion of pectoral than to the ventral. Second dorsal smaller, its origin nearer caudal than hinder insertion of the first dorsal. Anal small, its origin beneath the middle of the base of the second dorsal and midway between the hinder insertion of the ventral and the caudal. Pectorals a little larger than the first dorsal; insertion of ventral nearer anal than pectorals. The length of the caudal equals the space between the two dorsals, and the length of its peduncle is 1·8 in its own length.

Colour, greyish blue above and white beneath; the coloured portion above with numerous very small white dots, which are close together, and evenly disposed along the lateral ridge.

Length of specimen described, 475 mm. (= $18\frac{3}{4}$ in.).

The smooth-hound is the smallest but at the same time by far the most numerous shark on the coast. It was taken, with but few exceptions, at all stations, and at depths ranging from 10 to 105 fathoms. It was not obtained at the Chatham Islands.

M. antarcticus agrees with the European *M. lævis* in having the embryo attached to the uterus by a placenta, a fact first noticed and described by Parker.* We obtained many young ones from the females, the largest number counted being eleven, six in one and five in the other uterus; they are similar to those previously described and figured by me. It may be noted that the peculiar form of the yolk-sac is retained until its complete absorption. In examples just prior to birth, the sac is like a small bean, the cord still entering towards one end.

In colour and general form the embryos bear some resemblance to those of *Galeus*, but may be at once distinguished by the smaller mouth, the position of the nostrils (removed from the margin of the head), the large second dorsal fin, and the simpler form of caudal.

* Parker, Trans. N.Z. Inst., xv, 1883, p. 219.

Family SQUALIDÆ.

SQUALUS, Linnæus, 1758.

Squalus fernandinus Molina.

SPINY DOGFISH.

Plate XVI, fig. 1.

Squalis fernandinus Molina, Hist. Chil., 1788, p. 393.

Acanthias lebruni Vaill. Miss. Sci. Cap. Horn., Poiss., 1891, p. 13, pl. i, fig. 2.

(Not *Squalus acanthias* Linn.)

Stations 9, 11, 21, 32, 33, 36, 38, 43, 45–47, 50–53, 57, 59, 63, 88, 91, 92.

Length of head 5·8, tail 4·7, in the total length; width of head, 1·4; interorbital space, 2·3; snout, 1·9; width of mouth 2·2 in the length of the head. The pectoral fin is twice, and the eye one-half, the interorbital space.

Head depressed. snout long, the tip raised above the base line. Eye large, twice as long as deep, lateral, without nictitating membrane. Mouth scarcely bowed, a small labial fold at the corner of both upper and lower jaws, and an oblique groove on each side; teeth similar in both jaws, very oblique. Nostrils large, sub-inferior, midway between the mouth and the tip of the snout.

Spiracles large, lunate, on the upper surface of the head, behind but above the corner of the eye. Gill-openings subequal, in front of the pectoral; its anterior edge forms the hinder margin of the fifth gill-slit.

Body elongate, compressed. Shagreen rather coarse.

Fins.—The spine of the first dorsal fin is a little nearer to the tip of the snout than to the spine of the second fin. It is one-half the height of the fin, and much shorter than the second spine, which is nearly as high as its respective fin; the latter is much smaller than the anterior one. Anal fin absent. The pectorals are large, but shorter than the head; their origin is further from the snout than from the hinder insertion of the first dorsal. The origin of the ventrals is nearer to the end of the tail than to the tip of the snout. Caudal large with a single notch and a small pit above; peduncle broader than deep, with a low keel below the lateral line, which latter is well marked from head to tail.

Colour.—Purplish grey above, white beneath. When young the coloured portions are strikingly adorned with large white spots; these spots often persist in adult life, and the specimen above described and figured exhibits them conspicuously. These spots vary a little in different individuals, but a pair in front of each dorsal fin and another pair behind the first dorsal seem to be very constant. A row of spots disposed in pairs is usually present along the lateral line, commencing between the spiracles; small irregular black spots are sometimes also present. In the young the tips of the first dorsal and the caudal are jet-black.

Length of specimen described, 512 mm. (= 20 in.).

Most of the adult females contained young, the highest number observed being seventeen. The following table shows the results of examination of eight individuals, including the number of young ones in each uterus.

A. 9 + 8 = 17.	E. 8 + 7 = 15.
B. 8 + 8 = 16.	F. 7 + 7 = 14.
C. 8 + 8 = 16.	G. 6 + 5 = 11.
D. 8 + 7 = 15.	H. 5 + 3 = 8.

The young were obtained in various stages of development in different individuals. The largest fœtal specimens taken measure 232 mm. in length: they were just ripe for extrusion, as the yolk-sac was wholly absorbed.

The point of each dorsal spine is covered by a little knob, a provision referred to in my notice of *Squalus megalops*,* and previously recorded by Ball in examples of "*Acanthias vulgaris*" on the Irish coast.† Richardson's figure‡ of a fœtus fairly represents our examples, but the first spine is too long, and the protective knobs are not illustrated.

This species was obtained along the whole of the coast-line explored, and at depths ranging from 9 to 105 fathoms. It was not found at the Chatham Islands.

The New Zealand representative of the family has hitherto been identified with the Atlantic *S. acanthias* Linn. Writing on *S. fernandinus*, Mr. C. Tate Regan§ says that "Records of *S. acanthias* from New Zealand doubtless refer to this species"—a conclusion based on an examination of specimens from Tasmania. He distinguishes *S. fernandinus* as follows:—

"Very closely allied to *S. acanthias*, but with a shorter snout, the præoral length equal to or less than the distance from eye to first gill-opening, the præocular length equal to the distance from anterior edge of eye to spiracle (more in *S. acanthias*, except in young examples). Dorsal-fin spines higher, and spots on the body larger, than in *S. acanthias*."

* Waite, Rec. Aust. Mus., iv, 1901, p. 34, pl. iv, fig. 2.
† Ball, Proc. Roy. Irish Acad., iii, 1847, p. 230.
‡ Richardson, Voy. Ereb. and Terr., Fishes, 1845, p. 44, pl. xxviii, fig. 1.
§ Regan, Ann. Mag. Nat. Hist. (8), ii, 1908, p. 46.

Family NARCACIONTIDÆ.

NARCACION, Walbaum, 1792.

Narcacion fairchildi Hutton.

NUMBFISH.

Plate XVII.

Torpedo fairchildi Hutton, Cat. Fish. N.Z., 1872, p. 83, pl. xii, fig. 134.
Torpedo fusca Parker, Trans. N.Z. Inst., xvi, 1884, p. 281, pl. xxii.

Stations 17, 46–49, 51, 57–60, 87, 95.

Disc rounded and very broad, one-sixth broader than long and 1·5 in the total length, its length 1·7 in the same. The eyes are a little nearer to each other than to the front edge of the disc. The spiracles are not fringed, are placed obliquely, and lie about an eye-diameter behind the orbits.

Breadth of mouth equal to its distance from front edge of disc; the teeth small, sharp, and similar in both jaws; inner nasal valves confluent into a quadrangular flap, wider than long.

The height of the first dorsal fin, measured from its origin to the tip, is exactly one-half more than the height of the second dorsal. The hinder edge of the first dorsal extends somewhat beyond that of the ventrals. In the male but a small portion of the ventrals are free from the claspers. Caudal large, truncate, its depth nearly one-half greater than its length. The vertebræ occupy a median position, and do not extend to the margin; the peduncle is wider than deep, and a prominent keel extends along its posterior portion.

Colour dark bluish-slate above, white beneath, without markings.

Length of specimen, 520 mm.

Knowing the tendency of the disc to assume and retain unnatural shape under the action of preservatives, I was careful to allow specimens to die in a vessel of ample dimensions, and several so treated present almost identical relative proportions.

The specimens entirely agree with the short description of *Torpedo fairchildi* supplied by Hutton, and after consideration of all features I incline to the opinion that *T. fusca* is not distinct. The form of the dorsal fin varies considerably in different examples. In some specimens the fin has a well-marked posterior angle projecting far beyond the hinder insertion of the fin, a feature common to many selachians; in other examples the fin is leaf-like, as figured by Parker. Apart from this, however, the phrase " first dorsals over the ventrals, with the posterior edges of both in a line " (*T. fairchildi*) is not antagonistic to the description of *T. fusca:* " The posterior end of the base of the pelvic fin is nearly opposite the middle of that of the first dorsal." In fact, both statements are quite applicable to our specimens. The next feature referred to by Parker is the relative size of the two dorsals. In *T. fusca* the " length of the first dorsal fin is to that of the second as 13 is to 8." In *T. fairchildi* it is "about one and a half times the size of the second," or as 12 is to 8. The descriptions may be regarded as identical in this respect.

As before indicated, too much reliance cannot be placed on the form of the disc, though the respective figures show great differences in this respect. My specimens are intermediate. The anterior emarginations in the disc referred to by Parker may be traced in my examples, also those figured by Hutton; but in neither case are they so pronounced as illustrated.

One example was trawled off Otago Heads in deep water (55–102 fathoms). The species was rather freely taken northward of Banks Peninsula, at a minimum depth of 18 fathoms; again in Cook Strait, in Poverty Bay, and finally in the Bay of Plenty. The "Doto" obtained "*Torpedo fairchildi*" in the Hauraki Gulf.

In my list of the Fishes of New Zealand* I used *Narcacion* Walbaum, 1792, as the name of the genus. In acknowledging a copy of the paper Mr. C. Tate Regan wrote, "If you reject *Narcacion* (as I intend doing), *Torpedo* is the correct name, as Gill's application of that name to *Malapterurus* is based on a misreading." In respect to this subject Dr. Jordan wrote, "As to Gill's use of *Torpedo*, Gill does not often make mistakes in matters of this kind. The only point against it, if I read Forskal's Latin aright, is that he uses only the oblique case, 'Torpedine,' instead of 'Torpedo.'"

Gill's papers on the subject are as follows: Proc. U.S. Nat. Mus., xviii, 1896, p. 162; and xxvi, 1903, p. 697. In the former paper the following passage occurs: "If the propriety of the retention of the name *Torpedo* in place of *Malapterurus* is conceded [and this is, of course, the crux of the discussion], it necessarily follows that another name must be used for the genus of electric rays. *Narcacion* is the oldest term, having been given by Klein in 1842 . . . . . but, having been given before the establishment of the binomial system of nomenclature, is now considered ineligible. The next in order of proposition is *Narcobatus*, introduced by De Blainville in 1816, and this should accordingly be adopted."

The use of Klein's names by Walbaum, in 1792, has not generally been recognised: *Narcacion* for the electric rays is one of these, and, as it antedates Blainville's *Narcobatus*, I consider that it should, apart from discussion of *Malapterurus*, be used to designate the genus. The question of Walbaum's names is one which might well be considered by the International Zoological Congress, and an authoritative decision would be not only approved, but welcomed by all concerned. The following quotation from an article by Dr. Jordan† is, though non-committal, suggestive:—

"Klein (about 1744) defined a large number of genera of fishes. In a post-Linnæan compilation of Walbaum ('Artedi Piscium,' 1792)

* Waite, *antea*, p. 8.

† Jordan, Science, xxii, 1905, p. 491.

the diagnoses of all these pre-Linnæan genera are reprinted, although without formal adoption, into the binomial system. These genera are mononomially defined, at a later date than 1758, and there is no doubt as to the species intended to be included in them. If these names had been original with Walbaum, they would be accepted without question. What is their status as reprints in a compilation ?"

Typhlonarke, gen. nov.

Disc subcircular, its outline broken only by a notch under the tail. Eyes not discernible. Spiracles with entire edges. Tail short, with a slight lateral fold. Dorsal fin single. Anterior portion of ventrals modified for walking ; posterior portion coalesced with the pectorals to form the hinder margin of the disc. Teeth confined to anterior portion of jaws, pavement-like, the hinder series with sharp cusps. Body naked.

This genus differs from *Narke* in the form of the disc, in the coalescence of the disc with the ventrals, in the absence of functional eyes, and in the shortness of the tail.

Benthobatis moresbyi Alcock,* a blind electric ray, was taken off the coast of Travancore (Southern India), at a depth of 430 fathoms. It is interesting to note that *Typhlonarke aysoni*, also blind, inhabits comparatively shallow water.

Typhlonarke aysoni Hamilton.

Blind Numbfish.

Plate XVIII.

Astrape aysoni Hamilton, Trans. N.Z. Inst., xxxiv, 1902, p. 224, pls. x–xii.

Stations 2–5, 7, 8, 17, 18.

Disc almost circular, the continuity of its margin being broken only by a slight notch under the tail. The position of the eyes is indicated by a minute white spot a little distance in front of each spiracle ; beneath the skin an optic nerve may be traced, but I fail to find any other sign of an eye. The spiracles are well developed, the space between them being one-third their distance from the front of the disc. Mouth narrow, protractile, in a fold of skin ; lips extremely fleshy, the upper one divided in the mid-line by an apparent space ; the lower lip is very deep, but the sides of the median fissure are close together, and each forms a ridge where they approximate. The nostrils are close together, and are covered by a common subquadrangular valve. Gill-slits in subparallel series. The teeth form a small pavement-like plate confined to the front of each jaw ; the posterior angle of each tooth is produced, slightly on the anterior series, and increasingly so backwards until in the hinder teeth a sharp cusp is developed.

* Alcock, Ann. Mag. Nat. Hist., (7), i, 1898, p. 145.

The ventral fins are peculiarly modified. They have a very forward position, the distance from the front margin of the disc to their anterior insertion, in relation to that between the latter point and the hinder edge of the disc, being as 3 is to 2. They are widely separated, the space between their anterior bases being more than that between the series of gill-slits. They are normally directed almost at right angles, horizontally, to the axis of the body, and their front margins and their rounded extremities are covered with thick skin; they are attached posteriorly far within the margin of the disc, to which they are so completely coalesced that a slight notch on the hinder edge of the disc is the only external evidence of their position and extent. The horizontal length of each fin is equal to their distance apart. The claspers of the male are small; they do not reach the hinder edge of the disc, and they are free from it for about half their exposed length. The single dorsal fin arises anterior to the hinder edge of the disc; its length is one-fifth greater than its base, the latter being equal to the space between the outer margins of the spiracles. The tail is short, its length being 2·3 in the total; the caudal is rounded, its depth 1·3 in its length, or about the length of the snout; the vertebræ directed as in *Narcacion*, before described. Under the dorsal fin the tail is depressed, but the free portion of the peduncle is compressed. A trace of lateral fold.

Colours.—Coffee-brown above, pale brown beneath, darker round the margin of the disc; the mouth-parts and the margins of the ventrals yellow.

Total length, 375 mm.; length of disc, 260 mm.

Of two examples originally obtained in 1900, one was taken in Foveaux Strait and the other off Otago Heads. These situations furnish the limits between which we trawled the species, the depths being 36–102 fathoms, and the bottom sandy.

Specimens were not obtained larger than that described, at which size they were fully adult and mature.

Many of the females contained young, eleven being the largest number obtained from an individual, there being six in one oviduct and five in the other. At birth, when the yolk-sac is fully absorbed, they are of relatively large size, being 93 mm. in length, or one-fourth that of the parent (fig. 2). Examples at a length of 78 mm. still exhibit external gill-filaments. At 50 mm. the disc is continuous round the snout. In specimens of 40 mm. the pectorals are quite free, the gill-slits and spiracles are laterally placed, and the ventrals are not joined to the pectorals (fig. 3). As the embryo grows from the elongate shark-like stage, and the disc is formed, it increases in relative width; but at birth (fig. 2) it has not quite assumed the circular shape eventually attained.

It may be noted that *Narke*, Kaup, 1826, should be used instead of *Astape*, Muller and Henle, 1837, as pointed out by Gill.*

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* Gill, Proc. U.S. Nat. Mus., xviii, 1896, p. 163.

Family RAJIDÆ.

Raja, Linnæus, 1758.

Raja nasuta Müller and Henle.

Skate.

Plate XIX and XXI, fig. 2.

Raja nasuta Müller and Henle, Plagiostomen, 1838, p. 150.

Stations 1–3, 5, 7–10, 13–16, 18–23, 25, 28–35, 39–44, 46–52, 54, 57, 63, 65, 70–74, 76–78, 81, 86–89, 91, 94–96.

Snout, from tip to anterior margin of orbit, 3·37 in the length of the disc; head, 2·52 in the same. Interorbital space 3·7, width of mouth 2·0, in the length of snout.

Breadth of disc one-sixth greater than its length, its anterior margin undulated; snout moderately produced, pointed: exposed portion of eye half the interorbital (cartilaginous) space, a fimbriated membrane over the upper part of the pupil. Spiracle close behind the eye. Mouth small, undulated, the gape a little further from the tip of the snout than is the eye. Internasal space equal to the width of the mouth.

Teeth in thirty-six rows, with long sharp points in the male (in the female the front rows are tuberculate, the hinder ones spinous). Upper lip not free in the middle; nostrils not confluent with the mouth; quadrangular flap fringed at the hinder corners. Gill-slits small; if continued posteriorly the two series would meet in an acute angle.

The skin generally is smooth, but roughened patches occur at the tip of the snout, above the rostral cartilage and at the middle of the anterior margin of the disc; the upper surface of the tail is also rough. The supraorbital ridge bears three to five spines; one to two occur in the mid-line of the back some distance behind the eyes, and a median row on the tail, one spine being placed between the dorsal fins. The anterior half of the front margin of the disc below, and beneath the snout and rostral cartilage, are roughened.

The two dorsal fins are subequal, and are separated only by the spine; second dorsal and caudal joined. Angle of the pectoral slightly obtuse. A well-marked fold along each side of the tail.

Colour.—Brownish olive above, with white spots, disposed around dark-grey markings. The largest of the latter is oval in shape, as long as the space between the outer margins of the eyes, and lies mid-way between the mid-line and the angle of the pectoral on each side. Another, much smaller, is placed in front and one behind. Still smaller markings occur round the margin of the disc, and dark-grey spots are elsewhere disposed—a double series forms bands along the back and tail. Snout and margin of disc reddish; under-surface yellow, clouded with grey about the snout and mouth; the posterior margin of the disc is grey, and there is also a broad band well within this: the mid-line of the tail beneath is also clouded. The orifices of numerous pores are black, forming dots.

A colour variety of this species was taken at Station 89. It is bright olive-green above, with brownish-grey markings in the form of subcircular spots about the size of the eye. They are of fairly uniform dimensions, and there is no trace of white spots, nor of the large oval markings characteristic of the normal form.

This variety is illustrated on the accompanying plate, and, though the dark spots are not only conspicuous but striking, they have apparently the same actinic value as the ground: they consequently do not appear on the negative, an ordinary plate uncorrected for colour-values.

Length of specimen described, a young male, 500 mm. I measured examples up to 1,670 mm. Embryos, in two stages, are illustrated on Plate XIX, figs. 2 and 3.

Mr. H. Nielson, engineer of the Government steamer "Hinemoa," has kindly given me a photograph of a female skate which measured $7\frac{1}{4}$ ft. in length (2,530 mm.). It was taken in Anita Bay, Milford Sound, and two eggs enclosed in their cases were removed from the body. Crayfishes were found in the stomach.

The armature of the adult differs from the young, as usual with members of the genus. A stuffed specimen in the Museum obtained at the Chatham Islands presents the following dermal characters: The roughened areas in the young become distinctly spinous, and are somewhat extended. A broad spine-bearing band extends from the snout to the tail. The median and posterior part of each pectoral is smooth. Four rows of large inwardly directed spikes occur within the angle of each pectoral. The tail, in addition to the median row of spikes, bears a row on each side also.

At Station 22 an example was obtained minus the snout. The tissues had so overgrown the parts left by what was probably an accident that, apart from the peculiarity, there was no suggestion of abnormality.

Eggs were taken at Stations 7, 15, 16, 18, 22, 26, 29, 31, 32, 48, and 50, in the South Island, and at 70, Chatham Islands, but a single one only was trawled off the North Island (at Station 84), though skates were freely obtained.

The egg-cases are of the usual quadrangular shape, with a pair of long "horns" in front, and a shorter, thicker pair behind. One side of the case is convex, while the other is concave; the lateral edges are quite thin, but are bent over towards the concave side, which, naturally, becomes the lower surface when the case is placed on the ground. (Plate XXI, fig. 2).

In the egg-case of *Cephaloscyllium* the spiraculæ are, as already described, longitudinal slits. In that of *Raja nasuta* the orifices are at the extremities of two tubes running on the inner edge of the anterior "horns," and opening at about the middle of their length. The hinder " horns " are bent inwards, and the openings of the posterior tubes appear to be at or near their extremities.

The egg-cases vary considerably in size and proportion. The following table shows the dimensions of some examples, the " body " being measured irrespective of the " horns."

—	(*a.*)	(*b.*)	(*c.*)	(*d.*)	(*e.*)	(*f.*)	(*g.*)	(*h.*)
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Length	149	144	137	132	129	124	118	97
Breadth	66	86	80	76	78	77	65	59

The mean dimensions of twenty-nine examples are—length, 132·5; breadth, 77·6 mm.

The skate is common along the whole of the east coast, and was also taken at the Chatham Islands. It occurred at all depths between the extremes of 9 and 105 fathoms.

Arhynchobatis, gen. nov.

No cartilaginous rostral prolongation of the cranium. The pectorals continuous in front, but modified to form a small nasal tip. Ventrals distinct from pectorals, and deeply notched. Tail long, depressed, with well-developed caudal fin, and a fold on each side. A single dorsal fin, near extremity of tail. Each nostril with two valves, the anterior tube-like, the posterior triangular, the latter pair joined medially.

This genus appears to be allied to *Psammobatis*, Günther,* the absence of a cartilaginous rostral, and the character of the nasal valves, pointing to such connection. It differs in having a distinct caudal and but one dorsal fin.

If, as suggested, the genus is associated with *Psammobatis*, it forms another link in the chain connecting the faunas of New Zealand and South America.

Arhynchobatis asperrimus, sp. nov.

Long-tailed Skate.

Plate XX.

Station 89.

Preorbital length (or snout) 4·27, length of head 3·08, in that of the disc. Interorbital space slightly concave, 3·3, and width of mouth 1·3, in the length of the snout.

The breadth of the disc is one-eighth greater than its length, its anterior angle is very obtuse, and the tip of the snout just breaks the

* Günther, Cat. Fish. Brit. Mus., viii, 1870, p. 470.

margin. The eye is 1·4 in the interorbital space. Spiracle close behind the eye, the posterior edge of the valve pilose. Mouth moderate, but slightly undulated; internasal space less than the width of the mouth. Teeth small, without cusps. Nasal flap triangular, but so deeply notched in the middle that two triangles are formed, each slightly fimbriated at the apex. Gill-slits moderate, convergent posteriorly.

The skin above is everywhere covered with closely set spines; thorns are developed in the area between the eyes and spiracles, the posterior ones being largest. A transverse patch of large thorns exists on the humeral region, whence a median row runs forward for a short distance. The tail carries a row of strong conical thorns in the mid-line, and several irregular series of smaller ones on each side; these extend forward into the pelvic region. No spine between dorsal and caudal. The whole of the body and tail below smooth and without pores.

The ventrals are quite distinct from the pectorals, and extend posterior to them; they are deeply notched behind, each being separately attached to the lower side of the tail. The distance of the vent from the hinder edge of the ventrals is one-fourth that between this point and the mouth. The tail is long, its length posterior to the disc being exactly half the total length; there is a well-developed fold of skin along each side, and the caudal is relatively large, its length above being twice the interorbital space. The dorsal lies near the caudal, but is removed from it by a space nearly equal to its own base.

Colour.—The colour above is uniform pale purplish-grey, and below deep yellow.

Length of female described, 640 mm.

The only specimen taken was trawled in the Bay of Plenty, at a depth of 66–94 fathoms.

Family DASYBATIDÆ.

Dasybatus, Walbaum, 1792.

Dasybatus brevicaudatus Hutton.

Sting-ray.

Plate XXII.

Trygon thalassia Hutton, Cat. Fish. N.Z., 1872, p. 85 (not Columna).

Trygon brevicaudata Hutton, Ann. Mag. Nat. Hist. (4), xvi, 1875, p. 317; and Trans. N.Z. Inst., viii, 1876, p. 216.

Dasybatis brevicaudatus Hutton, Index Faunæ N.Z., 1904, p. 53.

Stations 85, 93, 94.

An example preserved for future study was unfortunately lost overboard during heavy weather; I therefore had to fall back upon one in which nearly the whole of the tail had been lost. Though imperfect, some details not previously published may be gleaned from an examination of the specimen—a female.

Disc broader than long, widest at the first third of its length, anterior edge very obtuse, tip of snout scarcely indicated. Body entirely smooth.

Nostrils very large, widely separated, the width of the nasal fold nearly thrice its depth; lower lip papillose. Three processes behind the lower teeth, the median one being advanced. Two membranous flaps behind the upper teeth, extending along their entire width, the anterior one fimbriate, the other fleshy.

Each tooth with a shallow transverse groove; there are twenty-five series in each jaw, arranged quincuncially.

Colour.—Slaty-grey above, front margin of disc narrowly bordered with white and a dark zone within. An irregular series of white spots along each side, between the mid-line and the margins, in the thoracic region, and two white spots on each side in the lumbar region. White beneath, the area near the margins of the disc mottled with pink; minute black spots in the space between the mouth and gill-openings.

Length of disc, 800 mm.; width, 780 mm.

The type of the species, also a female, is described as being smooth with a small oval tubercle in the centre of the back. There is no cutaneous expansion above the tail, a feature characteristic of the subgenus *Hemitrygon*.

Of the three examples obtained, one was taken off Table Cape, north of Hawke Bay, in 42 fathoms; the other two in the Bay of Plenty, in 34–55 fathoms. The stomachs contained crustaceans which Dr. Chilton has identified as *Lysiosquilla*.

Myliobatis, Duméril, 1817.

Myliobatis tenuicaudatus Hector.

EAGLE-RAY.

Plate XXIII.

Myliobatis tenuicaudatus Hector, Trans. N.Z. Inst., ix, 1877, p. 468, pl. x.

Aetobatus tenuicaudatus Gill, Mem. Nat. Acad. Sci., vi, 1893, p. iii.

Stations 86, 87, 91, 92, 94, 95, 96.

Body smooth.

Width of disc more than one and a half times its length, posterior angles acutely pointed. Eye 6·3, and interorbital space 1·3, in the length of the head. Spiracle twice the diameter of the eye. Nostrils close together, separated by a thick columnar frenum; nasal fold long and rectangular, its hinder border concave and papillose, widest at its free margin, where it is twice its length. Teeth in pavement-like plates, the upper ones flat, the lower curved, all yellow in colour. Both plates are formed of two series, a median broad row and two lateral ones, the latter composed of rows of subcircular plates, three in width, and together about half the width of the median series; they do not extend to the front of the mouth. The upper median series are eleven in number, and the lower series seven. Dorsal fin small, its base one-sixth less than the spiracle. It is situated on the tail, its middle being over the hinder edge of the ventrals. Two serrated spines on the tail behind the fin. Tail a little shorter than the disc.

Colour.—Yellowish olive above, with blue transverse bars on the head and across the disc; lower surfaces white; tail black.

Total length, inclusive of tail, 775 mm.

Length of disc, 407 mm.; width, 661 mm. The specimen described is a male—and, though a dozen or more individuals were netted, only one female was obtained. No examples were taken southward of Hawke Bay, and, indeed, specimens were obtained only off Poverty Bay and in the Bay of Plenty, the depths ranging from 16 to 57 fathoms, with sandy or muddy bottom. Remains of molluscs were generally found in the stomach.

The generally accepted idea that the pectoral fins are interrupted, and reappear as cephalic fins in front of the snout, is recently stated by Mr. Regan to be incorrect. He says that the pectoral fins in *Myliobatis* and allied genera are continuous, but are very muscular, and have the anterior edge emarginate.*

HOLOCEPHALI.

Family CHIMÆRIDÆ.

Callorhynchus, Cuvier, 1817.

Callorhynchus callorynchus Linnæus.

Elephant-fish.

Plate XVI, fig. 2.

Chimæra callorynchus Linnæus, Syst. Nat., ed. x, 1758, p. 236.

Stations 2, 3, 8-18, 20-23, 27-29, 32-36, 39-48, 51-54, 57, 59 62, 72-74.

Length of head, 4·2; height of body, 5·0 in the length, measured to the base of the caudal lobe, and exclusive of the nasal appendage; the length of the latter is more than twice, and the retrorse foliate extremity is thrice, the diameter of the eye; the width of its distal half is more than an eye-diameter, and its termination is rounded and slightly notched. The eye is situated in the middle length of the head, and is contained 6·3 times therein. The dorsal fin arises above

* Regan, Proc. Zool. Soc., 1906, p. 757.

the isthmus, and its base, which can be received into a groove, is two-thirds that of the second; a low fold of skin runs from the first fin to within two eye-diameters of the second; the length of the spine is one-eighth longer than the head; it is acute and serrated in front, but flat or slightly concave behind, each posterior edge having in its upper half a series of retrose serrations; the rays are set on a high base, and the posterior ones are fairly distinct: the second fin is one-fourth lower than the first, and, following the high anterior lobe, falls gradually, terminating in advance of the anal: the length of the pectoral, exclusive of its base, is one-fourth that of the head, and it extends almost to the second dorsal; the ventral is inserted wholly in advance of that fin, and its length is 1·5 in the head; the anal lies directly in advance of the caudal lobe, and is long and narrow, its width one-third its length, which is 1·8 in the head; the caudal is deeply rayed below anteriorly, and the rays are continued to the end of the filament; there is a slight ray on the upper portion also; the upper insertion of the caudal is above the middle of the anal fin; the lateral line, posterior to the head, runs a direct though wavy course to above the caudal lobe, where it dips suddenly to the lower margin, thence to the end of the fin.

Teeth.—It would appear that the teeth undergo some change during the life of the animal, but I am not at present in a position to discuss the matter at length. The following references are to Garman's figures of the teeth of Chimæroids.* Young specimens exhibit teeth like *C. smythii* (vi, 1, 2), the vomerines forming a transverse cutting-edge; the palatines bear two pairs of ridges, of which the inner pair is the longer; there are two ridges on the mandibular plate, which operate between those of the palatines. In older specimens the palatine ridges are less pronounced, and the mandibular ridges disappear, the plate being flattened and incised anteriorly; these resemble *C. callorynchus* (vii, 7, 8), though the vomerine teeth still present the acute aspect; the jaws of an evidently very large specimen in the collection appear more like *C. tritoris* (vi, 9), the vomerine teeth have not a transverse aspect, while there is no trace of palatine or mandibular ridges, and the latter are rounded and have the front margin entire, as in the figure.

Colour.—Greenish yellow with black markings disposed in three longitudinal series along each side, one along the back, another following the course of the lateral line, and a third below it, terminating at the ventral; in some examples the lines are complete, in others they are broken up into blotches, and may be almost absent; the markings on the fins vary greatly also.

Bashford Dean has supplied a list of existing Chimæroids,† but the uncertainty there expressed shows that much yet requires to be

* Garman, Bull. Mus. Comp. Zool., xli, 1904, p. 245, pl. vi, vii.

† Dean, Carnegie Inst. Wash. Pub. 32, 1906, pp. 6, 7.

done before our knowledge of the species and relationship of the Order is satisfactory.

The elephant-fish was taken generally along the whole of the east coast of the South Island, but was not obtained to the northward of Cook Strait, nor did it occur at the Chatham Islands. In depth it ranged from 9 to 102 fathoms. The egg was obtained once only, an empty case being trawled at Station 31, in 21–24 fathoms, on a sandy bottom. The empty egg-cases are quite familiar objects to visitors to New Brighton, a marine suburb of Christchurch, for at certain seasons they are cast on to the beach in hundreds. It is extremely rare to find an embryo, though occasionally a living egg is thrown up among the spent cases.

The stomachs of the elephant-fishes examined, yielded examples of pipefishes, molluscs, and crustaceans.

EXPLANATION OF PLATES.

Plate XIII.

Eptatretus cirrhatus Forster.

Fig. 1. Adult, one-fourth natural size, exhibiting bite-scars on hinder half of body.

Fig. 2. Head, with tongue everted showing lingual teeth; slightly enlarged.

Fig. 3. Portion of body showing bite-scar; slightly enlarged.

Plate XIV.

Fig. 1. *Cephaloscyllium laticeps* Duméril. Female; one-sixth natural size.

Fig. 2. *Mustelus antarcticus* Günther. Female; three-eighths natural size.

Plate XV.

Galeus australis Macleay. Thirty-four young, removed from the body of one female; one-fifth natural size.

Plate XVI.

Fig. 1. *Squalus fernandinus* Molina. Male; one-fourth natural size.

Fig. 2. *Callorhynchus callorynchus* Linnæus. Female; one-fifth natural size.

Plate XVII.

Narcacion fairchildi Hutton. Male; about one-fourth natural size.

Plate XVIII.

Typhlonarke aysoni Hamilton.

Fig. 1. Adult male; three-eighths natural size.

Fig. 2. Embryo, showing line of junction between the pectorals and the head; natural size.

Fig. 3. Younger embryo, in which the pectorals are free from the head; natural size.

Plate XIX.

Raja nasuta Müller and Henle (variety).

Fig. 1. Young male; nearly one-third natural size.

Fig. 2. Embryo, showing rounded snout and long tail; natural size.

Fig. 3. Younger embryo, in which the tail is still longer relatively, and the pectorals are free from the head; natural size,

Plate XX.

Arhynchobatis asperrimus Waite. Female; less than one-fourth natural size.

Plate XXI.

Fig. 1. Egg-case of *Cephaloscyllium laticeps* Dumeril. (Note: A tendril at each end is represented as broken.)

Fig. 2. Egg-case of *Raja nasuta* Müller and Henle.

Both seven-ninths natural size.

Plate XXII.

Dasybatus brevicaudatus Hutton. (Note: The tail is imperfect.)

Fig. 1. Upper surface.

Fig. 2. Lower surface.

Both one-eleventh natural size.

Plate XXIII.

Myliobatis tenuicaudatus Hector. Male; less than one-fourth natural size.

John Mackay, Government Printer, Wellington.—1909.

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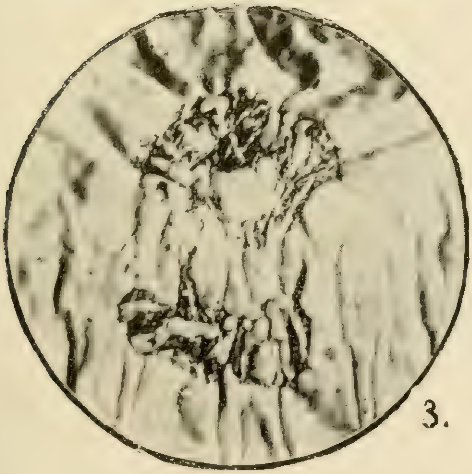

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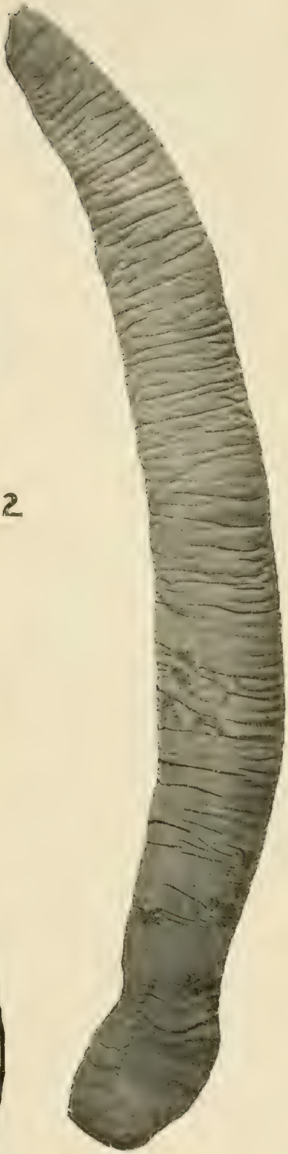

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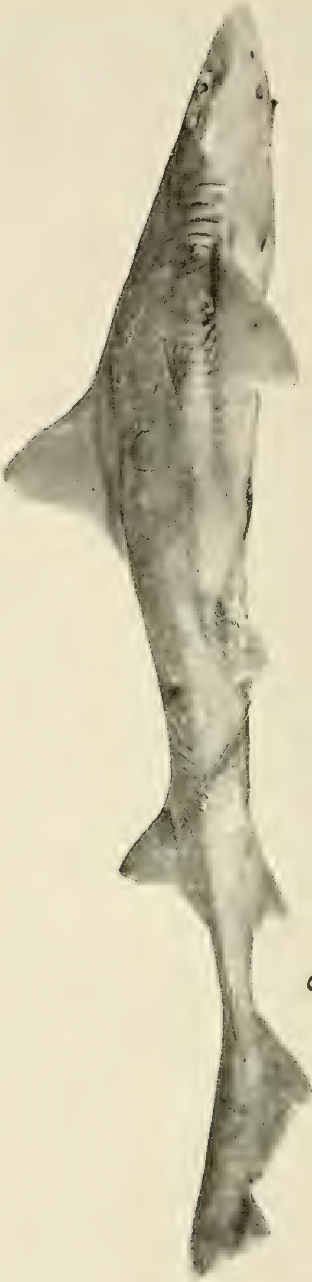

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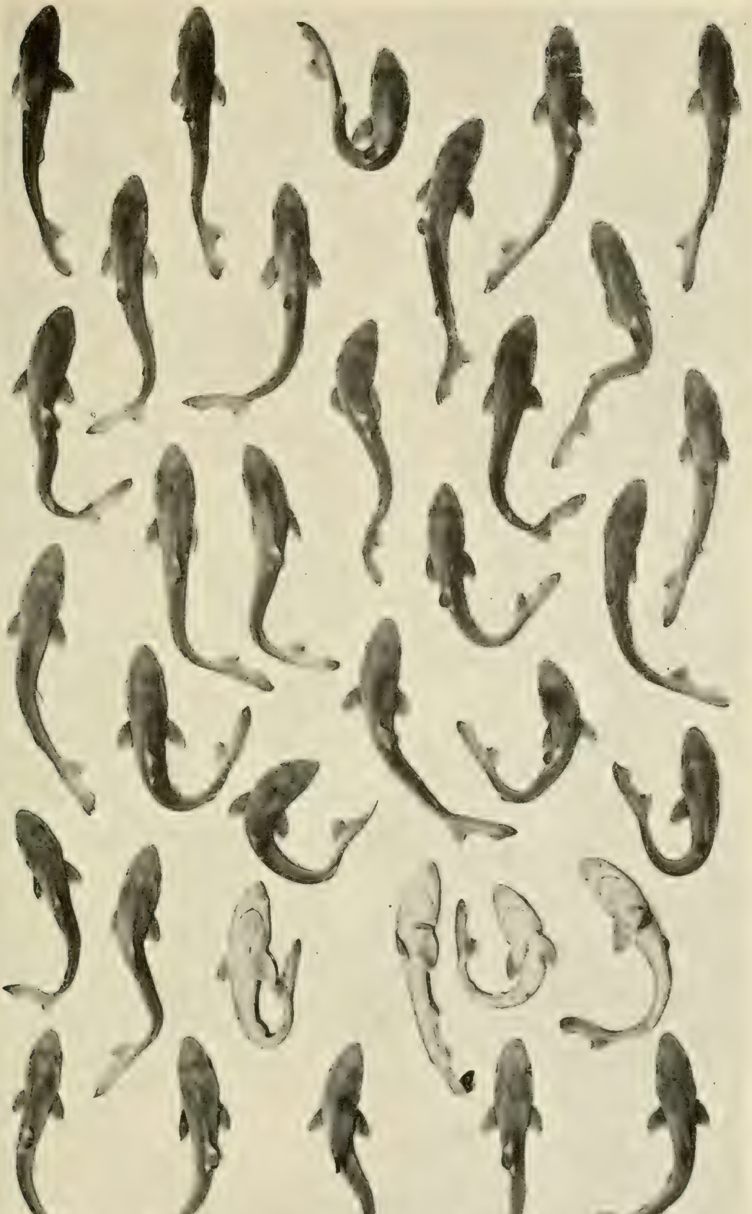

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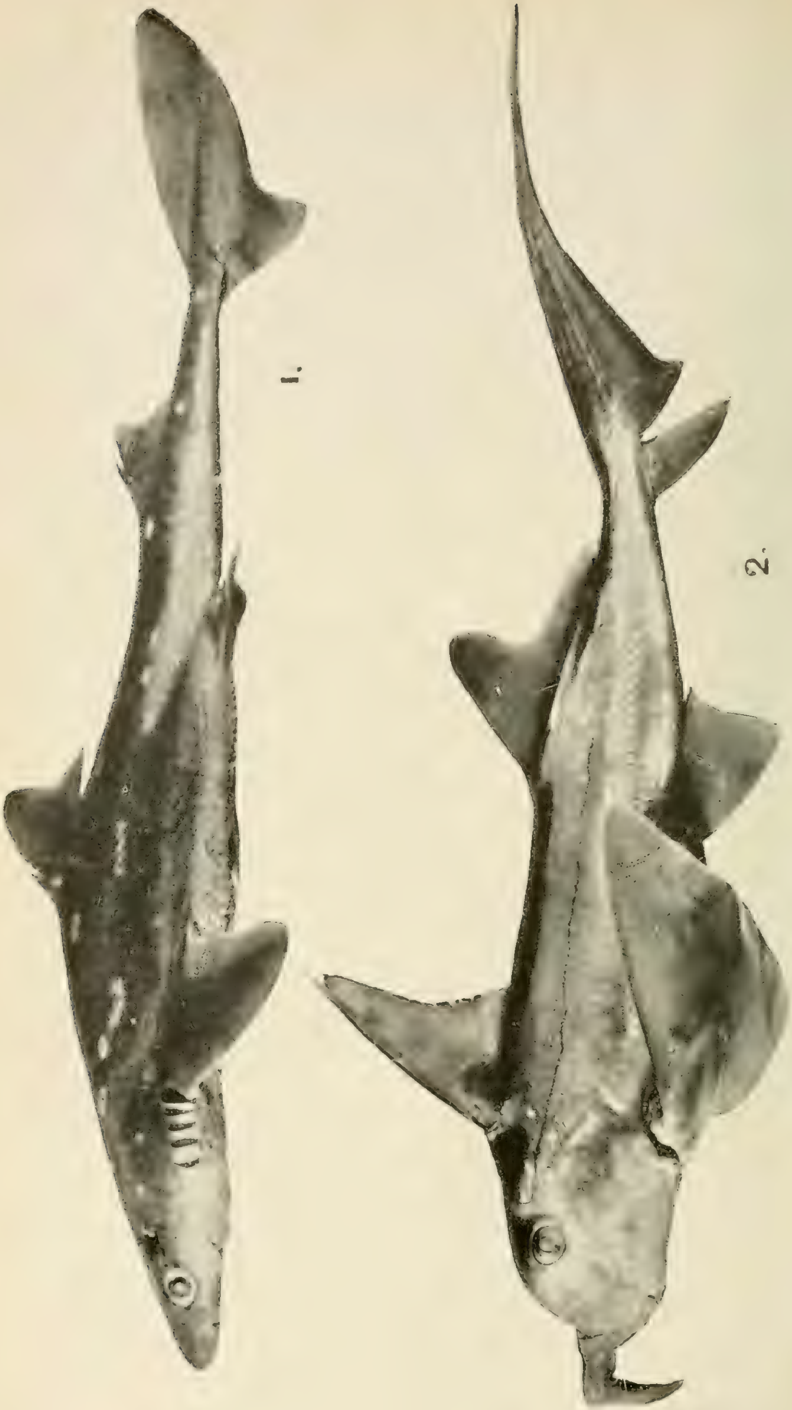

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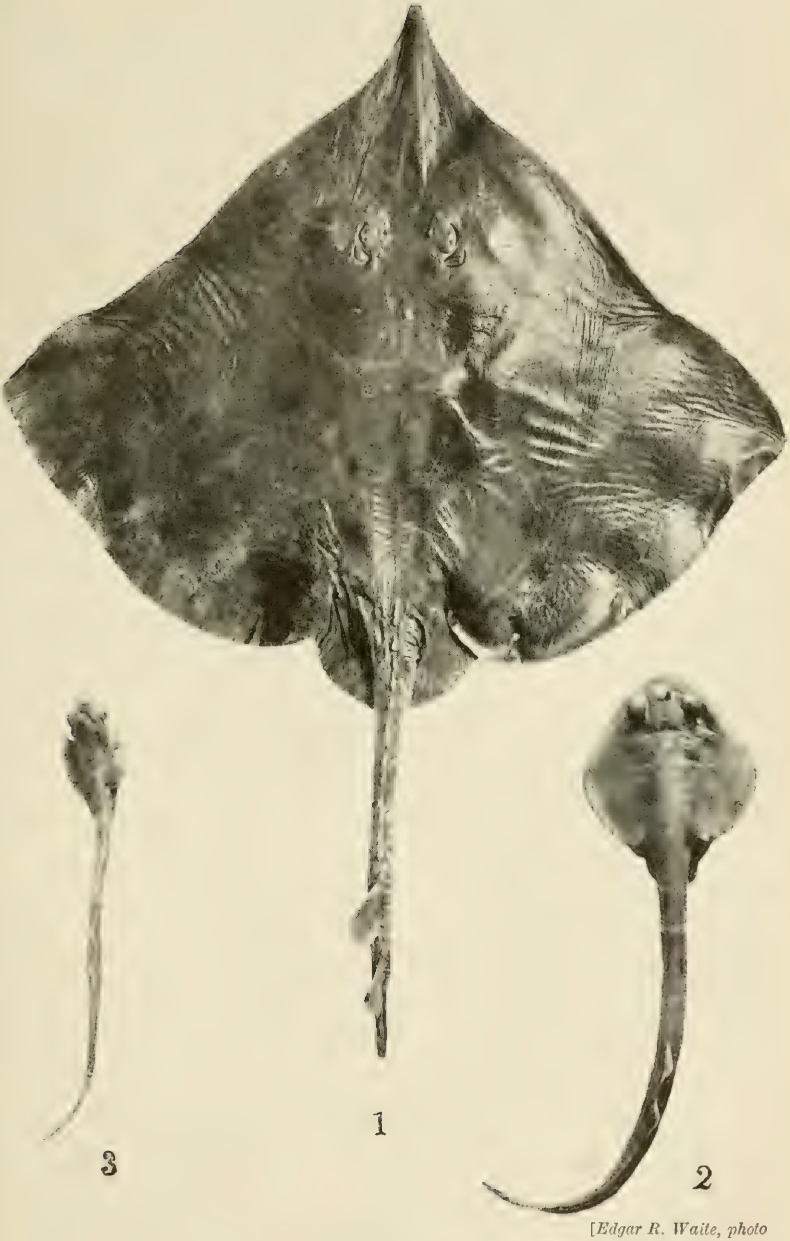

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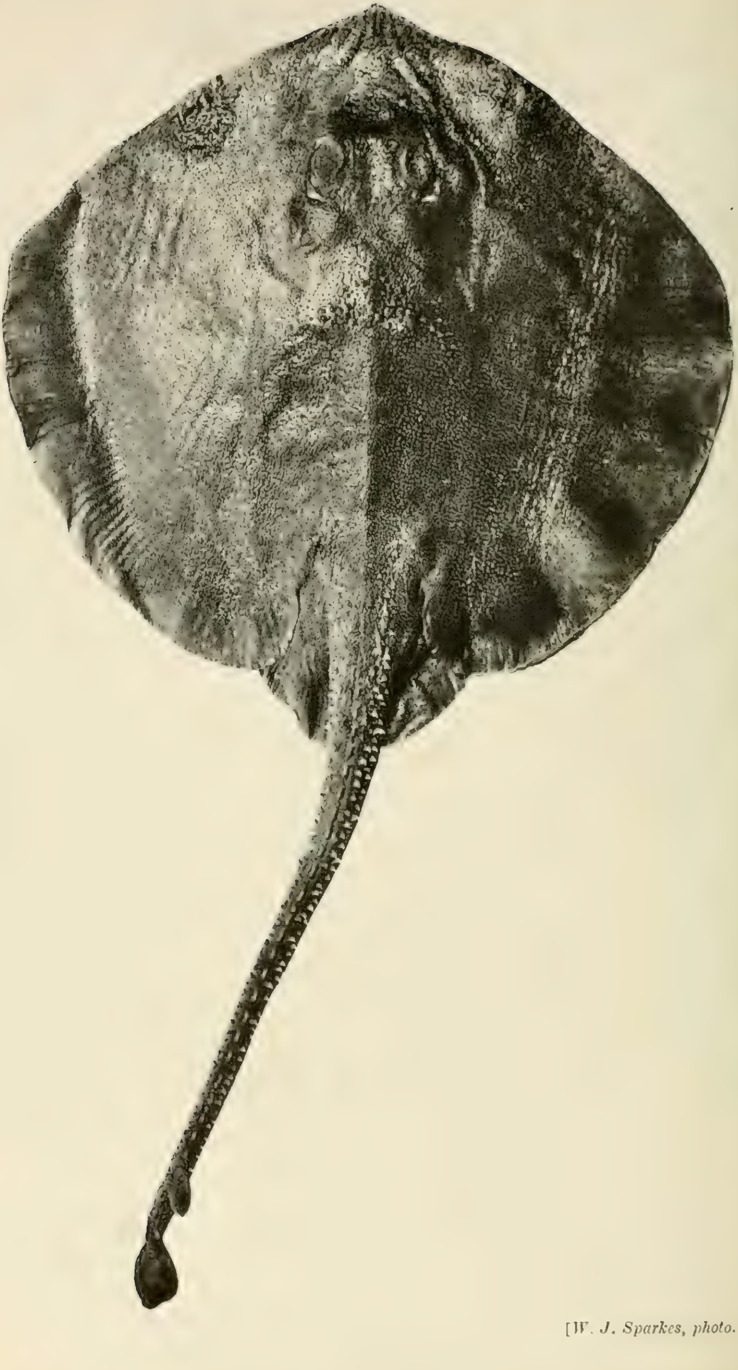

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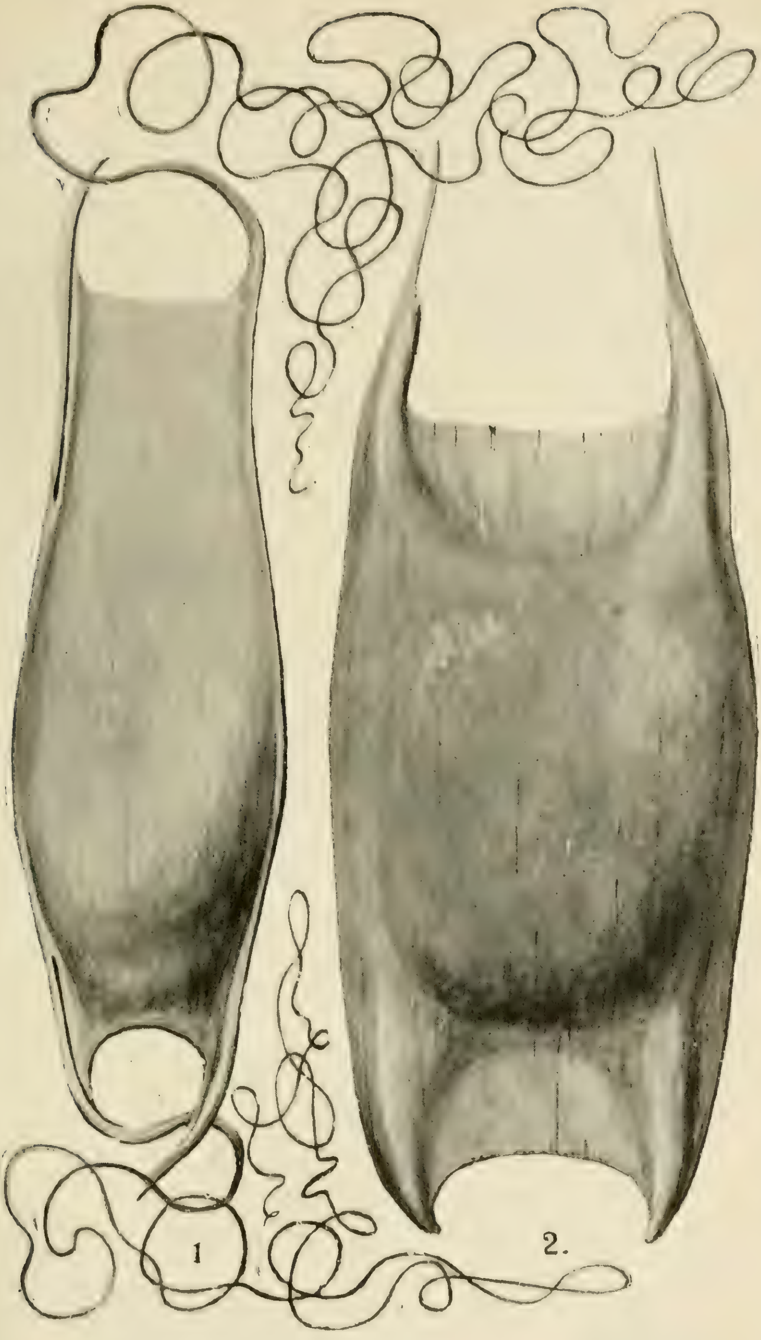

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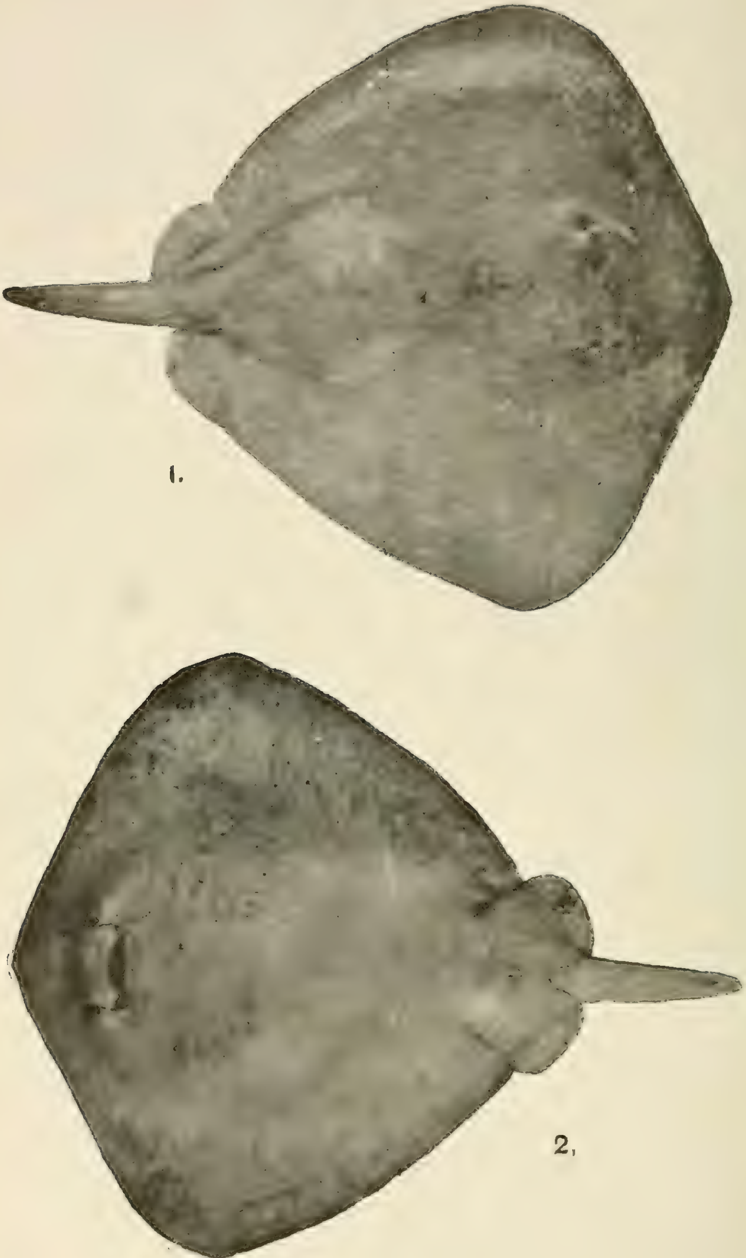

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CANTERBURY COLLEGE
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Scientific Results of the New Zealand Government Trawling Expedition, 1907

Plates XXIV.-LVIII. and text figures.

PISCES.

By Edgar R. Waite, F.L.S.

PART II.

Plates XXIV.—LVII. and figs. 1-3.*

This, the second and concluding portion, is devoted to the teleostean fishes, the new genera and species, with few exceptions, and known forms not hitherto recognised from New Zealand, having been briefly recorded elsewhere[1].

They may be summarised thus:—

NEW GENERA.

Maccullochia for *Histiopterus labiosus* Günther.
Rexea for *R. furcifera* sp. nov. and others.
Pelotretis for *P. flavilatus*, sp. nov.

NEW SPECIES, etc.

Centriscops humerosus Rich. var. *obliquus*.
Syngnathus norae.
Coelorhynchus aspercephalus.
Cepola aotea.
Pseudolabrus pittensis.
Rexea furcifera.
Rhombosolea millari.
Ammotretis nudipinnis.
Pelotretis flavilatus.
Hemerocoetes microps.

Other additions to the fauna are:—

Chlorophthalmus nigripinnis Günther.
Macrorhamphosus scolopax Linnæus.
Zanclistius elevatus Ramsay and Ogilby.
Pterygotrigla picta Günther.
Gnathagnus innotabilis Waite.

(1) Waite Proc. N.Z. Inst. 1910 pp. 25, 26, and 1911 pp. 49—51.
*For explanation of plates see p. 270

Though many of the species dealt with have previously been illustrated by outline figures, these cannot be regarded as satisfactory, and the opportunity has been embraced of refiguring a number of them.

Further, an attempt has been made to supply an oft expressed deficiency in the matter of descriptions, many of the earlier ones in especial, being scarcely recognisable, and in order to facilitate the identification of species, consultative keys have in places been supplied at the request of persons more or less interested in our fishes. Such aids are more properly regarded as appertaining to a manual or hand-book but no such work is yet available.

Finally, at the request of Mr. L. F. Ayson, Chief Inspector of Fisheries for the Dominion, and officer in charge of the trawling expedition, I have dealt somewhat fully with the *Pleuronectidae*. The flat fishes have never been adequately examined, and as a preliminary effort I have given some attention to the subject. I believe that as a result, their recognition will be much simpler than heretofore.

ISOSPONDYLI.

Family CLUPEIDÆ.

a. Body feebly compressed, belly rounded, ventral scutes weak, vertebræ 50 to 56 .. .. *Clupea.*

aa. Body strongly compressed, belly acute, ventral scutes strong, vertebræ 40 to 44 .. *Harengula.*

CLUPEA Linnæus, 1758.

CLUPEA NEOPILCHARDUS Steindachner.
PILCHARD.

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

Clupea sagax Arthur, T.N.Z.I. xv., 1883, p. 208, pl. xxxiv.

Stations 78, 81 (167).

B. vii.; D. 20; A. 19; P. 16; V. 8; C. 12 + 20; Sc. 52; Sc. tr. 11; Vert. 19 + 31 = 50.

Length of head 3.6, height of body 4.9, length of caudal 8.9 in the length; diameter of eye 4.4, interorbital space 6.2, and length of snout 3.1 in the length of the head.

Head compressed, flat above; adipose eyelid well developed, both before and behind; nostril on each side, single, placed a little nearer the end of the snout than to the eye. Lower jaw slightly the longer, cleft of mouth oblique, the maxilla extends to beneath the first third of the eye; gill openings wide, gill-rakers thin, long and slender, ninety-four on the first arch, of which sixty-seven are on the lower limb.

Body slightly compressed, belly rounded, abdominal scutes not much developed, nineteen in front and fourteen behind the origin of the ventral fin.

Teeth.—None.

Fins.—The origin of the dorsal is nearer to the end of the snout than to the base of the caudal, the longest rays are one-half the length of the head; the distance between the origin of the anal, and that of the dorsal is equal to the distance between the latter and the front margin of the eye; pectoral low, its length equal to the head less the snout; ventral placed posterior to the middle of the dorsal, its length equal to the distance between the end of the snout and the middle of the eye or 2.7 in the length of the head; caudal deeply cleft, the height of the peduncle one-half greater than the diameter of the eye.

Colours.—Back dark-blue, sides silvery, details cannot be ascertained owing to the poor condition of the specimen.

Length.—179 mm.

The Pilchard was not actually trawled during the period I was on the vessel, but was obtained from the stomachs of *Macruronus novae-zelandiae.* Mr. Anderton sent me three examples taken at Station 167, in Golden Bay, at the northern extremity of the South Island; the depth recorded is 16-17 fathoms but the fishes had evidently been ejected by some other fish as they are partially digested.

If properly fished for, the pilchard should prove a most valuable source of food, for it is evidently common on both the Australian and New Zealand coasts. Hector[2] stated that it visits the east coast of Otago every year in February and March, and when the schools migrate they extend as far as the eye can reach, followed by a multitude of gulls, mutton birds, barracouta, and porpoises. So densely packed are they in some years, that by dipping a pitcher in the sea, it would contain half fish; so that if large boats and suitable nets were employed, thousands of tons could be caught.

(2) Hector, Edible Fishes N.Z. 1872, p. 119.

HARENGULA Cuvier and Valenciennes.

Harengula antipoda Hector.

Sprat.

Clupea sprattus, var. *antipodum* Hector, Cat. Fish. N.Z., 1872, p. 133. Arthur, T.N.Z.I. xv., 1883, p. 203, pl. xxxiv., fig 1.

Clupea antipoda Hutton, Index Faunæ N.Z., 1904, p. 51.

Stations 6, 17, 33, 40, 41, 42, 45, 52, 53, 86, 87.

B. vii. D. 16; A. 16; V. 8; P. 15; C. 20 + 12; Sc. 47, Sc. tr. 13; Vert. 22 + 22 = 44.

Length of head 3.8, depth of body 3.27, length of caudal 7.5 in the length; diameter of eye 3.8, interorbital space 5.3, length of snout 3.25, mandible 1.9, pectoral 1.44 in the head.

Head compressed, flattened above, eye a little deeper than long, mouth sub-vertical, the lower jaw projecting, mandible almost covered by the maxillary, which is strongly bowed, very broad, and extends to beneath the first third of the eye; gill openings large, the membranes not attached to the isthmus, gill-rakers long and slender, fifty-nine on the first arch, of which thirty-seven are on the lower limb.

The body is compressed but thick above, passing into the sharp belly, the dorsal profile is slightly convex, the ventral profile markedly so.

Teeth.—Very weak, in the jaws, on the vomer, palatines and tongue.

Fins.—The origin of the dorsal is situated a little nearer to the base of the caudal rays than to the end of the snout, the base of the fin is equal to the length of the pectoral; anal fin short, the distance of its origin from the caudal much less than the length of the head; pectorals low; ventrals small, nearly twice the diameter of the eye, and placed below the third or fourth dorsal ray, caudal deeply cleft, the depth of the peduncle is one-half greater than the diameter of the eye.

Scales.—Head naked, the body scales are thin and deciduous, each of the abdominal scutes produced into a sharp spine, twenty-two being in advance of the ventral fins, and twelve thence to the anal.

Colours.—Back dark green, sides silvery, the dividing line being very marked and quite straight except near the caudal, the dark tint occupying the whole base of the caudal; fins colourless.

Length.—120 mm.

This herring was taken along the whole of the coast line explored, though it is improbable that it was trawled from the bottom, the specimens being more likely entrapped as the net was hauled to the surface: hundreds were washed through the large meshes, all appearing to be dead, their delicate bodies being unable to withstand the pressure to which they were subjected; most of the examples preserved were skimmed off the surface with a hand net.

Mr. W. Arthur collected some very interesting information on the habits of the sprat, publishing it in the paper above noted.

Captain J. Bollons of the Government steamer "Hinemoa" has sent me this species from Auckland Harbour.

Family ARGENTINIDÆ.

ARGENTINA Linnæus, 1758.

Argentina elongata Hutton.

Silverside.

Plate XXIV.

Argentina elongata Hutton, Ann. Mag. Nat. Hist. (5) iii., 1879 (Jan.), p. 53. Günther, Chall. Rep. xxii., 1887, p. 218, pl. lv,. fig. B.

Argentina decagon Clarke, T.N.Z.I. xi., 1879 (May), p. 296, pl. xiv.

Stations 16, 17, 19, 20, 21, 22, 23, 25, 26, 38, 50, 67, 74, 75, 81, 83, 85, 88, 89, 90.

B. vi.; D. 11; A. 12; V 12; P. 15; C. 20 + 12; L. lat. 57; L. tr. 4 + 5; Vert. 54.

Length of head 3.64, height of body 6.37, length of caudal 4.93 in the total: diameter of eye 3.0, interorbital space 6.0 in the head.

Head long, slightly deeper than wide, nearly flat above; the eye is very large, cutting the upper profile, and leaving less than half its vertical diameter below: the snout is pointed, one-sixth longer than the eye; the nostrils are close together, the anterior one being a large round pore, situated midway between the end of the snout and the eye: the mouth is small and sub-horizontal, the upper jaw is a little the longer, and the maxilla reaches slightly more than half way to the eye; gills four, a slit behind the fourth; gill rakers moderate, very slender, thirteen on the first arch, ten being on the lower limb, pseudobranchiæ feebly developed.

Body elongate, slightly compressed, with three longitudinal ridges, especially well-marked posteriorly, one ridge above, and two below the lateral line; the width of the body is three-fourths its depth, it is flattened above and below anteriorly, less so behind.

Teeth.—No teeth in the jaws, some minute teeth at the end of the vomer, and seven larger curved teeth on the tongue, near its tip.

Fins.—The dorsal fin originates midway between the end of the snout and the hinder insertion of the adipose fin; the first ray is less than half the length of the second, which is the longest, and equals the length of the snout plus the eye, the length of the base equals the diameter of the eye, the extreme length of the adipose fin being the same; the latter is situated over the middle of the anal; the anal is lower than the rayed dorsal; the pectoral is placed low, and is longer than the ventral, the latter originates beneath the penultimate ray of the dorsal; the caudal is forked, and has many short rays above and below, extending forward more than one-third its distance to the adipose fin; the peduncle is twice as long as deep, or one-third greater than the diameter of the eye.

Scales.—Head naked, the scales on the body are large and deciduous, those of the lateral line more adherent; these, as are also those of the three longitudinal ridges, notched in the centre. The lateral line dips slightly in front thence runs straight to the base of the caudal.

Colours.—The body is yellowish or silvery, with very pale-brown semi-cross bands, at least in the young, three before the dorsal, one at its base, three between this and the adipose fin, and one between the latter and the caudal: they do not extend below the lateral line. There is also a polished silvery band along the middle of the sides; eye blue with a silver patch above the pupil.

Length.—184 mm., attains to 191 mm.

The Silverside was generally obtained in all waters from Otago to the Bay of Plenty, also at the Chatham Islands and at depths between the extremes of 16 and 105 fathoms. A single example taken at Station 75 was voided by a Red Cod (*Physiculus bachus*).

The respective descriptions of Hutton and Clarke apply to the same fish, and were published within four months of each other, the name *A. elongata* having priority.

Günther considered *A. decagon* as a synonym of *A. sphyraena* Linnæus, and regarded *A. elongata* as distinct. The type was a young example, and an examination of my series shows that in small specimens the head is relatively longer and the body less deep than in larger ones. Günther appears to have had the type specimen, which is doubtless in the British Museum, but the respective descriptions of Hutton and Günther vary somewhat, thus the former gives the depth of the body as 9 times in the length, the latter 8. The eye is rendered as 3½ and 4 times in the length of the head respectively; I have specimens showing the former proportion. In neither the depth of the body nor the diameter of the eye, does Günther's figure quite agree with his description. Under these circumstances, and seeing that I have specimens from the type locality, I cannot but regard my examples as identical with this species.

Clarke's specimen was larger, and I have small hesitation in regarding mine as of the same species; though the relative position of the nostrils, as described, is different. As above mentioned, Günther has identified this, apparently from the description only, with *A. sphyraena.* Our specimens have 54 vertebræ, while the northern one is said to possess but 50.

Günther writes:—"The three Atlantic species known are very similar to each other in their organisation, and, therefore, we may infer that they agree very much in their habits. They live at a considerable depth, but probably at some distance from the bottom, as they have never been captured by the dredge or trawl during any of the deep-sea expeditions." Additional species, made known since this was written have been taken in the dredge, while all our numerous examples were captured in the trawl. Specimens taken at the northern stations were ready for spawning, the roe being small and colourless.

APODES.

Family ANGUILLIDÆ.

CONGERMURÆNA Kaup, 1856.

Congermuræna habenata Richardson.

Little Conger Eel.

Congrus habenata Richardson, Voy. Ereb. and Terr., 1848, p. 109, pl. l., figs. 1-5.

Stations 7, 89.

The only examples of this species were obtained from other fishes, and were either thrown up or removed from their stomachs. At Station 7 specimens were voided by Lings (*Genypterus blacodes*) and at Station 89 the Dories (*Zeus faber*) furnished several examples, in addition to *Cepola aotea* and *Myctophum humboldti*. All are too much digested to be useful further than for identification and for ascertaining the number of vertebræ, which I find to be 44 + 78 = 122.

LEPTOCEPHALUS Scopoli, 1777.

Leptocephalus conger Linnæus.

Conger Eel.

Muraena conger Linnæus, Syst. Nat. ed. x., 1758, p. 245.

Stations 40, 51, 52, 72, 76, 77, 78, 80.

The Conger Eel was taken at Stations between Timaru and Porangahau Bay, south of Hawke Bay, and at depths from 9½ to 28 fathoms. Some of the examples reached a length of 2060 mm. (= 6ft. 9in.).

The number of vertebræ has been variously rendered within close limits, a count of one of the trawled specimens yields 54 + 102 = 156.

INIOMI.

Family SUDIDÆ.

CHLOROPHTHALMUS Bonaparte, 1840.

Chlorophthalmus nigripinnis Günther.

Cucumber Fish.

Plate XXV.

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.

Stations 88, 89.

B. vii.; D. 11; A. 10; V. 9; C. 19 + 12; Sc. 55; L. lat. 51; L. tr. 5 + 6; Vert. 47.

Length of head 3.44, height of body 5.21, length of caudal 4.91 in the total: diameter of eye 2.63, interorbital space 10.0 in the head, and one-fourth the diameter of the eye.

Head wider than deep, eye very large, cutting the upper profile, its cavity occupying the greater part of the head; interorbital space concave, its edges forming low ridges; the snout is flat but pointed in profile, its length little more than half that of the eye; nostrils small, close together, slightly nearer the eye than the snout, the anterior with a flap behind; the mouth is moderate, slightly oblique and the lower jaw projects noticeably beyond the upper, the maxilla reaches nearly to beneath the middle of the eye, and its distal extremity is one-fifth greater than the interorbital space; gills four, a slit behind the fourth, pseudobranchiæ present.

Body sub-circular in section, with a ridge from the occiput to the beginning of the dorsal fin which stands on a slight eminence, lower surface of body rather flat.

Teeth.—A broad band of villiform teeth in the jaws; they extend outward over the lips, a large patch of similar teeth on the vomer, subcontinuous with a narrow band on the palatines; the tongue is spatulate and truncate, and bears teeth on the front and sides.

Fins.—The dorsal commences a little nearer the snout than the adipose fin, the first ray is half the length of the second, which is the longest, and more than four-fifths the length of the head, or one-third the height of the body, the remaining rays regularly decrease in length, the adipose fin terminates evenly with the anal, the rays of which are but three-fourths the diameter of the eye in length; the pectoral is equal to the ventral in length 1.4 in the head and reaches below the hinder insertion of the dorsal; caudal deeply cleft, the upper lobe one-third longer than the lower, peduncle long, and, except quite posteriorly, as wide as deep.

Scales.—Cheeks and upper part of opercle with scales smaller than those of the body, all cycloid and nearly smooth; the lateral line arises over the opercle and gradually attains the median line passing along the middle of the peduncle, minute scales along the ventral (which has an enlarged axillary), and caudal fins.

Colours.—Green above and silvery below; head green with brilliant silvery opercles, edge of premaxillary blue, upper lip black, dorsal fin and caudal lobes tipped with black, the colouring on the lower lobe of the caudal broader than on the upper; inner rays of ventrals clouded.

Length.—192 mm., attains to 210 mm.

When we first obtained the fish I recognised it as of the same species taken so commonly off the coast of New South Wales in 1898, and it is an addition to our marine fauna. *C. nigripinnis* was but twice taken during the "Nora Niven" expedition, though each haul was fairly rich in individuals.

Our first two hauls, after rounding Cape Runaway, in the Bay of Plenty were practically continuous and produced this fish in depths ranging from 66 to 105 fathoms.

Some characters of this species were discussed in my report of the Fishes of the "Thetis" Expedition (*vide supra*) and need not be repeated here, the number of caudal rays there printed as 9 should have been 19. The word *Chlorophthalmus*, also, is misspelled.

The only species ascribed to this genus previously taken in New Zealand is *C. gracilis* Günther,[3] which however differs so greatly from typical forms as to be quite unmistakable, and which indeed I would regard as a separate genus .... differing from *Chlorophthalmus* by its elongate body, smaller eye, long maxillary, and the forward position of the ventral fins.*

Family MYCTOPHIDÆ.

MYCTOPHUM Rafinesque, 1810.

Myctophum humboldti Risso.

Lantern Fish.

Plate XXVII., fig. 3.

Gasteropelecus humboldti Risso, Ichth. Nice, 1810, p. 358.

?*Myctophum boops* Richardson, Voy. Ereb. and Terr., 1845 p. 39, pl. xxvii.,, figs 13-15.

Myctophum californiense Eigenmann, West Amer. Scient., 1889, p. 124.

Station 89 (*ex Zeus*).

B. viii.; D. 12; A. 21; V. 8; P. 12; C. 19 + 12; L. lat. 39; L. tr. 3 + 4; Vert. 38.

Length of head 3.38, height of body 4.58, length of caudal 3.88 in the total; diameter of eye 2.62, and interorbital space 10.5 in the length of the head.

The head is compressed and obtuse, snout blunt, almost vertical in front, 2.7 in the eye, which is very large, and almost

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(3) Günther, Ann. Mag. Nat. Hist. ii. 1878, p. 182, pl. xlix. fig. A.

*Since the foregoing was written Mr C. Tate Regan has proposed the name *Bathysauropsis* for a new genus of which *Chlorophthalmus gracilis* is the type species [Ann. Mag. Nat. Hist. (8) vii. 1911, p. 127.]

cuts the upper profile; preopercle nearly vertical, mouth slightly oblique, the jaws equal, the maxilla reaches to the angle of the preopercle: gills four, a slit behind the fourth, gill-rakers long and slender, twenty-three on the first arch, sixteen of which are on the lower limb; pseudobranchiæ present.

Teeth.—In villiform bands in jaws, on palatines, pterygoids and vomer, also a double row on the tongue.

Fins.—The dorsal commences midway between the anterior margin of the eye and the adipose fin, the first two rays are short but the third and fourth, which are subequal are as high as the body; the length of the base is equal to the distance between the end of the snout and the hinder edge of the eye; the anal lies wholly behind the dorsal, and its margin is incised, the rays falling from the first to the tenth, whence they are subequal, the length of the first ray is equal to the base of the dorsal, and the last is inserted beyond the adipose fin; the pectoral is long, but little shorter than the dorsal, and it extends to the middle of that fin; the ventral equals the base of the dorsal, and its first ray lies somewhat in advance of that of the dorsal; caudal deeply cleft, its peduncle strongly compressed and twice as deep as its length behind the adipose fin.

Scales.—Cycloid, those of the lateral line slightly enlarged vertically. The upper mediolateral and the posterolateral photophores lie each in an auxillary scale in the lower part of the seventeenth and twenty-sixth or twenty-seventh scales of the lateral line, respectively.

The photophores are placed as follows:—

Anteorbital.—The nostrils are situated in a small luminous area.

Opercular.—Two, close together, the lower one just behind the extremity of the premaxilla.

Pectoral.—Three, two of which lie close behind the opercular border, and are widely separated, the third is at the base of the lower pectoral rays.

Anterolateral.—Two, the first above the anterior ventral ray, the second slightly nearer to it than the lower mediolateral, all three in the same horizontal line.

Mediolateral.—Two, forming a straight line with the fourth ventral photophore.

Posterolateral.—One, on the lateral line, and over the last pore of the anterior series of the anal, behind middle of anal, but in advance of the soft dorsal.

Thoracic.—Four, the pore immediately in front of the ventral fin, and raised above the line of the thoracic pores, has been counted as an anterolateral.

Ventral.—Four, the first immediately behind the ventral fin.

Anal.—Fifteen, a break between the eighth and ninth; the anterior series is slightly convex above, the posterior one is straight.

Caudal.—Two, close together, the hinder one slightly raised in position.

Supercaudal (in all examples).—Small, occupying three scales.

Length.—81 mm., largest 92 mm.

The example obtained was ejected by a Dory, and was somewhat digested. The Dory was one of many taken in the Bay of Plenty, at a depth of 66-94 fathoms. Several specimens of *M. humboldti* were thrown aboard the trawler during the night of August 13th, when we rode out a storm off Cape Palliser.

I have associated the specimens obtained with *M. humboldti* with the published descriptions of which it well agrees. In suggesting the identity of *M. boops* with *M. humboldti*, Lütken[4] added the Pacific to its habitat, but as I do not possess authenticated examples of either I am unable to write with more certainty than Lütken. My examples, however, agree much more nearly with the descriptions of *M. humboldti* than with that of Richardson, for in *M. boops* the pectoral is described and figured as reaching to the anus, whereas in my examples, as with *M. humboldti* it attains but to the middle of the dorsal. According to Richardson his specimen possessed both occipital and mandibular photophores, neither series occurring in the examples before me. The usual break in the anal series is not referred to and the dorsal fin is represented as very low; lower than the anal, and not half the height of the body, while the margin of the anal is illustrated as being straight. In these particulars the description does not apply to the specimens trawled. It has been suggested that *M. californiense* is identical with *M. humboldti*.

The only other species of the genus *Myctophum*, as restricted, recorded from New Zealand, is *M. hectoris* Günther[5], but the shortness of the pectoral fin, scarcely reaching the ventral, coupled with the fact that the scales of the lateral line are rather smaller than the others, places that species out of consideration. A description of its photophores would be useful.

(4) Lütken, Spolia Atlantica, ii. 1892, p. 255.

(5) Günther, Ann. Mag. Nat. Hist. (4), xvii. 1876, p. 399.

SOLENICHTHYES.

Family MACRORHAMPHOSIDÆ.

CENTRISCOPS Gill, 1862.

Centriscops humerosus Richardson.

Bellows Fish.

Centriscus humerosus Richardson, Voy. Ereb. and Terr., 1846, p. 56, pl. xxxiv., figs. 5, 6.

Centriscops humerosus Gill, Proc. Acad. Nat. Sci. Phil., 1862, p. ——.

Stations 18, 22, 29, 37, 51.

B. v.; D. vii. 15; A. 19; V. i. 5; P. 18; C. 9 + 12.

Length of head 2.0, height of body, at ventral fin 2.4, length of caudal 5.0 in the total; diameter of eye 5.5, length of snout 1.5, interorbital space 7.3 in the length of the head.

Head strongly compressed, a slight keel runs along the upper edge of the snout between the eyes and merges into the acute edge of the body; a strong horizontal ridge passes from the base of the snout on each side over the eyes, and backwards to the upper angle of the opercle, thence downwards towards the base of the pectoral, a similar ridge passes below the nostrils to the front edge of the eye thence forming its lower border; the snout is directed slightly upwards, and is roughened along its entire length; the nostrils are placed in a smooth area a little in advance of the eye and between the ridges above mentioned.

The body is excessively compressed and elevated, the anterior profile is very steep and there is a more or less prominent hump above the opercle, thence it runs straight to the first dorsal spine; the descent to the caudal peduncle is much steeper; the lower profile forms the even segment of a circle, drawn from a point on the dorsal edge, midway between the hinder edge of the eye and the first ray of the soft dorsal; forward of the anal fin the edge is acute and knife-like, and has five scutes in advance of the ventral fin, the hinder ones terminating in a spine. A ridge runs on each side of the median one and opposite to the ventral fin becomes spine-bearing; there are two median plates between the ventral and anal, each with a cluster of jagged spines.

Fins.—The first spine of the dorsal is very short and claw-like, the long second spine is equal to the length of the snout less the diameter of the eye, it is triangular in section and multi-grooved, each posterior angle being set with ten long upwardly directed spines, confined to the basal two-thirds of the spine; the points of the five following spines form a vertical line and the last is immediately followed by the soft dorsal, the fourth and fifth rays are the longest, and one half more than the eye; the base of the anal is longer, and it commences much, and terminates slightly, in advance of the dorsal; the upper rays of the pectoral are longest, measuring twice the diameter of the eye; the ventral is very short two-thirds an eye diameter; the caudal is truncate, twice the length of the eye and the depth of its peduncle is half the length of the fin.

Scales.—Head and body covered with minute rough scales, and, in addition to the ventral keels already mentioned, there are the usual bony strips towards the upper part of the sides anteriorly.

Colours.—Base of snout and upper part of head and body orange, the other portions silvery; white lines, directed upwards and backwards lie in the neighbourhood of the upper bony strips and a thicker one runs a wavy course from behind the eye and joins the fifth line of the series referred to; a dark oblique broad band passes across the lower half of the body from under the pectoral rays to a space between the ventral and the anal, and is followed by a similar white band directed towards the anal rays; the fins are colourless.

Length.—153 mm.

The specimens obtained agree generally with Richardson's figure, but the snout is not so thick and is longer, the eye is much larger, and is nearer the profile, the back is straight and not saddled, the caudal is longer and the belly is less convex; the hinder profiles are not so steep, and the bony scutes have not the stellate form shown, the last difference may be due to the fact that the type was a dried specimen, and some of the other differences may be due to age.

Centriscops was taken on five occasions, somewhat remarkably only at southern stations, having been secured in the waters between Otago and Lyttelton Harbours, and at depths between 18 and 53 fathoms.

CENTRISCOPS HUMEROSUS, OBLIQUUS var. nov.

Plate XXVI.

There is an example in the Dominion Museum of which the Director, Mr. A. Hamilton, has kindly given me a photograph: it is possibly an older specimen than the type, has a shorter spine, and is much more gibbous; with these exceptions and the larger eye and colouration, it more nearly agrees with the figure. It is marked with five oblique black bands on each side, the first passing between the eye and the pectoral, and the fifth running nearly parallel to the hinder profile and embracing the greater part of the caudal peduncle, the stellate form of the scutes can also be seen.

MACRORHAMPHOSUS Lacépède, 1803.

Macrorhamphosus scolopax Linnæus.

Snipe Fish.

Balistes scolopax Linnæus, Syst. Nat. ed. x., 1758, p. 329.

Station 89.

B. iv.; D. v. 12; A. 19; V. i. 5; P. 15; C. 9 + 14.

Length of head 2.0, height of body 3.3, length of caudal 6.5 in the total: diameter of eye 5.1. length of snout 1.5. inter-orbital space 7.6 in the length of the head.

Head compressed, but wider than the body, the supero-lateral ridges of the snout divide in front of each eye, one branch passing over the orbit and continued as a bony strip along the body, the other branch goes to the eye at its mid height; the nostrils are situated in the triangle thus formed but the area is as rough as other parts.

The body is compressed and oblong, the upper profile forms three low angles, the first over the opercle, the next at the origin of the dorsal fin, and the third at the origin of the soft dorsal; the lower profile forms a low arc; there are five ridged scutes on the lower profile in advance of the ventral fin, two pairs bordering the groove of the fin and two scutes behind it, all except the thoracic ones are slightly produced as spines. a bony strip formed of three parts lies on each side the thoracic scutes.

Fins.—The dorsal arises midway between the front margin of the eye and the end of the caudal rays, the first spine is very short, the second is extremely long, equalling the height of the body, and nearly the length of the snout, it is acute in front and flat behind, the hinder edges bear upwardly directed thorns which, however, leave the terminal two-fifths of the spine smooth, the third spine is less than the diameter of the eye, the two following ones are still shorter; the soft dorsal is separated from the spinous portion by a sub-horizontal space equal to its base, the fourth ray is the longest, one-sixth greater than the eye: the base of the anal is twice that of the dorsal, but both fins terminate in the same vertical: the ventral is small, and is inserted midway between the front of the eye and the end of the anal, it is receivable into a groove: the upper rays of the pectoral are twice the diameter of the eye: the caudal is emarginate, its length is one-half longer than the eye, and the peduncle is very narrow, its depth being but one-half the eye.

Scales.—Head and body covered with small elongated rough scales which are spinous, and extend over the greater part of the eye, the bony strip mentioned as passing over the eye extends to midway between the pectoral and dorsal and is obliquely crossed by three other strips, the two last of which join another sub-horizontal strip, which passes to the base of the first dorsal spine.

Colours.—Upper parts red, lower parts silvery, all the fins pink in life.

Length.—106 mm.

This species which was but once taken, constitutes an addition to the known fauna of the Dominion, though examples were taken by the Challenger Expedition between Sydney and Wellington. It was obtained in the Bay of Plenty: of the number netted, seventeen examples were secured, mainly by means of a hand-net as they escaped through the large meshes of the trawl, but scores were lost. The depth attained at Station 89 was 66-94 fathoms, the bottom being charted as sand, shell and mud.

The New Zealand examples agree very closely with the descriptions of the Mediterranean and Atlantic *M. scolopax.* Johnson[6] recorded the species from Tasmania, but the New South Wales specimens differ considerably, and have been distinguished under the name *M. elevatus.*[7]

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(6) Johnston, Proc. Roy. Soc. Tasm. 1884, p. 255.
(7) Waite, Mem. Aust. Mus. iv. 1899, p. 59, pl. vii. fig. 1.

Family SYNGNATHIDÆ.

SYNGNATHUS Linnæus, 1758.

Syngnathus noræ Waite.

Long-snouted Pipefish.

Plate XXVII., fig. 1.

Syngnathus norae Waite, Proc. N.Z. Inst., 1910, p. 25.

Stations 2, 3, 4, 12, 22, 30, 50.

D. 39; P. 13; C. 8; Rings 18 + 49 = 67.

Other specific characters and comparative details are shown on the accompanying table, the specimen examined being a female and marked "B".

The head is low, being but half the depth of the body, the opercle is not crossed by a ridge, the snout is long, more than twice the post-orbital length of the head, the dorsal begins on the anterior of the two rings occupied by the vent, and its base is not elevated, the anal is minute.

In the males the bodies are, as usual, not so high, nor is the dorsal edge ridged as in the females.

Colours.—Green with brown cross bands, five semi-bands on the body, namely, one behind the head, three in advance of the dorsal, and one across the vent; the three middle bands, each of which occupies three rings, separated by two rings, have above the lateral ridge of the body a brown vertical mark on each of the contributing rings; there are eight complete bands across the tail; a brown line from the eye to the snout on each side.

Length.—224 mm.

Examples obtained at Station 3 were removed from the stomach of *Callorhynchus*. *Polyprion* also yielded specimens.

This Pipefish appears to be a southern species, having been taken only between Stewart Island and Port Lyttelton, and at depths from 20 to 54 fathoms. It is, however, improbable that Pipefishes would have been secured at all by a trawl whose meshes measured several inches across, and I notice that the only stations at which they were obtained were those where I introduced either a small meshed net or a piece of sacking into the trawl. As with many other species, therefore, their distribution can be ascertained only when a properly-equipped expedition is provided for the scientific investigation of our marine resources.

I had provisionally associated the specimens with *S. pelagicus*, Linnæus, examples identified as such, from New Zealand, being in the British Museum. The markings on the body appear to be very similar but the number of dorsal rays and body rings is much greater in *S. norae,* the respective numbers being:—

S. pelagicus, Dorsal rays 29-32, Body rings 17 + 35 = 52 maximum.

S. norae, Dorsal rays 37-40, Body rings 18 + 48 = 66 minimum.

The nearest ally of the latter species appears to be *S. semistriatus* Kaup[8], but the colour markings are different "Under the interrupted lateral line 19 cross stripes; above that line yellow spots with black borders." In *S. norae* the body bands are most pronounced on the upper half of the side. In Kaup's species the snout, when measured from the fore angle of the eye, equals in length the distance thence to the base of the pectoral fin. In the New Zealand species the same measure extends to the end of the pectoral rays, or to the end of the second body ring, which more nearly approximates Günther's[9] redescription of Kaup's species under the name *S. semifasciatus:* the dorsal rays number 38 and the body rings 21 + 49 = 70. He supplies the habitat as South Australia and Tasmania.

I have associated with this pretty species the name of Miss Nora Niven, after whom the trawler was named and from the owner of which I received many kindnesses while in Napier.

Syngnathus blainvillianus Eydoux and Gervais.

Short-snouted Pipefish.

Plate XXVII., fig 2.

Syngnathus blainvillianus Eydoux and Gervais, in Guerin, Mag. Zool. vii., 1837, pl. xvii.

Leptonotus blainvillii Kaup, Cat. Lophob, Brit. Mus.,1856, p. 46.

Station 2.

D. 38; P. 12; C. 6; Rings 18 + 42 = 60.

The snout is short, being equal to the post-orbital length of the head; no ridge on the operculum; the dorsal begins on the second ring in advance of the vent, and its base is not elevated.

Additional details are given in the table on page 175, and the fuller account published in the report of the Sub-antarctic Expedition need not be repeated[10].

The single specimen secured is a young female, obtained with examples of *S. norae* off Stewart Island, in 37-41 fathoms.

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(8) Kaup, Cat. Lophobranchiate Fish, Brit. Mus. 1856, p. 48.

(9) Günther, Cat. Fish Brit. Mus., viii., 1870, p. 162.

(10) Waite, Vertebrata, Subantarctic Islands, N.Z., 1909, p. 588.

	A Male	B Female	C Male	D Female	E Male	F Female	* Female
Total length in millimetres ...	209	224	185	192	173	184	108
Head in total length	7.4	6.5	7.4	7.3	7.5	6.8	8.3
Head in head and trunk ...	2.6	2.6	2.8	2.7	1.9	3.0	3.2
Head and trunk in total ...	2.7	2.5	2.6	2.7	2.7	2.5	2.5
Head and trunk in tail ...	1.7	1.5	1.6	1.7	1.6	1.5	1.5
Height in head	2.8	6.8	3.5	2.6	3.8	3.4	2.6
Snout in head	1.7	1.6	1.6	1.6	1.7	1.6	2.1
Eye in head	7.0	8.5	8.3	8.6	7.6	9.0	6.5
Egg-pouch in tail	5.1	—	5.0	—	5.0	—	—
Body rings	18	18	20	19	19	20	18
Caudal rings	49	49	51	48	50	51	42
Dorsal begins on ring No. ...	17	17	17	17	16	17	14
Dorsal stands on (number of rings)	10	10	11	11	11	11	10
Pouch stands on (number of rings)	12	—	12	—	12	—	—
Dorsal rays	39	37	40	37	38	38	38
Pectoral rays	13	12	13	12	13	13	12
Caudal rays	8	8	7	8	8	8	6

*The first six columns refer to *S. norae;* the last one to *S. blainvillianus*.

HIPPOCAMPUS Rafinesque, 1810.

Hippocampus abdominalis Lesson.

Seahorse.

Plate XXVIII.

Hippocampus abdominalis Lesson, in Ferussac. Bull. Sci. Nat. xi., 1827, p. 127, Bleeker, Verh. Akad. Wet. Amsterd. ii., 1854, p. 28, fig. 4. Kaup. Cat. Lophb. Brit. Mus., 1856, p. 17, pl. iii., fig. 3 (head).

Stations 25, 28, 30, 65.

D. 32; P. 18; Rings 11 + 49 = 60.

Snout long, equal to the post-orbital portion of the head, the supraorbital ridges rise together abruptly at the base of the snout, and diverging form a simple spine over each eye, pointed outwards and backwards and terminating in a short filament; coronet low compressed, with a median filament in front and two behind placed on low knobs. Body very deep, the depth at the tenth ring being two and a third times the length of the snout; the spines are represented by low knobs slightly enlarged below the dorsal, a filament on the dorsal knob of the third body ring.

Colours.—Brown, with darker rings across the tail, snout, pouch, and under edge of tail yellow; dark brown markings at the base of the snout, below the eye, and opercle; circular spots on most of the body rings; dorsal fin spotted and with a narrow black intramarginal band.

Length.—238 mm., male.

In the females the body is much deeper, being three times the length of snout, and there are no filaments on head or body at any age. Young examples have the body spines much more pronounced, and in the males those of the first and third rings carry filaments.

The Seahorse was taken near the mainland only at three stations, namely, off Oamaru in depths of 18 to 35 fathoms. A very large female was obtained at Station 65 off Port Hutt, Chatham Islands, from 24-33 fathoms; it measures 312 mm. in length.

ANACANTHINI.

Family MACROURIDÆ.

a. A fold of membrane limiting the aperture of the first branchial arch; mouth beneath the head .. .. .. *Coelorhynchus.*
aa. First branchial arch free, mouth normal *Macruronus.*

CŒLORHYNCHUS Giorna, 1803.

Though the fact was not recognised on board the trawler, subsequent examination shows that two species of the genus were obtained. It is not therefore possible to supply the individual stations, excepting in certain cases as specified. The following is the complete list:—

Stations 5, 22, 26, 33, 34, 35, 36, 38, 39, 40, 41, 44, 45, 46, 47, 50, 51, 52, 53, 54, 57, 58, 59, 61, 63, 71, 76, 77, 81, 85, 88.

a. Snout pointed, longer than the eye, scales large, scales on the head well defined, extremely spinous .. .. .. *australis.*

aa. Snout obtuse, shorter than the eye, scales smaller, less spiny, no distinct scales on the head .. .. *aspercephalus.*

Cœlorhynchus australis Richardson.

Plate XXIX., fig. 1.

Lepidoleprus australis Richardson, Proc. Zool. Soc., 1839, p. 100.
Macrurus australis Günther, Cat. Fish. Brit. Mus. lv., 1862, p. 391, and Study of Fishes figs. 256, 257. Hector, Edible Fish. N.Z., 1872, pl. viii., fig. 78.

Stations (in part), 54, 59, 61, 71.

B. vi.; D. 12, 88; A. 89; V. 7; P. 16; L. lat. 96; L. tr. 5 + 18; Vert. 15 + 52 = 67.

Length of head 4.4, height of body 6.4 in the length: diameter of eye 3.4, length of snout 2.7 and interorbital width 4.2 in the head.

Snout long and very acute, whether viewed from above or in profile; longer than the eye; the latter is placed in the middle of the length of the head; the mouth lies below the space between the posterior nostril and (nearly) the hinder edge of the orbit, the gape is somewhat less than its length: the barbel is short, less than half the diameter of the eye: the nostrils lie near together close in front of the eye, the anterior one is an oval pore, the posterior one a long sub-vertical slit, rostro-infraorbital ridge nearly straight and strongly marked, the nasal ridge, which terminates between the eyes, is but slightly marked, the inter-orbital ridges, at first parallel, diverge, and joining the origin of the lateral line distinctly mark off the head scales from those of the body; the supraorbital ridges are continued to the upper angle of the opercle and a temporal ridge arising above the posterior angle of the eye is continued to and in the same direction with the lateral line.

The body is compressed throughout its length and tapers evenly to the end of the tail.

Fins.—The dorsal commences at a point one and a half diameters behind the orbit, its first spine is minute, the second is slightly shorter than the succeeding and longest ray, and is not serrated; the space between the two fins is equal to the diameter of the eye and to the length of the base of the first fin; the rays of the second fin are short and lie in a groove: the anal commences below the middle of the space between the two dorsals and is comparatively deep, its rays being equal to the eye; the pectoral extends to nearly below the origin of the second dorsal; the ventral arises beneath the hinder insertion of the pectoral and the outer lengthened ray reaches the base of the second anal ray.

Scales.—The scales on the head are fairly defined, but those on the sides of the snout and below the eye are more irregular with rough vertical spines; on the under side of the head the scales run together and form an even roughened area; the scales on the top of the head and on the temporal region though well defined have a scabrous appearance which marks them sharply from those of the body, the opercular scales are marked with smoother divergent striæ; each scale of the body bears about twelve slightly radiating ridges formed of imbricating spines and those of the lateral line are split down the middle.

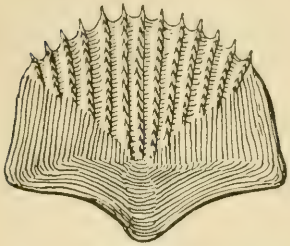

fig 1.
Scale of *Coelorhynchus australis.*
x 4.

Colours.—The general colour is a delicate grey, the body bears darker bands directed backwards, one in front of the first dorsal and another beneath the anterior rays of the second dorsal being best defined and persistent. A dark blue mark on the opercles is due to the presence of the black membrane beneath; the inner base of the pectoral is also black, the first dorsal and ventrals are grey, and a blue black line runs along the basal portions of the hinder half of the dorsal and anal fins, including the caudal.

Length.—416 mm. The largest specimen preserved measures 530 mm.

Hitherto this species has been considered as rare, but the trawling expeditions of 1900 and 1907 show that, on the contrary, it is quite common. It was probably taken along the greater part of the eastern seaboard, but, as above mentioned, it was not recognised as distinct from the next species, the list of stations being obtained from those preserved for future study.

Another species of *Coelorhynchus* was recorded from New Zealand seas by Günther under the name *C. parellelus*, but Jordan and Starks[11] consider that this may be distinct from the Japanese species, and propose to identify it as *C. kermadecus*.

CŒLORHYNCHUS ASPERCEPHALUS sp. nov.

Plate XXIX., fig. 2.

Stations (in part) 5, 22, 26, 35, 51, 58, 59, 63.

D. 12, 96; A. 87; V. 7; P. 16; L. lat. 136; L. tr. 8 + 20.

Length of head 5.2, height of body 6.8 in the length; diameter of eye 2.5, length of snout 3.5, and interorbital width 4.1 in the head.

(11) Jordan and Starks, Bull. U.S. Fish. Comm. xxii. 1904, p. 619.

Snout short and blunt, its margin obtuse from above, acute in profile, shorter than the eye, which latter equals the post orbital length: the front edge of the mouth lies beneath the posterior nostril, but the maxilla reaches to beneath the second third of the orbit: the gape is greater than its length; the barbel is short, less than half the diameter of the eye; the nostrils are as in *C. australis*, the rostro-infraorbital ridge is well marked and slightly sinuous, the nasal ridge is pronounced, terminating between the anterior borders of the orbits, the interorbital ridges are very faint, and are scarcely traceable beyond the hinder margin of the orbits.

Fins.—The dorsal commences at a point one and a third diameters behind the orbit, the first spine is short and the second is not quite so long as the second and third rays, which are longest and equal to the length of the head less the snout, the space between the two fins is small, equal to a third that of the base of the first fin; the rays of the second fin are very low, and the anterior ones lie in a groove: the anal arises below the narrow space between the two dorsals, and its middle and longest rays are slightly shorter than the eye: the pectoral extends to beneath the fourth ray of the second dorsal, the second ray of the ventral reaches the anal, but its first ray is a little longer, its hinder insertion is below the first dorsal spine.

Scales.—The head is everywhere roughened without distinct scales, the scales on the body are comparatively small, and those below the dorsal fin bear about 19 striæ, each formed of minute imbricate spines, the scales of the lateral line are split along the middle.

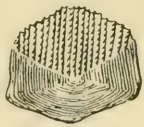

fig. 2.
Scale of *Coelorhynchus aspercephalus.*
x 4.

Colours.—The general colour is greyish-yellow with many darker grey cross bands, which incline forward below; the edges of the opercles and branchiostegals and many of the scales bear minute black dots: the distal half of the first dorsal fin and all the ventral rays, the tip of the first excepted, are clouded, the tint in the ventrals being deepened by the presence of black dots: a black band runs along the whole length of the anal fin midway between the tips and bases of the rays.

Length.—264 mm.

This species may be distinguished from *C. australis* by its short, obtuse snout, the absence of definite scales on the head, the short intradorsal space, the smaller and smoother scales, the different direction of the dark bands crossing the body, and the character of the anal band: the scaleless head also removes any suspected association with *C. fasciatus* Günther[12] the scales of the body also are much smaller with more numerous keels, and the distance between the dorsal fins is less. *C. fasciatus* was originally taken by the Challenger Expedition in from 40 to 245 fathoms off the east coast of the southern extremity of South America. It was next obtained in Cape Seas by Dr. Gilchrist, and Mr. McCulloch[13] has recently identified it from 800 fathoms off the coast of New South Wales. He refers to the mutilation of the tail of the type specimen: this condition is quite common among the Macruroids, and in some of our specimens the snout also exhibits similar mutilations.

MACRURONUS Günther, 1873.

MACRURONUS NOVÆ-ZELANDIÆ Hector.

Plate XXX., fig. 1.

Coryphaenoides novae-zelandiae Hector, T.N.Z.I. iii., 1871, p. 136, pl. xviii., fig. 1.
Macruronus novae-zealandiae Günther, Rep. Voy. Chall. i., 1880, p. 22, and xxii., 1887, p. 157.

Stations 20, 76, 77, 78, 81, 86, 87.

B. vii.; D. 12, 96; A. 89; V. 8; P. 16; L. lat. 182; Sc. tr. 8-16.

Length of head 5.6, height of body 7.5, in the length; diameter of eye 3.5, interorbital space 5.1, length of snout 3.4 in the head.

Head compressed, interorbital space flat, mouth large, lower jaw projecting, the maxilla reaches to below the middle of the eye; no barbel.

The body is strongly compressed, and tapers evenly to the end of the tail.

Teeth.—The teeth in the upper jaw are in two series, the inner one with small regular teeth, the outer teeth large and somewhat uneven, a single series of large teeth in the lower jaw, a band of small teeth on the vomer.

Fins.—The dorsal fin begins wholly behind the base of the pectoral, its first ray is the longest, one-half greater than the diameter of the eye: the ventral is placed slightly in advance of the point midway between the end of the snout and the

(12) Günther Chall. Rep. xxii. 1887, p. 129, pl. xxviii. fig. A.
(13) Mc. Culloch, Rec. Aust. Mus. vi. 1907, p. 348.

origin of the anal, and a little in advance of the vertical of the insertion of the dorsal, its length is half that of the head: the pectoral, which is rather longer than the ventral, extends to below the origin of the dorsal: the anterior rays of the anal form a lobe nearly as high as the first dorsal, but generally the rays are lower than those of the second dorsal fin.

Scales.—Sub-circular and cycloid, no trace of spines as mentioned by Hutton. The lateral line arises high, above the opercle, and dips to the mid line above the origin of the anal fin.

Length.—513 mm.

A specimen taken in the Bay of Plenty, shows that it attains to at least 935 mm.: this large specimen was secured by Mr. T. Anderton, after I left the trawler.

Colours.—General colour deep iridescent purple, the fins smoky; the lower part of the body silvery.

Examples of *Clupea neopilchardus* were taken from the stomachs of some of the specimens.

A single specimen was obtained north of Port Chalmers in 20-22 fathoms; the species was several times trawled between Castle Point and Gisborne, in the North Island. As suggested by Günther, it does not appear to live in the deeper water, none of our records being more than 28 fathoms, the minimum being 16 fathoms, while it is recorded to have been cast up in numbers in Cook Strait after heavy gales.

In their synopsis of the family *Macrouridae* Goode and Bean[14] use as one of the distinguishing characters between *Macruronus* and *Steindachneria* the absence or presence respectively, of vomerine teeth. As above described vomerine teeth exist in the specimens of *Macruronus* examined by me: the forward position of the vertical fins, the anal especially, easily characterises *Steindachneria argentea*, at last specifically.

Günther draws attention to a mistake in the original illustration, writing:—"Some misunderstanding by the artist must have occurred, as, at any rate, the bifid barbel could not be at the place where he has drawn it." This figure was copied in outline in the "Cat. Fish. N.Z.," [15] and an enlarged copy of the latter was published by Goode and Bean.[16] The tail of the original specimen was evidently incomplete.

(14) Goode and Bean, Oceanic Ichth. 1895 p. 390.
(15) Hector, Cat. Fish N.Z., 1872, pl. viii., fig 79.
(16) Goode and Bean, Oceanic Ichth. 1895, pl. ci, fig. 150.

Family GADIDÆ.

MERLUCCIUS Rafinesque, 1810.

Merluccius gayi Guichenot.

Hake, Whiting.

Plate XXX., fig. 2.

Merlus gayi Guichenot, in Gay, Hist. Nat. Chili, Zool. ii., 1847, p. 328, pl. viii., fig. 2.
Gadus australis Hutton, Cat. Fish, N.Z., 1872, p. 45, pl. vii., fig. 72.

Station 11.

D. 11, 36; A. 36; V. 7; P. 13; C. 24 + 10; L. lat., 169; Sc. tr. 20 + 38.

Length of head 3.3, height of body and length of caudal 5.0 in the total. Diameter of eye 7.4, length of snout 2.9, and interorbital space 3.6 in the length of the head.

Head very large and pike-like, the posterior border of the eye is exactly in the middle of its length: the interorbital space is lowly convex, with three parallel ridges; the nostrils are less widely separated than the orbits, the anterior one is very small, and is separated from the much larger posterior one by a thin septum; mouth very large, the maxilla reaching to the hinder border of the eye.

Teeth.—Large depressible teeth in two rows in the jaws, strong teeth also on the palatines, none on the vomer or the tongue.

Fins.—The first dorsal fin begins an eye-diameter in arrear of the opercular margin, and its third or longest ray is 2.5 in the head, the second fin is notched, but not very deeply, its median rays being one-half longer than the eye; the anal commences beneath the third ray of the second dorsal, and its notch is much deeper, being less than the diameter of the eye, and occurring posterior to the notch of the dorsal; the two fins end on nearly the same vertical: the pectoral is inserted beneath the angle of the opercle and extends to the vent; its length is 1.5 in the head: the ventral arises wholly in advance of the pectoral, and is nearly half the length of the head; the caudal is small, and its rays terminate evenly.

Scales.—The scales on the top of the snout and head and on the cheeks and opercles are very small, those of the body larger;

the lateral line is extremely pronounced and is gently bowed over the pectoral.

Colours.—General colour purplish-brown above, silvery beneath, inside of mouth and the caudal rays dark grey.

Length.—650 mm.

The only example taken during the whole cruise of the trawler, was obtained at Station 11, at the mouth of the Clutha River in 10 fathoms. Hector mentions that he obtained a specimen in Bruce Bay, on the West Coast, in 1866. Since that time, according to Hutton, it has been thrown up from Cook Strait.

Large specimens are very rarely seen in the Christchurch market, and though examples over three feet in length have been reported to me, the largest I have measured totalled two feet nine inches (840 mm.). Small specimens, twelve inches or so in length, are common, and are sold under the name of whiting.

In the official report of the trawling expedition, the above record is entered under "Hake (*Lotella rhacinus*"). In the report of the operations under the extended charter a similar entry occurs under Stations 125, 129 (in Karamea Bight, on the West Coast of the South Island), 155 (between Golden Bay and Tasman Bay, South Island), and 210 (near the Kaipara Entrance, West Coast, North Island), but whether these records, made by a different observer, refer to *Merluccius* or *Physiculus,* I am unable to say.

PHYSICULUS Kaup, 1858.

Physiculus bachus Forster.

Red Cod.

Plate XXXI., fig. 1.

Gadus bachus Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 53.

Stations 6, 9, 10, 11, 12, 13, 15, 16, 17, 18, 20, 21, 22, 23, 27, 28, 29. 31, 32, 33, 34, 35, 36, 39, 40, 41, 42, 43, 44, 46, 50, 51, 52, 53, 57, 61, 63, 72, 75, 76, 77, 78, 80, 81, 83, 85, 86, 87, 95.

B. vii.; D. 10, 42; A. 40; V. 5; P. 23; C. 21 + 12. Vert. 16 + 28 = 44.

Length of head 3.7, height of body 4.3, length of caudal 4.7 in the length. Diameter of eye 4.6, interorbital space 3.0, and length of snout 3.6 in the head.

Head rounded, snout depressed, mouth sub-horizontal, the maxilla extending to beneath the hinder edge of the orbit, upper jaw slightly the longer, eye large near to the upper profile, inter-orbital space broad and flat; gills four, a slit behind the fourth, gill-rakers moderate fourteen on the first arch, eleven being on the lower limb. A barbel below the chin.

Teeth.—Villiform teeth in bands in the jaws, none on the tongue vomer or palatines.

Scales.—Head and body entirely covered with small scales; lateral line well marked; it forms a long arch to below the middle of the second dorsal fin, thence straight to the caudal.

Colours.—In life the general hue is grey with a reddish tinge, with iridescent bluish lines above and pinkish beneath: the dorsal fins are reddish-grey tipped with black, a blood-red mark towards the edge of the first fin: a large black blotch on the body behind the operculum, including the upper base of the pectoral, more extensive on its inner side; pectoral and anal red, without markings; caudal red edged with black. On removal from the water the grey colour speedily gives place to a uniform red, hence the vernacular name.

Length.—372 mm.

The stomachs of specimens examined yielded remains of crustaceans, also of the fishes *Argentina elongata* and *Caranx trachurus.* This species commonly harbours the crustacean *Chondracanthus lotellae* Thomson, of which it is the type host, and, as previously mentioned (p. 134) it is frequently attacked by the Blind Eel (*Eptatretus cirrhatus*) exhibiting large wounds in its sides as a result.

The red cod was taken very generally throughout the cruise, but much more plentifully and uniformly so at the southern stations; the largest number of individuals netted at single Stations is as follows:—

Stations	9	10	11	15	20	21	27	36	39
Specimens	141	750	484	175	204	217	270	115	300

Two hundred examples were also taken at each of Stations 77 and 81, both south of Hawke Bay. The vertical range was from 9 to 102 fathoms.

This is one of the commonest of the New Zealand food fishes, but, unfortunately, it does not find much favour as a market species, and I am told that the trawlers return large quantities to the water, these, having been subjected to the pressure of the net, if not actually dead, never recover, even if, for the time being, they escape their natural enemies.

AUCHENOCEROS Günther, 1889.

Auchenoceros punctatus Hutton.

Plate XXXI., fig. 2.

Calloptilum punctatum Hutton T.N.Z.I. v., 1873, p. 267, pl. xi., fig. 76.
Auchenoceros punctatus Günther, Rep. Chall. xxxi., 1889, p. 26, pl. iii., fig. c.

Stations 40, 41, 46, 86, 87.

B. vii.; D. 1 + 13 + 17 + 33; A. 68; P. 19; V. 2; C. 18 + 14; Vert. 10 + 37 = 47.

Length of head 5.1, height of body 4.7, length of caudal 5.6 in the length; diameter of eye 3.7, interorbital space 5.5, and length of snout 3.7 in the head.

Head and body strongly compressed, mouth oblique, jaws equal, gills four, a slit behind the fourth, pseudobranchiæ present, gill membranes free from the isthmus, which is narrow.

Teeth.—Villiform teeth in the jaws, none on vomer, palatines or tongue.

Fins.—First dorsal ray hairlike, placed over the root of the pectoral and a little shorter than the head; the second dorsal begins above the extreme tip of the pectoral or nearly twice the length of the head from the snout, the intermediate rays are very short to the seventeenth, whence they rise to form the third portion of the fin, the hinder part of which is elevated: the anal fin commences below the point midway between the first and second dorsal fins and terminates evenly with the dorsal, near to the caudal rays: the ventrals are equal to the head in length, the pectorals being somewhat shorter: the caudal peduncle is very slender, its depth being less than the diameter of the eye.

Scales.—Cheeks and opercles scaly, the scales are extremely deciduous, the number on the body, as indicated by the pits, being nineteen in the transverse, and ninety in the longitudinal series.

Colours.—Pink, a black spot within the upper angle of the opercle and a broad yellow band along the whole course of the lateral line.

Length.—157 mm.

As above indicated, two illustrations of the species have been published, the outline figure by Hutton does not show the intermediary dorsal rays, while the pectoral is represented as emerging from beneath the gill cover, whereas it has a very pronounced fleshy base: the ventral is too short, and is represented as originating on the mid-line, while a non-existent ray is shown in front of the vent. Günther's figure is more nearly accurate, but the pectoral is represented as rather too high, and as overlapping the second dorsal. The middle rays of the dorsal are indicated as without membrane, and the elevation of the hinder portion of the fin is not shown, though included in Hutton's figure. When the mouth is closed the lower jaw does not project as stated. In his generic diagnosis he writes "Pseudobranchiæ none"; this is incorrect, for, though small, they are distinctly present.

This species was taken between Timaru and Lyttelton and again off Gisborne, at depths between 9½ and 35 fathoms. Many specimens were obtained, the largest of which is described.

ALLOTRIOGNATHI.

Family LAMPRIDÆ.

LAMPRIS Retzius, 1799.

Lampris pelagicus Gunnerus.

Opah.

Scomber pelagicus Gunnerus, Dronth. Selsk. Skr. iv., 1768, p. 80, pl. xii., fig. 1.

In the introduction (p. 53), I have given evidence that several examples of this fish were cast up on to the beach at Topenga Bay, on the northern coast of the Chatham Islands. I have there used the name *Lampris retsius*, but from a paper by Lönnberg[17], which has just come to my hand, I find that this author claims priority for Gunnerus, writing as follows:—"Although *Lampris* is a benthopelagic fish which has its home in the warmer parts of the Atlantic, it is not unknown along the Scandinavian coasts, being, in fact, for the first time after the introduction of the binomenclature named *Scomber pelagicus* by the Norwegian bishop Gunnerus (1768)."

(17) Lönnberg, Annuaire Mus. St. Petersb. 1900, p. 242.

BERYCOMORPHI.

Family BERYCIDÆ.

PARATRACHICHTHYS Waite, 1899.

Paratrachichthys trailli Hutton.

Trachichthys trailli Hutton, T.N.Z.I. viii. 1876, p. 212. Günther Chall. Rep. xxii., 1887, p. 23, pl. lv., fig. A.

Paratrachichthys trailli Waite, Mem. Aust. Mus. iv., 1899, p. 65.

Station 77.

B. viii.; D. v. 13; A. iii. 10; V. i. 6; P. 13; C. 19 + 15.

Five examples of this species were taken at Station 77, this being the only occasion on which the fish was secured. The position was about five miles off the mouth of the Aohanga River, between Castle Point and Cape Turnagain, south of Hawke Bay. The depth was 20 to 23 fathoms and the bottom sand and mud. The largest specimen secured measures 212 mm. in length, and the life colours are very striking, the body being purple and all the fins red.

Reporting on the only specimen taken by the "Thetis" expedition, I mentioned that it differed from the description of the type by having thirteen in place of eleven abdominal scutes. Günther, who also found the scutes to number eleven, had three examples, but strangely only notes the anal peculiarity in one specimen, writing:—"The specimen from Otago shows a very extraordinary and probably abnormal position of the vent, which is placed between the ventral fins." The series to hand enables me to ascertain that the number of abdominal scutes is variable; of six specimens examined, including one taken off Wellington, I find the following characters:—One has ten scutes only, one has twelve and four have thirteen, also three specimens only possess the two anterior spines mentioned in my notice of the New South Wales specimen.

A second species of the genus (*P. prosthemius*) Jordan and Fowler[18] has been described from Japan.

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(18) Jordan and Fowler, Proc. U.S. Nat. Mus. xxvi. 1902, p. 9, fig. 1.

ZEOMORPHI.

Family ZEIDÆ.

The New Zealand representatives of the family may be thus distinguished:—

a. Bony plates at base of vertical fins..	ZEINÆ. *Zeus faber.*
aa. No bony plates at base of vertical fins	CYTTINÆ.
b. Body longer than deep.	
c. Two dorsal fins.	
d. Ventrals receivable into a sheath	*Cyttus.*
e. First dorsal filamentous ..	*australis.*
ee. First dorsal not filamentous	*novae-zealandiae.*
dd. Ventrals not receivable into a sheath	*Capromimus.*
cc. One dorsal fin	*Diretmus.*
bb. Body deeper than long.. ..	*Rhombocyttus.*

ZEUS Linnæus, 1758.

ZEUS FABER Linnæus.

JOHN DORY.

Zeus faber Linnæus, Syst. Nat. ed. x., 1758, p. 137.
Zeus australis Richardson, Voy. Ereb. and Terr., 1845, p. 36, pl. xxv., fig. 1.

Stations 89, 90, 91, 92, 93, 94, 95, 96.

B. vii.; D. x. 24; A. iv. 22; V. i. 7; P. 14; C. 13 + 11; Sc. 81; L. lat. 114; L. tr. 15 + 108.

Length of head 2.45, height of body 1.78, length of caudal 4.0 in the total; diameter of eye 3.84, interorbital space 6.61 in the head.

Body oval, strongly compressed, head deeper than long, the profiles meeting at the snout form a right angle: the eye is moderate, longer than deep, and placed high in the head, the space below it being three times its vertical diameter; the snout is nearly twice the length of the eye; the mouth is large and oblique, and can be considerably protracted; the maxilla is twice and the dentary twice and a half the diameter of the eye, the latter is produced at the angle, and has a spine above it; the lower jaw projects well beyond the upper.

The nostrils are placed immediately in front of and on a level with the axis of the eye, the anterior one is directed forward, the hinder one, which is much larger, being placed laterally; gill openings extremely large, gills four, no opening behind the last; gill-rakers short and stout, twelve on the first arch, eight of which are on the lower limb: pseudobranchiæ present: edge of preopercle long, oblique, and feebly curved.

Teeth.—A band of small teeth in each jaw and on the vomer, all directed backwards.

Fins.—The dorsal commences above the angle of the preopercle, which lies about one-third of the distance between the snout and the end of the caudal rays; the spines are long and slender and markedly heteracanth; in all but the last the membrane is filamentous; the first spine is a little shorter than the second, which is the longest and slightly less than twice the length of the head; the rays are shortest anteriorly, and the longest ones are equal to the diameter of the eye; the anal commences beneath the fifth or sixth dorsal spine, the rays of both fins being similar; the pectoral is short, the third or longest ray being one-fifth longer than the head: the ventral is inserted in advance of the pectoral; the spine is as long as the longest pectoral ray, and its second, or longest, ray is twice the length of the spine, and extends to beyond the vent: the caudal is truncate, and the depth of the peduncle equals its length.

Scales.—There are some deeply imbedded scales on the cheeks, otherwise the head is naked: the scales on the body are smooth and small, becoming a little larger towards the hinder vertical fins. There are eight bony plates at the base of the soft dorsal each bears a strong backwardly directed spine and also, the first excepted, a smaller one below the principal one; there are seven bony plates at the base of the soft anal, each bearing two spines, there are no plates at the base of the spinous portion of the fins, but the bases of the spines themselves have a laterally directed spine, the first of each fin respectively excepted; there are seven plates on the mid-line in advance of the ventral fins, each with a pair of spines, and eleven similar spinous plates between the ventral and the anal; the first two plates have each a single spine medially situated. The lateral line arises above the opercle, thence descends in an irregular curve to the mid-line of the body, whence it runs to the base of the caudal rays.

Colours.—Dark brown above, lighter beneath. A large ocellated spot in the middle of the side, an eye diameter behind the opercle, it consists of a light coloured ring, enclosing a black area which contains an irregular and varying light-coloured figure; the filamentous rays of the dorsal black; the distal portions of the ventral and spinous anal dark brown, otherwise the fins are colourless.

Length.—364 mm.

The dory was trawled at the final eight consecutive Stations, all charted in the Bay of Plenty, and it was taken nowhere else during the first cruise: the depths ranged from 16 to 94 fathoms. In New Zealand it proves to be a northern species, and is not uncommon in the Auckland district. One hundred and sixty examples were taken at one haul in 30 fathoms in the Hauraki Gulf during the extended cruise of the trawler. I have no record of the Dory having been seen south of Cook Strait; the trawler "Doto" obtained examples in 1900, in Tasman Bay, which, though in the South Island, is northward of Wellington.

CYTTUS Günther, 1860.

CYTTUS NOVÆ-ZEALANDIÆ Arthur.

SILVER DORY.

Plate XXXII.

Zeus novae-zealandiae Arthur, T.N.Z.I. xvii., 1885, p. 163, pl. xiv. fig. 3.
Cyttus novae-zelandiae Gill, Mem. Nat. Acad. Sci. Phil. vi., 1893, p. 115.

Stations 22, 26, 67, 70, 83, 84, 85, 88, 89, 90, 91, 92, 93.

B. vii.; D. vii. 29; A. ii., 31; V. i. 6; P. 11; C. 13 + 4; L. lat. 76; L. tr. 10 + 52; Vert. 12 + 19 = 31.

Length of head 2.73, height of body 1.62, length of caudal 4.4 in the total; diameter of eye 2.77, interorbital space 3.81 in the head.

The head is deep; its upper and lower profiles are straight and meet in a slightly obtuse angle: the interorbital area is raised, due to the posterior process of the premaxilla whose tip lies in a V-shaped groove formed by the divergence of the supraoccipital above the middle of the eye: the eye is large, high in the head, the space below it being equal to twice its vertical diameter; the snout equals the length of the eye; the mouth is moderate and sub-vertical, it can be protracted to thrice the length of the snout: the nostrils lie close together in front of the eye, the anterior one is small, the other larger and vertically oval: the maxilla is one-fourth longer than the diameter of the eye, and is narrowed distally: the lower jaw projects, the mandible is twice as long as the eye, and is produced at its lower angle; gill openings very large, gills three and a half, no opening behind the last: gill-rakers moderate, fifteen on the first arch, pseudobranchiæ small, edge of preopercle long and oblique, opercular bones thin.

Body short, deep, elevated and compressed, forming, with the head, a rhomboid; the anterior profile, from the snout to the dorsal spines straight, the posterior one, from the anal spines to the caudal peduncle nearly so; the upper posterior and the lower anterior profiles curved, especially the latter, the edge of which, though narrow is flat, and almost uniformly so.

Teeth.—The teeth are minute, in a single row in each jaw, a small patch on the vomer.

Fins.—The dorsal commences slightly in advance of a point midway between the end of the snout and the root of the caudal peduncle: the spines are short and slender, the first being minute, the second is the highest, being slightly longer than the eye: the others regularly decrease in height; they do not terminate in filaments: the rays are short anteriorly, and increase to behind the middle of the fin, where they are highest: the two anal spines are very short and curved, and are situated beneath the last dorsal spine; the soft rays are similar to those of the dorsal, but the base of the fin extends a little further posteriorly: the pectoral is short, its third or longest ray being one-seventh longer than the eye, its margin is rounded and its base narrow: the ventrals are inserted behind the pectorals, and can be received into a deep groove which extends from their base to that of the first anal spine: the ventral spine is straight and weak, its length slightly more than the diameter of the eye, its rays are longer: caudal slightly emarginate, its peduncle narrow, and half the length of the fin.

Scales.—All the scales are cycloid, those above being slightly roughened, they are strongly adherent, and the exposed portion is four times as deep as broad, the scales on the head are confined to the cheeks, which are deep and triangular; the bases of the vertical fins are sheathed in two rows of enlarged scales, but there are no bony plates. The lateral line arises abruptly above the opercle thence curves backwards, but does not run quite concurrently with the back, its hinder half being slightly concave above.

Colours.—Silvery, upper portion from eye to caudal brown, membrane of dorsal spines, distal half of ventral rays and end of caudal black: all other fins colourless.

Length.—202 mm.

Evidently an inhabitant of moderately deep water, this species was taken between the extremes of 30 or 40 and 94 fathoms, and probably occurs at greater depths. It was taken on two occasions off the South Island, namely, between Otago Harbour and Oamaru. It is to be remarked that it was not again encountered until Hawke Bay, in the North Island, was reached, when it was taken at both hauls made in the Bay. It was again taken at the deepest of the three Stations charted south of Gisborne, and at nearly every essay in the Bay of Plenty. It was also secured at the Chatham Islands, being taken at both sides of the island.

The known distribution of this species is now considerably extended, the original examples having been taken off Otago, and I have not met with reference to the fish since it was first recorded.

It is somewhat surprising that *Cyttus australis* Richardson,[19] was not once netted, both Hutton and Hector[20] mention it as having occurred on the shore of Cook Strait after heavy gales, in November, 1871.

CAPROMIMUS Gill, 1893.

Capromimus abreviatus Hector.

Plate XXXIII.

Platystethus abbreviatus Hector, T.N.Z.I. vii., 1875, p. 247, pl. xi., fig. 31c.
Cyttus abbreviatus Hector, *loc. cit.* ix., 1877, p. 465. Günther, Chall. Rep. xxii., 1887, p. 42, pl. x., fig. B.
Antigonia mulleri Klunzinger, Sitz. Akad. Wiss. Wien, lxxx., 1880, p. 380, pl. v., fig. 3.
Capromimus abbreviatus Gill, Mem. Nat. Sci. Phil. vi., 1893, p. 115.

Stations 83, 84. 88.

B. vii.; D. vii. 27; A. ii. 28; V. i. 6; P. 16; C. 11 + 4 + iv. Sc. 63; L. lat. 69; L. tr. 7 + 22; Vert. 11 + 20 = 31.

Length of head 2.48, height of body 1.63, length of caudal 3.94 in the total: diameter of eye 2.25, interorbital space 2.7 in the head.

The head is deeper than long, the profiles meeting at the snout form a right angle. Eye very large and round, the space below it equal to its diameter, the snout is one-third shorter

(19) Richardson, Voy. Ereb. and Terr. 1848, p. 136.
(20) Fishes of N.Z., 1872, pp. 19, 112.

than the eye; the mouth is moderate and oblique, it can be protracted to twice the length of the snout; the maxilla is one-fifth longer than the eye; the jaws are equal; the mandible is one-half longer than the eye, and is produced into a spine below; the posterior nostril is a vertical slit close to the front edge of the orbit; the anterior nostril is in a tube directed forwards: gill openings moderately large, gills three and a half, a slit behind the last; gill-rakers small, fifteen on the first arch; pseudobranchiæ present; edge of preopercle short and rounded.

Body short, deep, elevated and compressed, forming, with the head, almost a rhombus, the upper posterior and lower anterior edges being the further apart; anterior profile straight, except where broken by the tumidity in front of the eyes: lower hinder profile from the anal spine upwards, nearly straight; lower edge of body broad and flat.

Teeth.—The teeth are minute and form a narrow band in each jaw: there is also a small patch on the vomer.

Fins.—The dorsal fin commences a little behind a point midway between the end of the snout and the root of the caudal peduncle; the spines are stout, the second, and longest, especially so; its length is one-fourth greater than the diameter of the eye, and when depressed reaches to the base of the sixth ray; with the exception of the first, which is short and equal to the seventh, or one-third the diameter of the eye, the spines are graduated backwards, they are free for about one-third their length, but in the second the membrane extends but half way up: the rays are short anteriorly, and are graduated to about the eighteenth whence they become shorter, the longest is a little less than the diameter of the eye; they are simple as are also those of the anal and pectoral: the first anal spine is stout and dagger-like, and is one-half the diameter of the eye; the second is short and weak; the rays are similar to those of the dorsal but extend a little further back: the vertical fins lie in a broad and deep groove bounded by the spiny scales of the sheath: the pectorals are short and rounded, the seventh, or longest ray being three-fourths the diameter of the eye; the ventrals are widely separated and have a lateral aspect, they cannot be received into a groove, the spine is strong, one-sixth longer than the eye, and extends to the first anal ray; the rays are slightly longer; the caudal is truncate, and has two sharp spines at the base of the rays, above and below; the peduncle is slender, twice as long as deep.

Scales.—The scales are cycloid but rough, producing a harsh sensation to the touch; they are strongly adherent and the exposed portion is four times as deep as wide, the head is naked with the exception of the cheeks; the scales which form the sheaths of the vertical fins are enlarged, and bear each about six spines, of which the first is the largest. There are twenty-six spinous scales at the base of the dorsal, the first commencing with the fourth spine, and seventeen at the base of the anal. The lateral line rises from the upper angle of the opercle, thence follows the line of the back.

Colours.—The general colour is silvery, and the body is strikingly marked as follows:—A broad purplish band arises behind the eye, follows near to the curve of the back, and deepening to black passes in advance of the caudal peduncle, thence half way towards the ventral; this band is sometimes broken at its hindermost point. A black crescent, widening below, passes from above the base of the pectoral, behind the fin, to a position in advance of the ventral; there is also a black spot above the insertion of the last ventral ray and a brown band at the base of the caudal; all the fins are colourless.

Length.—84 mm.

This pretty little fish was first made known from a specimen obtained by the Challenger Expedition in 400 fathoms off Cape Farewell. It is surprising that we secured it at all, seeing that the greatest depth reached was, with a single unanticipated exception, 105 fathoms; it was however taken at this depth, recorded in the Bay of Plenty: it was likewise secured at both hauls made in Hawke Bay, the depth ranging from 68 to 82 fathoms.

Under the name *Antigonia mulleri*, Klunzinger describes the species from New Zealand, but without indication of locality or depth.

HETEROSOMATA.

Family PLEURONECTIDÆ.

In his official report on the Expedition Mr. L. F. Ayson writes:—

"One of the reasons why the cruise was undertaken in the winter season was for the purpose of ascertaining the winter habitat of the flat-fish, as they generally disappear from the in-shore trawling-grounds during that season. The general opinion of fishermen is that they either go out to deep water or migrate to off-shore banks which were supposed to exist. The result of the work done during this cruise would seem to negative both theories, as no flat-fish of any value were obtained beyond the depths at which they were taken at other seasons, and no off-shore banks were found to exist within the 100-fathom line, and beyond that all the soundings taken showed a sudden drop down to great depths. It is probable that the disappearance of flounders and soles off the known fishing grounds at certain seasons is due to weather and temperature conditions and spawning habits, and, like the soles and plaice in the Northern Hemisphere, they partly bury themselves in the sand on the bottom. In this way the trawl net would pass over them.''

This quotation will indicate that in New Zealand, as elsewhere, the flatfishes are accounted as of considerable commercial importance, and the writer of the paragraph has asked me to pay special attention to the group with the object of ascertaining what species are really referred to under the common names applied by fishermen, dealers and the public generally. Mr. Thomas Anderton, Director of the Portobello marine fish hatchery, has also made a similar suggestion, remarking that as the Government is importing European flounders it will be well to have a reliable guide to native species, so as to prevent confusion in the future.

It has not been found possible to do this as thoroughly as could be wished, for there are several species recorded from our waters which were not taken by the trawler. This deficiency has, to a certain extent, been minimised by both the gentlemen named, they having forwarded specimens to me from districts accessible to them. I have also to thank the President and Council of the Canterbury Acclimatisation Society for granting me facilities for acquiring specimens and also the rangers of the Society, Messrs. David Hope and William Cobeldick for procuring specimens from Lake Ellesmere in the Canterbury Province.

My efforts have been mainly directed towards ascertaining the number of species, their correct designation and the relationship they bear to one another, also in endeavouring to discover characters whereby the different kinds may be easily identified. It will however be evident that this is only a small portion of the investigation which should be carried on, and my experience leads me to think that no better work in the domain of fisheries could be undertaken by the Government than a proper investigation of the flatfishes of the waters of the Dominion.

Several trawlers regularly operate for the supply of fish to each of our principal centres, and I venture to think that the masters of the craft could obtain much valuable information with very little trouble. The distribution of good coloured illustrations supplemented with a little personal coaching would enable the men to correctly identify the different species taken. If any specimen was found which could not be thus identified, it should be tagged and at once forwarded to head quarters for examination. I would further suggest that a schedule be drawn up and copies placed in the hands of all the masters of trawlers with the request that it be filled up as regularly and carefully as the ship's log. It is not to be expected that all the trawling masters would comply with the request, but some useful information would certainly result. Among the more important subjects of inquiry we should endeavour to learn:—(1) The different kinds of flatfishes inhabiting the several localities, and the extent of the grounds peopled by each kind; (2) their relative abundance at different seasons; (3) their migrations and the reason for such, whether for breeding, or questions of food, temperature, etc.; (4) the nature of the food; (5) the spawning season; and (6) the development of the ova. The last named could be supplemented by observations made in the laboratory, and as we already possess such an institution in the Marine Biological Station, at Portobello, there is no reason why a very complete set of observations should not be made. These schedules would be regularly sent to those entrusted with the work, and the information being collated, our knowledge would in time be greatly extended. We should then be in a position to determine how best to improve our source of fish food, whether by working certain grounds at the best season or by artificial propagation, and by rearing and planting the young fry in localities known to be suitable for their further development.

A reading of the local literature relating to the flatfishes, together with information supplied by Christchurch fish dealers and others, indicates that the following names are in use for our commercial species. Black Flounder, Brill, Flounder, Grass Flounder, Greenback, Lemon Sole, Mahoa, Megrim, Patiki, Sand Flounder, Sole, Three corner, Tinplate, Turbot, Witch, and Yellow-belly.

As, however, it is improbable that this list is exhaustive, I shall be pleased to receive communications on the subject, but must ask any correspondent to forward the specimen to which he refers, as otherwise no absolute decision can be given.

The trivial nomenclature is very involved; a certain species may be known by several common names, and, on the other hand, a given name may be applied to two or more species, thus Flounder, Sand Flounder, Three corner and Tinplate are names all applied to *Rhombosolea plebeia.* The name Brill has been used to designate *Caulopsetta scapha* and *Ammotretis guntheri.* Some of the names are only found in books and seem never to have been current among the fishing community or the public. It is probable that the names in use vary in different districts, as in Britain, an undesirable condition, but one somewhat difficult to remedy. No law except that of usage can operate in respect to common names, and all one can do is to adopt that most in common use, and attempt to fix it by means of publications, the more popular the better, and supplemented by effective, good coloured illustrations. If such were displayed on the trawlers and at the fish markets the attendant names would soon be in use, and I venture to think that uniformity of nomenclature would be in time secured.

Though the common names suggested appear in the following account under their respective scientific headings, it will be advisable to give some indication of their synonomy as follows:—

Suggested name.	Other names.	Scientific name.
Black Flounder	Patiki	*Rhombosolea retiaria*
Brill	Turbot	*Ammotretis guntheri*
Greenback Flounder	Grass Flounder	*Rhombosolea tapirina*
Lemon Sole	*Ammotretis rostratus*	*Pelotretis flavilatus*
Megrim	Brill, Mahoa, Witch	*Caulopsetta scapha*
Sand Flounder	New Zealand Flounder, Patiki, Three corner, Tinplate	*Rhombosolea plebeia*
Sole	English Sole	*Peltorhamphus novae zeelandiae*
Turbot	*Ammotretis rostratus*	*Ammotretis nudipinnis*
Yellow-belly	*Rhombosolea flesoides*, *Rhombosolea leporina*	*Rhombosolea millari*

It is to be understood that in no case have I transferred any name from one species to another. To give an example: the name Brill appears to have been first used by Dr. Hector,[21] who writes: "It has been termed Brill on account of its being the only one of our flatfish with the eyes on the left side of the head (*Pseudorhombus scaphus*) ; it is of small size and is so full of bones that it cannot be eaten with any comfort."

The fish indicated by this book name is commonly called Megrim or Witch, while the name Brill is freely used in connection with *Ammotretis guntheri,* it is therefore here associated with this large and prime edible species.

It might be argued that because the British Brill is a left-sided fish it is wrong to apply the name to a right-sided species in New Zealand; one cannot force names upon the public, but if two or more names are in use for the same species we are justified in attempting to secure uniformity of nomenclature within the Dominion. "Turbot" is the only name I have so far met with applied to *Ammotretis nudipinnis*, and this fish also

(21) Hector, Edible Fish N.Z., 1872, p. 117.

is a right-sided species, whereas the British Turbot is left-sided, both are however good to eat, and "New Zealand Turbot" is by no means a bad name.

Owing, perhaps to the looseness with which these common names have been used, a considerable amount of misconception has arisen in respect to the scientific names also, thus the Lemon Sole has been generally identified with *Ammotretis rostratus*, a species which I have reason to believe is not found in New Zealand seas, but represented by an allied though undescribed species, *Ammotretis nudipinnis*. In any case the common Lemon Sole does not belong to the genus *Ammotretis* as previously supposed, a supposition which, probably taken as an axiom, left no ground for further research. As far as I am aware, therefore, this fish has never been described, and it will here be found under the name *Pelotretis flavilatus*.

This confusion of names may be very embarrassing to those who may not be specialists in taxonomy, but nevertheless undertake excellent work in connection with the life history, distribution, artificial propagation, diseases, and other subjects connected with our fisheries. It is difficult to give examples without appearing to be somewhat personal, but I trust that my remarks may be taken in the spirit in which they are intended.

Mr. Thomas Anderton, to whom I have before referred, and to whom I owe many courtesies, has written a very excellent account of the development of some of our marine fishes, but as the following quotation will indicate, he makes no pretence of dealing with the troublesome question of nomenclature, and indeed on this very account delayed the publication of his work for a whole year:—"Owing to the uncertainty as to the identity of the two species of Flounders which were taken in the harbour it was considered inadvisable in last year's report to publish an account of the eggs and larvæ until the species had been definitely ascertained. This has now been done by Professor Benham, and we are able to give a few particulars of each species."[22]

The species referred to are *Rhombosolea plebeia* and *R. tapirina*, which, if it be not presumption for me to say so, I have had the opportunity of verifying. On the previous page Mr. Anderton refers to "The Brill" remarking—"This fine fish appears to be only an occasional visitor; it is seldom taken on trawling grounds off Otago Heads, and only in small quantities. It is a very handsome fish, and is greatly esteemed as a table delicacy. Nothing is at present known of its habits and movements, but it is a fish deserving every possible attention." Mr. Anderton has used the name *Pseudorhombus scaphus*

(22) Anderton, Trans. N.Z. Inst. xxxix. 1907, p. 480.

in connection with this fish, but it will be evident that this "fine handsome fish, deserving every possible attention" can not be the one to which Dr. Hector applied the same name under the remark, "it cannot be eaten with any comfort." When, however, the name Brill is applied to *Ammotretis guntheri* Mr. Anderton's statement becomes perfectly intelligible and apt. Instances of this character might be multiplied, but enough has been written to indicate that my statements as to the unsatisfactory condition of the nomenclature of the New Zealand Flatfishes are by no means uncalled for.

Thirteen species of flatfishes, assigned to seven genera, are now known to inhabit New Zealand coasts and rivers, one of which is believed to be confined to fresh or brackish water.

The full list is as follows:—

**Caulopsetta scapha* Forster.
Caulopsetta boops Hector.
Caulopsetta hectoris Günther.
Apsetta thompsoni Kyle.
Brachypleura novae-zeelandiae Günther.
**Pelotretis flavilatus* Waite.
**Ammotretis nudipinnis* Waite.
**Ammotretis guntheri* Hutton.
**Peltorhamphus novae-zeelandiae* Günther.
**Rhombosolea plebeia* Richardson.
Rhombosolea tapirina Günther.
**Rhombosolea millari* Waite.
Rhombosolea retiaria Hutton.

Of these, only seven were taken in the trawl, they are indicated by an *. For reasons already given, my study has not been confined to these seven species, but has embraced all those, which as far as I am aware, find a place in our markets. Two species of *Caulopsetta*, and the monotypic *Brachypleura* and *Apsetta* have not been recognised since first described, and not having specimens to hand, these do not appear in the report. As, however, a statement of their distinguishing features may be useful their characters are included in the following synopsis of genera:—

a. Eyes on the left side, two ventral fins
  b. ventrals separate from the anal, scales ctenoid .. .. *Caulopsetta.*
  bb. Left ventral connected with the anal, scales cycloid .. .. .. *Apsetta.*

aa. Eyes on the right side.
- c. Two ventral fins, scales wholly imbricate.
  - d. Ventrals separate from anal, scales cycloid .. .. .. *Brachypleura.*
  - dd. Right ventral connected with the anal, scales ctenoid.
    - e. Snout normal, dorsal fin commencing over the eye .. *Pelotretis.*
    - ee. Snout produced over the mouth, dorsal fin commencing at its tip.
      - f. Mouth visible from right side, pectoral short and rounded .. .. *Ammotretis.*
      - ff. Mouth concealed from right side by cutaneous extension of rostral process, pectoral long, upper ray produced .. *Peltorhamphus.*
- cc. Ventral fin single, connected with the anal, scales imbedded non-imbricate, at least anteriorly .. .. *Rhombosolea.*

Flatfishes are occasionally subject to reversal, that is, a right-sided Megrim or a left-sided Flounder may be found, but such are so very infrequent that the condition is worth recording when it does occur.

The dimensions recorded under each species are those of the specimens described and figured, and are taken from the end of the snout to the tip of the middle caudal rays. They are not necessarily those of the largest specimens seen. The colouration is described from preserved examples and is little guide to the fishes in life.

CAULOPSETTA Gill, 1893.

Caulopsetta scapha Forster.

MEGRIM.

Plate XXXIV.

Pleuronectes scapha Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 163.
Platessa? scapha Rich. in Dieffenbach, N.Z. ii., 1843, p. 222.
Pseudorhombus scaphus Hutton, Cat. Fish. N.Z., 1872, p. 51, pl. ix., fig. 82.

Caulopsetta scaphus Gill, Mem. Nat. Acad. Sci. vi., 1893, pp. 121, 124.

Stations 1, 2, 3, 5, 6, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 31, 32, 35, 36, 39, 40, 43, 46, 47, 48, 49, 50, 51, 54, 61, 63, 64, 65, 66, 67, 69, 70, 71, 74, 81, 86, 87, 89, 90 91, 92.

B. vii.; D. 117; A. 95; V. sin. 6, dex. 6; P. sin. 14, dex. 10; C. 14 + 4; L. lat. 85*; Vert. 12 + 35 = 47.

Length of head 4.1, height of body 2.2, length of caudal 5.5 in the length: eyes on the left side, lower eye one-fourth its length in advance of the upper, and 5.5 in the length of the head, snout longer than the eye: interorbital space a very narrow raised ridge, one-fourth the depth of the eye: nostrils in a depression in advance of the interorbital ridge: mouth nearly symmetrical with teeth on both sides, though less extensive on the left, the maxilla is 2.5 in the length of the head.

Fins.—The dorsal fin commences over the anterior nostril, the longest rays being one-fifth the height of the body, it extends to the base of the upper caudal ray: both ventrals distinct and free from the anal, the latter similar to the dorsal: the length of the left pectoral is 1.8 in that of the head, the right being smaller and shorter: caudal rounded, the peduncle about half the length of the fin.

Scales.—Ctenoid, imbricate, absent from the jaws and fore part of the head, but extending on to all the fin rays, the pectoral excepted. The lateral line forms a bold arch over the pectoral, the top of the arch being quite flat, the line thence passes evenly along the middle of the body: the scales of the lower side are nearly smooth and extend on to the fin rays of the caudal only; the lateral line is well developed and has a similar contour to that of the upper side.

Colours.—The upper surface, including the fins, is uniform greyish yellow, with minute irregularly disposed black spots; lower surface uniform yellow.

Length.—325 mm.

The commonest and most widely distributed of the flatfishes of New Zealand, and yet, unfortunately, the least valuable. It was taken from one end of the course to the other, and at all depths tested: it is a very thin species, and the long fine bones render it unsuited for table use. In the official reports it is entered as "Megrim *Ammotretis* sp. ind.," and in his report on the 1900 expedition Mr. Ayson wrote:—"This fish was found

*The scales are counted from the margin of the opercle.

at any depth, but generally present in the deepest water tested, and then frequently found in considerable numbers when no other flatfish were taken. The largest specimen taken measured 12½ inches. These fish are peculiarly transparent, flesh white and full of fine bones."

Two other species of the genus have been described, namely:—*C. boops* Hector and *C. hectoris* Günther, but they were not taken by the trawler. They were included in the collections of the Challenger Expedition, made in deep water, beyond the reach of payable trawling; moreover they are doubtless equally inedible with the Megrim.

RHOMBOSOLEA Günther, 1862.

Stations 7, 8, 10, 16, 32, 35, 40, 44, 45, 46, 51, 52, 61, 72, 76, 77, 96.

Owing to the unsatisfactory condition of our knowledge of the members of this genus it was not possible to identify the species as they were brought aboard, but an examination of the specimens preserved indicates that but two species were taken, namely, *R. plebeia* and *R. millari*. The specific stations at which each was secured cannot however be given.

A study of the literature and available specimens indicates that there are four species of *Rhombosolea* at present described from our waters, one of which, *R. millari*, is herein named for the first time. The following synopsis indicates their distinguishing characters:—

a. Body deep, 1.4 or more in the length, vertical fins elevated, shape rhomboidal, colour grey clouded .. .. *plebeia*.
aa. Body lower, 1.7 or less in the length, shape ovate.
  b. Anterior profiles straight, or nearly so, eyes large.
    c. Snout produced over the mouth, ventral inserted below the eye, colour green above, with dark blotches, pure white below .. .. *tapirina*.
    cc. Snout normal, ventral inserted behind the eye, colour grey, clouded; yellow below, uniform or with scattered black spots .. .. *millari*.
  bb. Anterior profiles rounded, eyes small, colour olive with red spots, dark beneath *retiaria*.

RHOMBOSOLEA PLEBEIA Richardson.

SAND FLOUNDER.

Plate XXXV.

Rhombus plebeius Rich. in Dieffenbach, ii., 1843, p. 222.

Rhombosolea monopus Günth., Cat. Fish. Brit. Mus. iv., 1862, p. 459. Hutton, Cat. Fish, N.Z., 1872, p. 51, and (Hect.) p. 117, pl. ix., fig. 83. Macl. P.L.S. N.S. Wales, vi., 1881, p. 129.

Bowenia novae-zealandiae Haast, T.N.Z.I. v., 1873, p. 277, pl. xvi.

Rhombosolea plebeia Gill, Mem. Acad. Sci. Phil. vi., 1893, p. 121.

B. vii.; D. 60; A. 43; V. 6; P. 11; C. 14 + 4; L. lat. 159; L. tr. 36 + 54; Vert. 10 + 18 = 28.

Length of head 3.3, height of body 1.3 in the length. Lower eye one-third in advance of the upper, diameter (orbital) 4.9 in the head; interorbital space smooth, less than the depth of the eye: snout a little shorter than the eye, anterior nostril of both sides with a skinny process behind, posterior nostrils simple.

Teeth.—In several rows in the jaws of the blind side only.

Fins.—The dorsal commences on the snout, but not quite at its tip, though in advance of the nostrils; the first ray is almost free, the following ones successively less so; the 28-31 rays are the longest, being 2.2 in the head: the distance of the insertion of the last ray from the base of the outer caudal ray is one-half the depth of the peduncle: ventral and anal continuous, the division corresponding to the absence of one or two rays, the vent occupying the position; the longest rays of the anal are at least equal to the dorsals and occur at the 12-15th: the pectoral of the coloured side is slightly the longer, being 1.8 in the head; it has a wider base, but is placed exactly opposite to its fellow: caudal large, its margin rounded, the peduncle one-half the length of the fin.

Scales.—Fore part of snout, interorbital space and mandible naked: scales cycloid, deeply imbedded and non-imbricate anteriorly, producing a honey-combed appearance. Lateral line feebly wavy above the pectoral, otherwise straight to the extremity of the tail, a branch is continued forward to the upper part of the head.

Colours.—Upper surface grey with clouded markings, fins dusky at the margins, lower surfaces colourless.

Length.—386 mm.

This is the commonest and best-known of the New Zealand flounders, occurring all round the coasts, in addition to being obtained in shallow water it was taken at a depth of 60 fathoms. It was not included in the catches made at the Chatham Islands.

Though commonly called Sand Flounder or Flounder simply, such names as Tinplate and Threecorner, applied by fishermen, indicate how the characteristic shape of the species is utilised as a ready means of identification.

Rhombosolea tapirina Günther.

Greenback Flounder.

Plate XXXVI.

Rhombosolea tapirina Günther, Cat. Fish. Brit. Mus. iv., 1862, p. 459. Hutton T.N.Z.I. vi., 1874, p. 106 (not *ib.* v., 1873, p. 268).

B. vi.; D. 67; A. 50; V. 6; P. dex. 12, sin. 11; C. 14 + 4; L. lat. 91; L. tr. 25 + 34.

Length of head 3.4, height of body 1.7, length of caudal 4.8 in the length. Lower eye very slightly in advance of the upper, 4.5 in the head, interorbital space very narrow, not half the vertical diameter of the eye; snout one-half longer than the eye produced into a fleshy process which overhangs the mouth: mouth small, only slightly more developed on the blind side. The anterior profiles of head and body are nearly straight, but the lower one is broken by the head, which depends below the profile.

Teeth.—Confined to the blind side; they are small and in several rows.

Fins.—The dorsal fin commences at the base of the rostral process, that is, nearly an eye diameter from the tip, and its three anterior rays are slightly split, the remainder being simple; the longest ones are 2.4 in the head: the ventral commences below the posterior third of the lower eye, and is continuous with the anal, which terminates evenly with the dorsal; the left pectoral is inserted exactly opposite to the right one but is a little shorter: the caudal is rounded and the depth of the peduncle is 1.9 in the length of the fin.

Colours.—Body and fins green above with black blotches, the anterior dorsal and anal rays lighter; wholly white below.

Length.—280 mm.

The only specimen of this species which I have seen was kindly sent to me by Mr. Anderton, who says that it occurs in Otago Harbour and other inlets in the vicinity down to about 15 fathoms. Hutton does not mention whence his specimen was obtained, Günther records examples from Australia, Tasmania and the Auckland Islands.

Rhombosolea millari sp. nov.

Yellow Belly.

Plate XXXVII.

Rhombosolea leporina Hutton, T.N.Z.I. v., 1873, p. 268, pl. xi. (not Günther).

Rhombosolea flesoides Hutton, *ib.* viii., 1876, p. 215. (not Günther).

B. vi.; D. 60; A. 40; V. 6; P. 12; C. 14 + 4; L. lat. 84; L. tr. 36 + 53; Vert. 12 + 20 = 32.

Length of head 3.1, height of body 1.8 in the length. Lower eye one-third in advance of the upper, orbital diameter 5.4 in the head, interorbital space smooth, equal to the depth of the eye: snout longer than the eye, anterior nostril of both sides with a skinny process behind, posterior nostrils with raised margins. The upper anterior profile is slightly bowed, the lower is straight.

Teeth.—The teeth are rather large, in several rows on the blind side only.

Fins.—The dorsal commences almost at the tip of the snout, the first ray is largely free and divided to its base, most of the rays are bifid, the posterior sixteen or so being simple. The 32-36 rays are equal and longest, being 2.5 in the head; the distance of the insertion of the last ray from the base of the outer caudal ray is 2.5 in the depth of the peduncle: ventral and anal continuous, the division corresponding to the absence of two rays, the vent occupying the position of the second one: the longest rays of the anal are slightly more than those of the dorsal, and occur at the 11-14th: the right pectoral is one-sixth longer than the left, being 2.0 in the head, the relative position of the two fins is the same: the caudal is 3.8 in the length, the margin is slightly rounded and the depth of the peduncle is one-half the length of the fin.

Scales.—As in *R. plebeia*, lateral line quite straight, with a branch continued forward to the margin above the middle of the orbit.

Colours.—Upper surface dark grey, with dusky markings, lower surface colourless or with scattered black spots.

Length.—442 mm.

This species was included in the collection made for me by Mr. J. J. Niven, in Hawke Bay. It was also forwarded by Mr. Anderton, who writes: "The Yellow-belly (*Rhombosolea flesoides*) is rare in Otago Harbour, it is common in Wycliffe Bay and Hooper's Inlet, but I have never known it to be taken by the trawlers outside the Heads."

On the other hand the species is tolerably well represented in our takings, but, as previously mentioned, I was not then in a position to identify the different members of the genus, which has proved to be a somewhat difficult task, an experience evidently also of previous workers on the group. The species is not referred to in the official report of the expedition, all records being entered as "Common Flounder (*Rhombosolea monopus*)."

In describing this prime food fish under a new name, I have been largely guided by a study of the description and figure published of Victorian specimens determined by me as *Rhombosolea flesoides*[23] with which species the New Zealand fish has been commonly associated.

It seems to differ in its non-overhanging and less free snout, its wider interorbital space, and its smaller number of fin rays, which are for the most part split; it differs notably in the more posterior insertion of the ventral fin and the non-imbricate scales, the arch in the lateral line above the pectoral also is less marked.

I have much pleasure in associating with this really valuable food fish the name of the Hon. J. A. Millar, Minister of Marine, by whose department the fisheries of the Dominion are controlled. He authorised the necessary expenditure for conducting the expedition, and it is due to the interest taken by him also, that it has been possible to publish the present report.

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(23) Waite, Rec. Aust. Mus., vi., 1906, p. 197, pl. xxxv. Having left Sydney before this paper was printed, and not being able, therefore, to correct the proofs, I take this opportunity of making the following corrections:—

Page 197, for "fenibriated" read fimbriated.

Pp. 204 and 205, for fig. 1 read fig. 2.

Plate xxxvi. (explanation of), interchange figs. 2 and 4, also figs. 6 and 7.

RHOMBOSOLEA RETIARIA Hutton.

BLACK FLOUNDER.

Plate XXXVIII.

Rhombosolea tapirina Hutton, Trans. N.Z. Inst. v., 1873, p. 268, pl. xii. (not Günther).
Rhombosolea retiaria Hutton, *ib.* vi., 1874, p. 107.

B. vi.; D. 60; A. 43; V. 6; P. dex. et sin. 11; C. 12 + 6; L. lat. 77; L. tr. 23 + 31; Vert 9 + 20 = 29.

Length of head 3.6, height of body 1.8, and length of caudal 4.4 in the length: diameter of eye 7.1, interorbital space 9.0, and length of snout 4.7 in the head.

Head rounded, snout short and blunt; eyes on the right side, small, the lower about one-third in advance of the upper; mouth small, much more developed on the blind side; the maxilla is short, and does not extend to below the eye: nostrils in a smooth area in front of the eye, the former with a low rim. Upper and lower anterior profiles markedly rounded.

Teeth.—On the blind side only; they are small and in several rows.

Fins.—The dorsal fin commences close to the tip of the snout, the anterior rays are split at their tips, and the longest ones are 2.4 in the head; ventral and anal continuous, the longest rays of both fins are equal to those of the dorsal, the rays are co-terminal on the caudal peduncle; the right pectoral is the longer and 1.9 in the head; the caudal is slightly rounded and the depth of its peduncle is 1.5 in its length.

Scales.—On the head and anterior two-thirds of the body the scales are small, imbedded, and rather widely separated, thence they become larger and more closely set and towards the tail are distinctly imbricate.

Colours.—Dark olive green with darker mottlings, and with brick-red spots. These spots vary in size from a mere dot to areas as large as a pea; they are also irregular as regards their distribution, and are even found on the snout and eye membranes. Membrane of fins lighter olive with dark markings: dorsal anal and caudal with red spots; these spots recall the markings on the British Plaice, but are much more numerous; the dorsal and anal are bright orange in their hinder portions, and the posterior part of the caudal is blood-red: pectoral with two irregular dark bars. The left side of the head is flesh-coloured, without or with only slight markings, in noticeable contrast to the remainder of the under side of the fish, which is yellowish olive, each scale edged with brown and suffusing the whole: the fins, the pectoral included, are almost as darkly coloured as on the upper side; in some specimens this colour is replaced with red.

Length.—314 mm.

This species was not taken by the trawler, but is included here for comparison with the other members of the genus, which as before stated, have been very vaguely described. I owe the specimens examined to Messrs. D. Hope and W. Cobeldick, Rangers for the Canterbury Acclimatisation Society, who have also kindly supplied me with the following information:—

This is regarded as a fresh-water flounder, and is also taken near the mouths of rivers, the chief source of supply in Canterbury being Lake Ellesmere, the fishes being caught where the rivers enter the lake, chiefly among the weeds. Here it is considered to be a winter fish, being very rarely obtained during the warmer months of the year, but the fishermen profess no idea as to where it migrates. The two specimens originally described were taken in the harbours of Wellington and the Bluff. Writing under the name *Rhombosolea monopus* (*R. plebeia*) Hutton[24] remarks: "A small flatfish, also called Patiki by the Maoris, is found in some of the rivers; it is brown, with red blotches on the upper side. I do not know whether it is identical with this species or not." This distinctly refers to the Black Flounder, which the Maoris on Banks Peninsula always speak of as "Patiki."

Once its characteristics are discerned this fish is readily distinguishable, its contour and the character of its snout well mark it as distinct from the Sand and the Greenback Flounders respectively, while the red spots on the body and the dark under side also serve to distinguish it from the Yellowbelly, it differs from the latter structurally, by its more rounded contour, blunter head, shorter snout, and smaller mouth and eyes.

It attains a length of 17½ inches (= 445 mm.), and a weight of 5 pounds, and as specimens of this size are, according to Mr. Cobeldick, 3 inches in thickness (= 76 mm.), the fish is a very fleshy one.

Owing to the enormous number of eels occurring in the lake, the flounders obtained are very commonly mutilated, a certain proportion having suffered the loss of portions of their fins and tails, while some exhibit much more extensive wounds.

(24) Hutton, Cat. Fish N.Z., 1872, p. 52.

AMMOTRETIS Günther, 1862.

Two species of this genus were taken, one of which is regarded as undescribed. The three known species may be thus distinguished:—

a. Ctenoid scales on both sides of body, dorsal and anal fin rays scaly .. .. *rostratus.*
aa. Ctenoid scales on right side of body only, no scales on dorsal or anal fin rays
 b. Rostral hook very long, interorbital space wide, body with large blotches .. *nudipinnis.*
 bb. Rostral hook small, interorbital space narrow, body with spots forming lines *guntheri.*

A. rostratus is an Australian and Tasmanian species. *A. nudipinnis* and *A. guntheri* are known only from New Zealand.

Ammotretis nudipinnis Waite.

TURBOT.

Plate XXXIX.

Ammotretis rostratus Hutton, T.N.Z.I. viii., p. 215 (not Günther).
Ammotretis nudipinnis Waite, Proc. N.Z. Inst., 1911, p. 50.

Station 80.

B. vii. D. 85; A. 60; V. dex. 7, sin. 4; P. dex. 11, sin. 12; C. 14 + 4; L. lat. 82; L. tr. 33 + 48.

Length of head 3.6, height of body 1.7, length of caudal 4.7, in the length, diameter of eye 9.2, length of snout 3.2 in the head.

The rostral hook is very long, extending downwards below the level of the maxilla, mouth large; lower lip with a fringe of ten rays on the right side. Eyes on the right side on the same level, interorbital space wide, equal to the longitudinal diameter of the eye: gill membranes not broadly united below, gill rakers short.

Teeth.—A broad band of small teeth in each jaw on the left side only.

Fins.—The dorsal rays commence at the tip of the rostral hook, the first five or six are free, the longest rays occur between the 36th and 46th, and, measured from the edge of the sheath on the right side, are contained three times in the head: the sheath is lower on the left side by an eye diameter, thus exposing a longer ray: the anal is similar to the dorsal and is coterminal with it, close to the outer caudal rays: the right ventral is very long, commencing at the tip of the proventral and connected with the anal; the base of the last ray of the left ventral is opposite to the vent: the pectorals are short and subacute, the right one is slightly the longer, measuring 2.1 in the length of the head: the caudal is of moderate length, acutely rounded; the peduncle is not an eye diameter in length, and its depth is 4.3 in that of the body.

Scales.—Strongly ctenoid on the right, smooth on the left side. The head is wholly scaly, with the exception of the snout on the right side; lateral line slightly arched over the pectoral and the circumorbital area, thence straight to the base of the caudal rays. No scales on the fin rays, the caudal excepted, in which the basal half of the rays are scaly.

Colours.—General colour above warm brown, reddish towards the margins of the body, irregularly blotched with dark brown. Under side colourless or more or less blotched.

Length.—482 mm.

This species was trawled only at Station 80, in Porangahau Bay, northward of Cape Turnagain, in 16-17 fathoms, but Mr. Niven kindly gave me examples taken by his trawlers in Hawke Bay.

The principal differences between this species and *A. rostratus*, with which it has been associated, appear to be the scaleless dorsal and anal fins, the smooth character of the scales on the left side, and the wide interorbital space.

In his generic diagnosis Günther states that the "dorsal and anal rays are branched and scaly." In erroneously assigning *Rhombosolea bassensis* Castelnau to the genus *Peltorhamphus*, I[25] overlooked the fact that Ogilby[26] had previously examined Castelnau's type, and had determined it as *Ammotretis rostratus* var. *adspersus* Kner. In my description of the specimen I stated that the head, body and fins were wholly clothed with small ctenoid scales, and the scales on the fins are represented in the figure. I further stated that the ctenoid scales were almost equally developed on both sides, and, as Günther does not differentiate between the two, ctenoid scales were presumably present on both sides of the type specimen. Kner[27] also found ctenoid scales on the left side.

(25) Waite, Rec. Aust. Mus., vi., 1906, p. 198, pl. xxxiv.
(26) Ogilby, Cat. Fish. N.S. Wales, 1886, p. 49.
(27) Kner, Voy. Novara Fische, 1867, p. 287.

Ammotretis guntheri Hutton.

Brill.

Plate XL.

Ammotretis guntheri Hutton, T.N.Z.I. v., 1873, p. 267.

Stations 34, 65.

B. vii.; D. 90; A. 66; V. dex. 10, sin. 5; P. dex. et sin. 11; C. 12 + 6; L. lat. 94.

Length of head 4.8, height of body 1.8, length of caudal 5.1; diameter of eye 7.6, length of snout 3.8 in the head.

The rostral hook does not extend beyond the level of the lower eye, mouth small, lower lip with a fringe of ten rays on the coloured side only; lower eye half a diameter in advance of the upper one, interorbital space narrow, half the vertical diameter of the eye: gill membranes moderately united below, gill rakers very short, reduced to a mere fringe.

Teeth.—A narrow band of small teeth on the lower side of both jaws.

Fins.—The dorsal rays commence at the tip of the snout, the first seven or eight being quite free, the rays on the head are elongate, those of the body are moderately uniform in length and short, the longest not exceeding a third of the head: the anal is quite similar and is coterminal with the dorsal, quite close to the base of the outer caudal rays; the right ventral corresponds to the anterior dorsal rays and the left, which lies opposite to the vent, has the rays similarly produced: the pectorals are very short, the right one being 1.8 and the left one 2.3 in the head; they are evenly rounded, the longest rays being in the middle: the caudal is short and boldly rounded. Owing to the juxtaposition of the dorsal and anal rays there is no distinct peduncle, the depth at this point being 3.2 in the height of the body.

Scales.—Strongly ctenoid on the right, smooth on the left side, entire head on both sides, including the interorbital space, scaly; lateral line with a low arch over the pectoral, thence straight to the base of the caudal rays; the dorsal and anal fins are sheathed, the sheaths being more extensive on the right side, but there are no scales on the rays, the basal third of the caudal is wholly scaly, and scales are continued up the separate rays for another third.

Colours.—General colour above brownish grey, each scale with a black mark on its outer edge; these form longitudinal lines on the body but are in places somewhat irregularly disposed. The anterior dorsal and the ventral rays are reddish, the dorsal and usually the anal and caudal are dark brown towards their free edges narrowly margined with a reddish tinge: under side colourless, or blotched with grey.

Length.—420 mm.

This species was only once taken off the mainland, namely, near Timaru, in 16 to 21 fathoms. It was also secured off the Chatham Islands, south of Port Hutt, in 24-33 fathoms, both occurrences being on a sandy bottom.

PELOTRETIS Waite, 1911.

Eyes on the right side, the lower advanced, the upper close to the profile; mouth small, subsymmetrical; teeth villiform, on the blind side only, no vomerine or palatine teeth. The dorsal commences behind the snout, and is not connected with the caudal; two ventrals, the right one in the same line and continuous with the anal. Scales moderate, ctenoid on the right side, cycloid on the left, lateral line nearly straight. Gill openings narrow, the membranes broadly united below the throat; gill-rakers short and conical.

This genus differs from *Ammotretis* by the small subsymmetrical mouth, the large eyes, the upper of which is close to the profile, the backward origin of the dorsal fin and the absence of any rostral hook.

Pelotretis flavilatus Waite.

Lemon Sole.

Plate XLI.

Pelotretis flavilatus Waite, Proc, N.Z.I., 1911, p. 50.

Stations 20, 21, 23, 25, 26, 28, 29, 31, 34, 35, 39, 40, 41, 43, 44, 46, 47, 48, 49, 50, 51, 52, 54, 58, 62, 64, 65, 66, 67, 69, 70, 71, 72, 73, 74, 76, 78, 81, 86, 87, 94.

B. vii.; D. 89; A. 71; V. dex. 7, sin. 5; P. dex. 12, sin. 11; C. 13 + 4; L. lat. 78; L. tr. 26 + 39; Vert. 11 + 31 = 42.

Length of head 4.8, height of body 1.8, length of caudal 5.0 in the length: diameter of eye 3.9 in the head. The eyes are large, crowded to the front of the head, and the upper one is close to the dorsal edge, which is incised so that the eye can be seen from the under side: lower eye slightly advanced a small knob in front of it; this eye is separated from the maxilla by a narrow ridge only.

Teeth.—Present on the blind side only.

Fins.—The dorsal fin begins above the front edge of the eye and none of the rays is entirely free; the longest rays are about the middle of the fin and are 2.2 in the length of the head, the rays are slightly sheathed, the sheath being more extensive on the right side: the anal is similar to the dorsal and is coterminal with it: the right ventral is but slightly separated from the anal; the left is small, a little longer than the eye; it covers the vent, which is behind its base: the right pectoral is longer than the left, 1.5 in the head, both are strongly rounded: the caudal is slightly rounded, and the depth of the peduncle is 4.5 in that of the body.

Scales.—Ctenoid on the right side, entire but striated on the left, the lips and the proventral on the blind side are naked, otherwise the whole head is scaly, the scales being imbricate; they clothe the fin rays also, the ventrals and anterior rays of the dorsal and anal excepted.

Colours.—Grey or brown above, both body and fins with irregular though well defined markings, sometimes absent: underside yellow.

Length.—311 mm.

This species was taken almost throughout the cruise including the Chatham Islands, and at all depths from 9½ to 50 fathoms.

Though so common, and sold in all the fish shops of the Dominion as "Lemon Sole," it does not appear to have been previously named. This may be accounted for by confusion in the application of the common name. In the official report the Stations are correctly given under Lemon Sole, to which however the name *Ammotretis rostratus* is wrongly applied, but it should be mentioned that the misidentification is of much older date than the report referred to.

PELTORHAMPHUS Günther, 1862.

Peltorhamphus novæ zeelandiæ Günther.

Sole.

Plate XLII.

Peltorhamphus novae-zeelandiae Günther, Cat. Fish. Brit. Mus. iv., 1862, p. 461. Hutton, Cat. Fish. N.Z., 1872, p. 52. Hector, *ib.* p. 117, pl. ix., fig. 84.

Stations 9, 10, 11, 32, 33, 34, 40, 41, 43, 45, 62, 70, 73, 76, 78, 80, 81.

B. v.; D. 100; A. 67; V. dex. 6, sin. 4; P. dex. et sin. 10; L. lat. 108; L. tr. 33 + 34; Vert. 10 + 27 = 37.

Length of head 4.1, height of body 2.0, length of caudal 4.8 in the length; diameter of eye 7.1, and length of snout 3.0 in the head.

The front portion of the head is formed by the rostral hook, which entirely covers the mouth, and its hinder edge forms a vertical notch about an eye diameter in depth: the small eyes are placed a diameter apart and more than two diameters from the front of the head, the upper eye is slightly advanced and is placed further from the dorsal edge than is the lower eye from the ventral edge: the nostrils lie in a naked area nearer to the lower than to the upper eye: the upper maxillary is small, not more than an eye diameter in length, while the lower one is twice and a half times the same; gill-rakers short and conical, fourteen on the lower limb of the first arch; preopercle adnate.

Teeth.—Teeth on the lower jaw, none on other bones of the head.

Fins.—The dorsal fin begins almost at the tip of the rostral hook, the anterior rays are free, thence less so to at least above the eyes; they extend quite close to the base of the caudal rays: the right ventral and anal are continuous, and on the coloured side the ventral rays do not appear to be much the longer, on the blind side they are twice the length, the left ventral is very small, placed in front of a decided drop in the profile which occurs immediately behind the vent: the anal is otherwise similar to the dorsal, the longest rays being 3.3 in the head. Owing to the extended sheath the depth of the body on the right side is greater than that of the left. The right pectoral is long, 1.4 in the head, its second ray is produced, being an eye diameter longer than the head, the left pectoral is less than half the length of the head: the caudal is rounded and its peduncle is about one-fifth the depth of the body.

Scales.—The whole of the head, excepting the small areas, containing the nostrils, and the entire body is covered with imbricate ctenoid scales, the under side is equally scaly, but the scales are smooth, there are some large open pores in the neighbourhood opposite to the eyes and along the margin of the preopercle, and several rows of large papillæ on the head, one such runs from the front of the mouth, upwards and backwards, another between this and the dorsal margin, while a third borders the maxillary: the upper and lower sides of the caudal and the right pectoral rays are for the greater part covered with small scales, but there are no scales on the other fins.

Colours.—Greenish grey above, without markings, wholly white below.

Length.—392 mm., obtained up to 415 mm.

This well known fish occurred throughout the area examined, and was also taken at the Chatham Islands. It was secured between the extremes of 9 and 50 fathoms.

The sole is so characteristic that there is no danger of confusing it with any other species, it is commonly called English Sole, and believed to be identical with *Solea vulgaris*, but is immediately distinguishable by the large rostral hook which wholly conceals the mouth on the right side, the long pectoral fin with its elongated second ray, the ventral fin arising beneath the mouth, and the freer caudal.

PERCOMORPHI.

Family SERRANIDÆ.

POLYPRION Cuvier, 1817.

POLYPRION PROGNATHUS Forster.

HAPUKA.

Plate XLIII.

Perca prognatha Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 302.

Polyprion prognathus Günther. (See Boulenger, Cat. Fish. Brit. Mus., 1895, p. 150, for synonomy).

Stations 2, 3, 8, 9, 12, 13, 14, 15, 16, 25, 26, 27, 28, 29, 36, 39, 42, 43, 48, 49, 54, 73, 84, 86, 87, 89, 90, 91, 92, 95.

B. vii.; D. xi., 12; A. iii. 9; P. 17; V. i. 5; C. 14 + 14.

Length of head 2.6, height of body 3.3, length of caudal 4.4 in the total; diameter of eye 6.1, interorbital space 3.6, length of snout 3.4, and of the longest (5th) dorsal spine 2.9 in the head. The anal rays are variable in number, ranging from eight to ten.

Though represented at many Stations, but few individuals were usually taken together. On four occasions only did the number exceed ten, they were: Station 13, 47 fishes; Station 15, 20 fishes; Station 16, 14 fishes; and Station 27, 17 fishes. As mentioned in the introduction (p. 53) large catches of Hapuka were made by means of hand lines at the Chatham Islands, and the opinion was ventured that these islands would in the future become important fishing grounds for the Dominion.

The stomachs of different individuals yielded examples of *Clupea neopilchardus*, *Syngnathus norae* and species of Cephalopods.

HYPOPLECTRODES Gill, 1862.

Hypoplectrodes semicinctus Cuvier and Valenciennes.

Half-banded Sea Perch.

Plectropoma semicinctum Cuvier and Valenciennes, Hist. Nat. Poiss. ix., 1833, p. 442.

Plectropoma huntii Hector, T.N.Z.I. vii., 1875, p. 240, pl. x., fig. 1.

This species was found to be very common off the Chatham Islands and usually caught on the lines employed for Blue Cod (*Parapercis*) and Hapuka (*Polyprion*). I have also seen specimens caught off Kaikoura in the South Island.

Family HISTIOPTERIDÆ.

ZANCLISTIUS Jordan, 1907.

Zanclistius elevatus Ramsay and Ogilby.

Long-finned Boar Fish.

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.

B. vi.; D. vi., 28; A. iii. 14; V. i. 5; P. 16; C. 17.

Among the sixteen species of fishes taken in the Bay of Plenty, after I left the vessel, is a single example of this fish, the first and only specimen known from New Zealand waters. As the number of the Station and the depth, etc., were not reported to me, I am unable to give a more exact locality. The length of the specimen is 300 mm.

In 1903 I[28] published a note on the nomenclature of some members of the family Histiopteridæ, and mentioned that *Pentaceros* was not available for fishes, being preoccupied in the Asteroidea. Later, Jordan[29] proposed the name *Quinquarius* to replace *Pentaceros*, while more recently, writing with R. E. Richardson[30] he states that "The name *Pentaceros* Cuvier and Valenciennes is apparently not preoccupied, as recently sup-

(28) Waite, Ann. Mag. Nat. Hist. (vii). 12, 1903, p. 288.
(29) Jordan, Proc. U.S. Nat. Mus. xxxii. 1907, p. 236.
(30) Jordan and Richardson, Mem. Carnegie Mus. iv. 1909, p. 192.

posed by Jordan, Proc. U.S.M. xxxii., 1907, p. 238. The first use of the name *Pentaceros* for a starfish by Schultze, 1760, is nonbinomial, according to Dr. Walter K. Fisher.'' These authors therefore use *Pentacerotidae* as the name of the family.

In his review of the Histiopterid Fishes of Japan, Jordan[33] has supplied a useful key to all the genera of the family. The genera as applied to Australasian species are:—

Zanclistius gen. nov. for *H. elevatus* Ramsay and Ogilby.

Richardsonia Castelnau for *H. labiosus* Günther and *H. farnelli* Waite.

Pentaceropsis Steindachner for *H. recurvirostris* Richardson.

The two species first named are found in New Zealand waters.

MACCULLOCHIA Waite, 1910.

Maccullochia gen. nom. nov. Waite, Proc. N.Z. Inst., 1910, p. 25.

This name was proposed to replace *Richardsonia*, applied by Castelnau to *Histiopterus labiosus* Günther in 1872. *Richardsonia* was first used by Steindachner in 1866 for *Argentina retropinna*, and is not therefore available for this family. The name *Maccullochia* is applied in recognition of the esteem in which I hold my former pupil, Mr. A. R. McCulloch, now Zoologist Australian Museum, Sydney. The type of the genus is *M. labiosa* Günther.

Respecting this species Mr. McCulloch, who is examining the fishes collected on the Federal trawler ''Endeavour,'' tells me that he has a large series, and notwithstanding the differences exhibited by the type of *H. farnelli*, he finds every link connecting it with *H. labiosus*, of which it proves to be the young. The name therefore becomes a synonym of Günther's species.

Family CEPOLIDÆ.

CEPOLA Linnæus, 1766.

Cepola aotea Waite.

Band Fish.

Plate XLIV.

Cepola aotea Waite, Proc. N.Z. Inst., 1910, p. 26.

Stations 89, 95.

B. vii.; D. 74; A. 69, V. i. 5, P. 20; C. 6 + 4.

Length of head 9.8, height of body 12.6, in the length; diameter of eye 3.0, interorbital width 6.0, and length of snout

5.1 in the head: depth of head 1.4 in its length, the large eye almost cuts the profile: the mouth resembles that of a bull dog, the lower jaw protruding and fitting into a notch in the upper one, the anterior teeth remaining without when the mouth is closed: the preopercle is unarmed, and the maxilla extends to below the middle of the eye: the gill-rakers are long and slender and finely spinous, they are forty-nine in number on the first arch, thirty-two being on the lower limb.

Teeth.—The teeth in the jaws are in single series, but there is a patch in front of the lower jaw, the anterior teeth of which are strongly curved: there are no teeth on the vomer, palatines or tongue.

Fins.—The dorsal commences above the edge of the opercle, its rays are articulated and branched: the anal arises less than the length of the head behind the opercle; the pectoral is rounded, its eighth ray being half the length of the head: the ventrals are longer, twice the diameter of the eye: the caudal rays are absent, their roots only remaining.

Scales.—The scales, left on portions of the body, are extremely small.

Colours.—No colour remains after the partial digestion of the fish, but there is a conspicuous black spot on the membrane between the maxilla and premaxilla: no mark traceable on the dorsal fin.

Length (to base of caudal rays).—353 mm.

The specimen described was obtained from the gullet of a *Zeus* trawled at Station 89. Two smaller ones, measuring 74 and 47 mm. in length respectively were taken from the stomach of *Pagrosomus* at Station 95, all occurrences being in the Bay of Plenty.

This species is a true *Cepola*, as restricted by Bleeker, and may prove to be not distinct from the European form *C. taenia*, the fin rays and the presence of the maxillary spot being identical, features also possessed by the Japanese *C. schlegeli* Bleeker. Pending absolute comparison it has been given a distinctive name. The Australian *C. australis* Ogilby differs from all by having a much smaller number of rays in the dorsal and anal, and also by the absence of the black spot noticed in the other forms.

As to the systematic position of the *Cepolida*, Boulenger[31] writes: "Although these fishes have hitherto been placed near the *Blenniidae*, the *Gobiidae*, or the *Trachypteridae*, they are nothing

(31) Boulenger, Camb. Nat. Hist. vii. 1904, p. 662.

but extremely elongate Perches, and they stand in the same relation to the *Serranidae* as the *Trichiuridae* to the *Carangidae* and *Scombridae.*"

In their review of the *Cepolidae* of Japan, Jordan and Fowler[32] publish details of the decades of the Fishes of the "Fauna Japonica." The pages attributed to Decades x.-xiv., have been also printed for Decades vii.-ix., for which the figures should be pages 113-172, 1845.

Family SCIÆNIDÆ.

ARRIPIS Jenyns, 1840.

Arripis trutta Forster.

KAHAWAI.

Sciaena trutta Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 542.
Centropristes salar Richardson, Voy. Ereb. and Terr. Fishes, 1845, p. 29, pl. xx., figs. 4-6.

Stations 71, 72, 73.

The only occasions on which the Kahawai was taken were in three successive hauls in Palliser Bay, the depths ranging from 11 to 38 fathoms.

It was taken somewhat more freely during the period of the extended cruise, but it is more than probable that the trawl did not secure all those encountered, for the fish is a very rapid swimmer, and would probably move off at the first sensation of the vibrations caused by the passage of the trawl.

Family LATRIDIDÆ.

LATRIS Richardson, 1840.

Latris lineata Forster.

TRUMPETER.

Sciaena lineata Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 342.
Latris hecateia Richardson, P.Z.S., 1839, p. 98, and T.Z.S. iii., 1842, p. 106, pl. vi., fig. 1.

Station 48.

The Trumpeter was but once taken in the trawl, a single specimen being obtained, east of Lyttelton in 44-46 fathoms.

(32) Jordon and Fowler, Proc. U.S. Nat. Mus. xxvi. 1903, p. 701.

Two specimens of *Tripterygion varium* Forster were taken from its gullet. Another example was caught on a long line off the Chatham Islands.

Latris ciliaris Forster.

Moki.

Sciaena ciliaris Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 310.

Latris ciliaris Richardson, Voy. Ereb. and Terr. Fishes, 1845, p. 37, pl. xxvi., fig. 6-7.

Stations 13, 14, 25, 46, 57, 71, 73, 76, 77, 85.

Though taken generally between Otago Harbour and Hawke Bay, the number of Moki secured by the trawl was not great. The fishes were taken between the vertical limits of 11 and 43 fathoms. During the extended period it was secured in large numbers in Great Exhibition Bay, almost at the northern extremity of the Dominion. When at the Chatham Islands we set nets and secured it in company with Tarakihi (*Cheilodactylus macropterus*) and other species.

Family CHEILODACTYLIDÆ.

CHEILODACTYLUS Lacépède, 1803.

Cheilodactylus macropterus Forster.

Tarakihi.

Plate XLV.

Sciaena macroptera Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 342.

Stations 15, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 34, 35, 36, 37, 38, 42, 43, 44, 46, 47, 48, 49, 50, 51, 52, 54, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 73, 74, 75, 76, 78, 81, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96.

B. vi.; D. xviii. 28; A. iii. 15; V. i. 5; P. 9 + 6; C. 16 + 6; L. lat. 59; L. tr. 7 + 17.

Length of head 3.4, height of body 2.2, length of caudal 6.4 in the length; diameter of eye 3.5, interorbital space 4.0, and length of snout 2.1 in the head.

Upper profile of head sinuous, tumid over the snout and eye, interorbital space convex, but not sharp, mouth small and subhorizontal the maxilla extending no further than the anterior nostril, lips thick, the upper jaw the longer.

The profile of the back rises suddenly from the occiput, thence gradually to the base of the eighth dorsal spine, whence it falls to the caudal peduncle, the dorsal edge is sharp throughout its length, the lower profile of the body is more even but tumid behind the throat and is sharp and ridged to between the ventral fins, it is rounded only beneath the caudal peduncle.

Teeth.—Teeth villiform, in a band in each jaw with a slightly enlarged outer series.

Fins.—The dorsal commences above a point within the opercular margin, its seventh spine is the longest, 2.8 in the head, and longer than the rays: the anal has a short base, it commences beneath the fourth dorsal ray and terminates an eye diameter before the end of the dorsal; the second spine is the longest, the hinder rays are elongated reaching beyond the base of the dorsal: the ventral arises beneath the longest dorsal spine which its own spine exceeds in length, the fin reaches to the vent: the two upper and seven lower rays of the pectoral are simple, of the latter the second is greatly elongated, reaching the base of the seventh anal ray, its length equals the height of the body or 2.2 in its length; it is one-half longer than the head, and is slightly fringed above and below: the caudal is deeply forked, the peduncle is low, little more than the diameter of the eye.

Scales.—The snout is naked, the upper part of the head, cheeks and opercles are covered with small scales, a band of small scales also extends behind the opercle downwards to the pectoral, the rest of the body is covered with moderate cycloid scales; the lateral line has a low even curve, passes near to the upper edge of the peduncle, thence drops to the central ray of the tail.

Colours.—Silvery, with a purple tint along the back; inner side of opercles black, showing through the membranes; a black band crosses the back in front of the dorsal fin, it extends below the lateral line but fails to reach the pectoral fin. In young examples there are, in addition, four other but fainter bands, one beneath the middle and another beneath the hinder spines of the dorsal, one beneath the middle rays and the last on the upper surface of the caudal peduncle: occasionally all the five bars persist, but usually only the first remains, and even this may disappear in old examples. Young specimens also exhibit about six longitudinal lines of brownish hue: the fins may be slightly clouded but without distinct markings.

Length.—267 mm.

Of all the fishes taken, economic or otherwise, this was the most ubiquitous species secured. After passing the Otago Peninsula, it was represented in every haul of the net with but few exceptions, and some of these Stations are charted as "net fouled" when no fishes of any kind were obtained. It was taken at the Chatham and Pitt Islands by means of set nets and hand lines. Not only was it so freely distributed but occasionally it was taken in enormous numbers; 1000 examples were counted in one haul, while a more careful census made at another Station, revealed 1650 specimens.

Operations conducted during the period of the extended charter shows that it is generally distributed over the area traversed, and as I with others have hooked it in the Sounds of the West Coast, it may be said to frequent the whole of the New Zealand seas.

Family SPARIDÆ.

PAGROSOMUS Gill, 1893.

PAGROSOMUS AURATUS Forster.

SCHNAPPER.

Labrus auratus Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 266.

Stations 9, 71, 72, 73, 74, 75, 76, 77, 78, 80, 81, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96.

The Schnapper is regarded as a northern species in New Zealand waters, and Hector writes: "The Schnapper is not reported to occur south of the Kaikoura Peninsula." It was therefore with considerable surprise that a single example was found included in the catch at Station 9, made off the mouth of the Clutha River, south of Otago, in 15-50 fathoms. This record is the more remarkable when, as the trawler records show, it was not again taken until the net was dragged outside Wellington Harbour, whence it was secured at almost every subsequent haul, the extremes of depths being 11 to 105 fathoms.

In the introduction I referred to the plenitude of Schnapper in the Bay of Plenty, and wrote (p. 54): "Large hauls of Schnapper were made, and so great was their buoyancy when drawn from the deep water that they not only brought the net and its contents to the surface, but, in addition, supported the weight of Mr. Alward, our chief engineer, who jumped boldly on to the net. It was some time before the fish slipped away from under his feet sufficiently to sink him to the chest, and in this situation I photographed him (Plate vi., fig. 1)."

At the final Station charted by me, 1178 Schnapper were taken in the net, but later hauls were even more productive, as the following records, taken from the official report, will indicate: "Upwards of 2 tons of fish, mostly large Schnapper, were taken at Station 102." At Station 103 a similar number was obtained, while at Station 104, 2250 Schnapper were netted. Station 106 yielded about 2000 examples. Although I examined several thousand specimens during the cruise, I did not find a single example in which the large humps on the snout or back, so characteristic of the New South Wales "Old Man Schnapper" were in any way indicated, though specimens quite as large as Australian individuals were secured.

In New South Wales the Schnapper is usually taken, on rough or rocky bottoms, in fact the line fishermen sometimes speak of such areas as "Schnapper ground."

The fish is by no means confined to such situations in the seas around New Zealand, but, on the contrary, appeared rather to favour clean ground, for the great hauls of Schnapper previously mentioned, were taken on clean sandy flats.

It is doubtless largely a matter of food. Remains of molluscs were generally found in the stomachs together with indeterminable fishes; on one occasion, namely, at Station 95, in the Bay of Plenty, two examples of *Cepola aotea* were taken from the stomachs of Schnappers.

Family LABRIDÆ.

PSEUDOLABRUS Bleeker, 1861.

The following is a synopsis of the New Zealand species of the genus, the fin formulæ being:—D. ix. 11; A. iii. 10; V. i. 5.

a. Scales on cheeks in five or more rows.
  b. Dark markings on body.
    c. Dark spots on or above the lateral line .. *celidotus.*
    cc. A black bar across the body .. *cinctus.*
  bb. No dark markings on body .. .. *coccineus.*

aa. Scales on cheeks in less than five rows
    d. Six dark transverse bars on body .. *pittensis.*
    dd. Two or three longitudinal bands on body .. .. *laticlavius.*
    ddd. No dark markings on body .. *fuscicola.*

The following four species were obtained:—

Pseudolabrus coccineus Forster.

Scarlet Parrot Fish.

Plate XLVI.

Labrus coccineus Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 264.
Julis? rubiginosus Richardson, Ann. Mag. Nat. Hist. xi., 1843, p. 425.
Labrichthys roscipunctata Hutton, T.N.Z.I. xii., 1880, p. 455.

This large and very handsome species was not taken in the trawl, but was obtained by means of hand lines off the Chatham Islands. It is of brilliant scarlet colour when first removed from the water, with a longitudinal pink line along each row of scales, and some examples have a dark purple vertical mark on each side also; there are about five rows of ocellated pink spots on the dorsal fin and a similar series on the anal; the pectoral and ventral are without markings; a broad dark brown bar passes across the extremity of the caudal peduncle, the outer margins of the caudal lobes, which are considerably produced are also dark brown; the caudal fin is dusky, either wholly or at its distal extremity.

Length.—The largest example obtained measures 355 mm. in length.

Julis? rubiginosus Richardson, which was placed by Günther with unidentified species, is without doubt a synonym of this species, the description of Parkinson's figure applying well to our specimens.

P. roscipunctatus is probably the same species also, differing only in the absence of the dark band across the caudal peduncle, possibly a condition of immaturity, the type specimen being but six inches (152 mm.) in total length.

Pseudolabrus celidotus Forster.

Spotty.

Labrus celidotus Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 265. Richardson, Voy. Ereb. and Terr., 1846, p. 53, pl. xxxi., fig. 1.
Labrus botryocosmus Richardson, *ib.*, 1846, p. 53, pl. xxxi., fig. 6.

Station 28.

Of all the New Zealand Labroids, this is the species best known to line fishermen in the South Island. It was but once taken in the trawl, when a few examples were obtained off Oamaru in 19-22 fathoms, on a sandy bottom. Richardson's figures fairly represent the markings, the most characteristic of one form being the dark spot on the lateral line, whence the name "Spotty." Being drawn, doubtless, from a spirit preserved example, it indicates a contracted appearance about the head, a feature far from the truth, and one common to many of Richardson's illustrations.

The specimens trawled include both forms, that is, examples represented by the names *P. celidotus* and *P. botryocosmus.* A careful examination has confirmed the opinion I held that the two are not specifically distinct but represent colour varieties, possibly of sexual import; the case may be analagous to the two forms of *Diastodon* occurring in the waters of New South Wales, *D. unimaculatus*, and *D. bellis*, and of which Ogilby[33] wrote: "For some time we inclined to the opinion that the differences were merely sexual, but the examination of specimens of both sexes belonging to either form has induced us to recede from that position. It must be borne in mind that notwithstanding the fact that the differences in the coloration is not always concurrent with the differences in the sexes, yet we may have here two distinct varietal races living under similar conditions and inhabiting the same waters, but which, nevertheless preserve intact their colour variations."

Respecting the *Pseudolabri* the differences are chiefly those of colour markings. In *P. celidotus* there are two marks behind the eye, a series of black spots above the lateral line, and below them, on the lateral line, just beyond the tips of the pectoral, a large black blotch; sometimes, also, other two marks, one beneath the middle of the soft rays and the other below the termination of the dorsal fin. Occasional specimens exhibit a longitudinal band on the dorsal fin. In the *botryocosmus* form the postocular marks are absent as is also the large blotch on the side, but the smaller spots above the lateral line are retained. In addition to the band on the dorsal fin, there is a similar one on the anal.

Richardson states that the branchings of the tubules on the posterior scales of the lateral line are simpler than in *P. celidotus*, but this is a variable character, for in some specimens the tube is simply forked, whereas some examples of the *botryocosmus* form exhibit complex branchings on the posterior scales, equally with those on the more anterior portion.

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(33) Ogilby, Edible Fishes, N.S. Wales, 1893, p. 138.

Pseudolabrus cinctus Hutton.

Girdled Parrot Fish.

Plate XLVII.

Labrichthys cinctus Hutton, T.N.Z.I. ix., 1877, p. 354.

Length of head and height of body 2.9, length of caudal 3.7 in the total; diameter of eye 6.1, interorbital space 3.5, length of snout 2.7 in the head.

There are five rows of scales on the cheeks and four on the opercle. The posterior canine tooth is exposed when the mouth is closed.

Fins.—The dorsal fin commences over the margin of the opercle and the anal arises midway between the end of the snout and the tips of the caudal rays: the pectoral carries a dark band at its base, and the characteristic black body band passes from the 6-8 dorsal spines to the space between the ventrals and anal, being inclined slightly backwards below, it is about three scales in width.

This well marked species was originally taken off the coast of Otago, and I am unaware if it has been recognised since. I caught two specimens on the line fishing from the wharf at Napier, and these were the only examples seen by me. The larger measures 300 mm. in length.

Pseudolabrus pittensis Waite.

Banded Parrot Fish.

Plate XLVIII.

Pseudolabrus pittensis Waite, Proc. N.Z. Inst., 1910, p. 26.

D. ix. 11; A. iii. 10; V. i. 5; P. 13; C. 14 + 11; L. lat. 25; L. tr. 4 + 9.

Length of head 2.7, height of body 2.6, length of caudal 3.4 in the total: diameter of eye 7.0, interorbital space 4.0, and length of snout 2.9 in the head.

The head is evenly rounded above and below, and the jaws are equal; gill-rakers short and pointed, seventeen on the first arch, twelve of which are on the lower limb.

Teeth.—The teeth are in a single series, exclusive of the large canines in front; the posterior canine teeth are concealed when the mouth is closed.

Scales.—There are four series of scales on the cheek and some larger ones on the opercle. No sheath at the base of the dorsal and anal fins, basal half of caudal clothed with scales. Lateral line continuous, bent downwards beneath the hinder dorsal rays.

Fins.—The membrane of the dorsal spines is longer than the respective spine, and the anal is similarly formed: caudal truncate or feebly rounded, the depth of its peduncle 1.9 in the length of the head.

Colours.—The colour in preservative is purplish, darker above, and yellow beneath. The body is ornamented with six dark bands, which do not reach the lower edge, the first is close behind the head, embracing the tip of the opercle, the last is on the caudal peduncle; these dark bands extend on to the dorsal fin including the membranes of the spines and rays as follows:—First band, spines, 1-4; second band spines, 5-7; third band, spine, 9-ray, 3; fourth band, rays, 5-7; fifth band, rays, 8-11; the pectoral has a purple bar across its base and the distal two-thirds of the ventrals are black.

Length.—271 mm.

This species was taken off Pitt Island, one of the Chatham Group, by means of hand lines, during the visit referred to in the introduction, p. 53.

Family SCARIDÆ.

CORIDODAX Günther, 1862.

Coridodax pullus Forster.

Butter Fish.

Plate XLIX and fig. 3.

Scarus pullus Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 288.

B. vi.; D. xxii. 13; A. iii. 12; V. 0-5; P. 15; C. 12 + 6; Vert. 27 + 19 = 46; L. lat. 80; L. tr. 12 + 32.

Length of head 4.4; height of body 3.2 and length of caudal 3.7 in the total: diameter of eye 6.3, interorbital space 2.4 and length of snout 3.5 in the head.

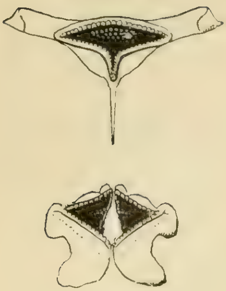

fig. 3.
Pharangeal teeth of
Coridodax pullus.

Head short and blunt, the broad interorbital space is very convex, mouth small with reflexed lips, maxilla not reaching to below the eye, a broad frenum in both jaws; gill-rakers short and weak, about thirteen on the lower limb of the first arch; opercle with a large thin flap. The body is elongate, the upper and lower profiles being similar.

Teeth.—Wholly coalescent sub-equal in size not united on the mid line. Exposed portion of pharangeal teeth diamond-shaped, the central depression being four times as broad as long.

Fins.—The dorsal fin arises behind the opercle, and the spines are flexible, increasing regularly to the last, which measures 1.5 in the length of the head; there is no apparent division between the spinous and the soft portion, and the rays regularly lengthen to the penultimate one, which is longer than the height of the body and one-half longer than the head: anal short, its base about one-seventh shorter than the head, the rays are a little shorter than the corresponding ones of the dorsal, the longest being one-third more than the head: the pectoral is sub-truncate, its fourth or longest ray being longer than the last dorsal spine, it extends nearly half the distance from its origin to the vent: the ventrals arise midway between the tip of the lower jaw and the vent: there is no trace of a spine, its office being taken by the first ray, which is simple, the third is the longest, measuring one-fourth more than the head; it extends to beneath the hinder dorsal spines: the caudal is slightly emarginate, its peduncle long and deep, its length from the dorsal rays being twice its depth or 1.1 in the head.

Scales.—The head is smooth and naked, with the exception of three rows of scales behind the eye, four rows on the upper edge of the opercle, and a small patch of ten scales in the temporal region, these are scarcely discernible in fresh specimens. The scales on the body are small and cycloid, the lateral line runs low, arising with a slight arch above the pectoral, thence it runs along the mid line of the body to the tail. No scales on the fin rays.

Colours.—The whole body is dark olive green, the extreme lower edge excepted, which is white: a bronze band along the middle of the body, from the angle of the mouth to the base of the caudal: irregular blue wavy lines run longitudinally along the whole body. Lower portion of head with vivid violet spots and short lines, lips tinged with pink, throat sky blue. Eye brown, a golden then a bright blue line encircling the pupil. Dorsal fin blood-red anteriorly gradually passing through a purple tint into the dark olive of the hinder rays: anal fin similar to the dorsal, the red colour confined to the margin, both fins with closely placed blue spots most pronounced basally: membrane of ventral green, the rays pink: pectoral bluish: caudal intense greenish-blue tipped with brown. All the bones, together with the teeth, including the pharangeals, are deep green.

Length.—520 mm.

The Butter Fish was not taken in the trawl, but was freely caught in the nets set in the kelp in various places round the Chatham Islands.

Family STROMATEIDÆ.

SERIOLELLA Guichenot, 1874.

Two species of the genus were taken, but, unfortunately, the individual records were lost. The three southern Stations were made northwards of Dunedin to the Canterbury Bight, and the three northern ones in Hawke Bay and the Bay of Plenty, the recorded depths being 9 to 105 fathoms.

Stations 22, 32, 39, 81, 83, 88.

Seriolella brama Günther.

Warehou.

Plate L.

Neptomenus brama Günther, Cat. Fish. Brit. Mus. ii., 1860, p. 390. Hector, Edible Fish. N.Z., 1872, p. 112, pl. v., fig. 31.

B. vii.; D. viii., 29; A. iii. 21; V. i. 5; P. 21; C. 14 + 8; L. lat. 88; L. tr. 17 + 34; Vert. 7 + 17 = 24.

Length of head 3.5, height of body 2.6, length of caudal 5.3 in the length; diameter of eye 4.1, interorbital space 2.4 and length of snout 3.2 in the head.

The upper and lower profiles of head and body form low even curves, the dorsal being the more convex: the eye lies wholly in the anterior half of the head and the nostrils are situated quite close to the end of the snout; the mouth is small, the maxilla not reaching the eye, it has a supplemental bone, the upper edge of which slips entirely under the preorbital; gill-rakers long, twenty-five on the first arch, of which seventeen are on the lower limb; opercles entire.

Teeth.—Extremely small in narrow bands in both jaws, none otherwise in the mouth.

Fins.—The dorsal spines are low and recumbent, the first being inserted well behind the edge of the opercle: the last spine is the longest, being adnate to the first ray which is simple, the second ray is the longest, nearly half the length of the head; the following rapidly diminish to the eighth, whence they are of nearly uniform height: the anal commences beneath the thirteenth dorsal ray and its hinder insertion is posterior to that of the dorsal: the pectoral is long and falcate, nearly as long as the body is deep, and extending to the first spine of the anal: the ventral is short, its spine equals the length of the snout and eye, its anterior insertion is midway between the hinder edge of the orbit and the anal; the caudal is large and deeply cleft, with a narrow peduncle, its least depth being equal to the snout.

Scales.—Cycloid and deciduous, those of the lateral line more adherent: scales are present on the cheeks and opercles, the upper part of the head is naked but without pores: the lateral line follows the contour of the back and extends to the base of the caudal.

Colours.—The head is brown above, yellowish on the sides and silvery beneath; eye with a bright golden mark before and another behind the pupil; the back, above the lateral line, is deep purple, and the sides are silvery with a pink tinge: a deep blue black blotch behind the head, crossing the lateral line but extending neither to the dorsal profile nor to the upper base of the pectoral: dorsal fin dark brown; pectoral and caudal with clouded edges, the latter reddish at the base.

Length.—553 mm.

In his revision of the fishes of the Family *Stromateidae*, Mr. C. T. Regan[34] admits five species of *Seriolella*, and supplies a useful synopsis.

Since that time Mr. E. C. Starks[35] has described a new species taken at Callao, Peru, under the name *Neptomenus crassa*, and perhaps being unaware of or not admitting the generic identity with *Seriolella* remarks:—"This is apparently the first record of the occurrence of this genus outside of Australian seas." The species should be compared with *S. violacea* Guichenot, from the coasts of Chili.

(34) Regan, Ann. Mag. Nat. Hist. (7) x. 1902, p. 127.
(35) Starks, Proc. U.S. Nat. Mus. xxx. 1906, p. 784, fig. 8.

SERIOLELLA PUNCTATA Forster.

Plate LI.

Gasterosteus punctatus Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 36.
Neptomenus bilineatus Hutton, T.N.Z.I. v., 1872, p. 261, pl. viii.

B. vii.; D. viii. 37; A. iii. 24; V. i. 5; P. 21; C. 14 + 8; L. lat. 118; L. tr. 22 + 28.

In addition to the fin formulæ this species differs from *S. brama* in being more elongate and by having a smaller eye. There is also a broad band of pores on each side of and a short distance from the dorsal fin; these pores are situated in a low ridge, which becomes more pronounced in the hinder portion of the body, but is lost beneath the upper caudal rays. The colouration is very similar to that of *S. brama*, the dark purple blotch at the origin of the lateral line being likewise present. Eye bright yellow with a dark mark above and another below the pupil. The largest example I have seen measures 204 mm. in length.

Placing the species under *Seriolella* Forster, with *S. bilineata* Hutton as a synonym Hutton[36] writes:—"I have no doubt but that this is the long lost fish of Forster. The mistake is due to the peculiar genus into which Forster put his fish, and from the absence in the colony of any copy of his drawing." In the "Index," Hutton[37] following Regan[38] reverts to his own name (*S. bilineata*).

Family CARANGIDÆ.

The following will serve to distinguish the three New Zealand species usually associated with Caranx:—

a. A detached finlet behind the dorsal and anal fins.. .. .. *Decapterus koheru.*
aa. Dorsal and anal fins without detached finlets.
  b. Lateral line with large scutes in its entire length .. *Trachurus picturatus.*
  bb. Lateral line with scutes in its posterior portion only .. *Caranx platessa.*

(36) Hutton, T.N.Z.I. xxviii, 1896, p. 315.
(37) *id.* "Index Faunæ Novæ Zealandiæ" 1904, p. 44.
(38) Regan, Ann. Mag. Nat. Hist. (7) x. 1902, p. 128.

TRACHURUS Rafinesque, 1810.

Trachurus picturatus Bowdich.

Horse Mackerel.

Seriola picturata Bowdich, Excursion to Madeira, 1825, p. 123. fig. 27.

Stations 72, 74, 80, 89.

D. viii. i. 29; A. ii. i. 26; V. i. 5; P. 21; C. 18 + 8; Sc. 44 + 41.

The specimens obtained agree with this species as diagnosed by Jordan and Evermann[39] exhibiting the following characters: The anterior scutes are low, not more than one-third the height of the posterior ones, and the curved portion of the lateral line is almost as long as the straight portion: the maxillary is relatively short, not reaching beyond the anterior margin of the orbit and the lining of the opercle is merely clouded with black On the other hand, the depth of the body and the number of scutes is intermediate between the figures supplied for the two species. The large size of the specimens is another feature in common with *T. picturatus*, and the writers referred to have apparently identified New Zealand examples with this species.

It was trawled on four occasions, namely, twice in Palliser Bay, once north of Cape Turnagain, and once in the Bay of Plenty. The indicated depths range from 13-94 fathoms, but it cannot be certain that the fishes were taken on the bottom.

Length.—420 mm.

As it is well known, members of this family are particularly prone to harbour Isopodous parasites in their throats; writing of the Yellowtail of New South Wales, Ogilby[40] says:—"These fishes almost without exception suffer from being the host of an isopodous crustacean of the genus *Anilocra*, which lives in the throat, and thus obtains both sustenance and protection for itself; though it is common to take this commensal from the Scad with its developed ova attached we have never found more than one in a single fish."

The specimens from the New Zealand fishes have been kindly identified by Dr. Chilton as *Meinertia imbricata* Fabricius (*Ceratothoa banksii* Miers, Cat. N.Z. Crustacea). From one specimen I obtained eight individuals representing an adult and young in various stages.

(39) Jordan and Evermann, Bull. U.S. Nat. Mus., 47, i. 1896, p. 909.

(40) Ogilby, Edible Fishes N.S. Wales 1893, p. 79.

CARANX Lacépède, 1802.

Caranx platessa Cuvier and Valenciennes.

Trevally.

Caranx platessa Cuvier and Valenciennes, Hist. Nat. Poiss. ix., 1833, p. 84.

Caranx georgianus id., p. 85. Richardson, Voy. Ereb. and Terr., 1848, p. 135, pl. lviii., fig. 1-3.

Stations 74, 81, 86, 87, 91, 92, 94, 95, 96.

D. viii. i., 26; A. ii. i., 21; V. i., 5; P. 20; C. 17 + 8; L. lat. 63 + 44 = 107.

This species was taken in Palliser Bay, off Cape Kidnappers, in Poverty Bay and in the Bay of Plenty. It was obtained between the extremes of 16 and 58 fathoms.

Length.—469 mm.

Family SCOMBRIDÆ.

SCOMBER Linnæus, 1758.

Scomber pneumatophorus De la Roche.

Mackerel.

Scomber pneumatophorus De la Roche, Ann. Mus. Hist. Nat. xiii., 1809, pp. 315, 334. McCoy, Prod. Zool. Vict. i., 1879, pl. xxviii.

Station 72.

D. x. 11, vi.; A. i. 11, vi.; P. 18; V. i. 5; C. 20 + 10; L. lat. 225.

Length of head 4.0, height of body 4.3, length of caudal 9.4 in the length. Diameter of eye 3.5, interorbital space and length of snout 3.3 in the head.

Upper surface of snout and head flat without median groove, no ridge on the occiput; lower jaw slightly the longer, the maxilla, which is concealed beneath the preorbital, extends to just within the margin of the orbit; hinder edge directed obliquely backwards. Body not much compressed, its width 1.45 in its height.

Fins.—The distance between the tip of the snout and the origin of the first dorsal fin is 2.86, that between the origins of the two dorsals is 2.9, and the distance of the tip of the lower jaw to the base of the ventrals is 3 2 in the total length, without caudal: the detached anal spine stands beneath the fourth dorsal ray: the pectoral is short, its length one-half that of the head, its upper insertion is level with the middle of the eye: the ventral is situated posterior to the insertion of the pectoral, and is slightly shorter than that fin: the caudal is deeply cleft, each lobe with a basal keel; the peduncle is very narrow as wide as deep. The lateral line is scarcely curved. Air bladder present.

Teeth.—Minute, present on the vomer and palatines, but not on the tongue.

Colours.—Upper surface bluish grey with dark blue lines and spots trending downwards and forwards to the lateral line, thence vertically or backwards; these markings extend to the midline of the body; the lower half of the body is silvery, with closely placed faint grey spots; the angle of the opercle is marked with radiating blue lines. The dorsal fins and finlets are dark blue, the ventrals and anal are colourless, while the pectoral is marked with black in its hinder third; a black axillary spot; outer and hinder edge of caudal narrowly bordered with black.

Length.—522 mm (= 20½ inches).

The only example trawled was obtained in Palliser Bay the depth being 13-14 fathoms.

The differences between the various supposed members of the genus *Scomber*, are so slight, and the difficulties of ascertaining the correct synonomy so great, that the identification of the New Zealand species with *S. australasicus* as distinct from *S. pneumatophorus*, is very doubtful; the latter has been regarded as a synonym of *S. colias*. In addition to other features, the example before me has a much shorter head and lower body than is described for the other forms; even more striking are the proportions rendered by Günther of (presumably) a specimen 26 inches long, attributed to *S. pneumatophorus*. It is noteworthy that the specimens described as having a long head and deep body are generally small. The question of the synonomy of the components of the genus *Scomber* is one which needs to be elucidated, but can only be accomplished by those who possess large collections and the necessary literature. Evermann and Kendall,[41] who recently studied the claims of *S. colias* and *S. pneumatophorus*, arrived at the conclusion that the two are specifically distinct, the former being the Atlantic and the latter the Pacific species.

(41) Evermann and Kendall, P.U.S. Nat. Mus. xxxviii. 1910, p. 327.

Family TRICHIURIDÆ.

THYRSITES Cuvier, 1829.

Thyrsites atun Euphrasen.

Barracouta.

Scomber atun Euphrasen, K. Vetensk. Acad. Nya Handl. xii., 1791, p. 315.
Thyrsites atun Cuv. and Val., Hist. Nat. Poiss. viii., 1831, p. 196, pl. ccxix.

Stations 2, 6, 9, 11, 12, 13, 15, 17, 18, 19, 20, 25, 26, 28, 34, 35, 36, 38, 39, 42, 43, 44, 46, 47, 49, 50, 51, 58, 60, 63, 64, 65, 71, 81, 83, 85, 86, 88, 94.

This species, known from South African and Southern Australasian Seas is very common all round the coasts of New Zealand. Goode and Bean state that it is undoubtedly a deep-water form. This however is not so, or, at any rate, if found in really deep water, it is not confined to the depths. It was taken by the trawler from Stewart Island to the Bay of Plenty and at all depths from 10 to 105 fathoms.

Specimens netted at Station 20 had their stomachs crowded with the fish *Hemerocoetes acanthorhynchus.*

REXEA Waite, 1911.

Body moderately elongate, fusiform; mouth large with a single row of dagger-like teeth in each jaw: three enormous fangs towards the front of the upper jaw and two smaller ones in the lower jaw: teeth on palatines, none on the tongue. Two contiguous dorsal fins, the spinous portion in a sheath, two finlets above and below; pectorals small and low, ventrals small, each with four spines, caudal forked, peduncle without keel, scales small and smooth, lateral line single anteriorly but dividing forms an upper and lower branch.

This genus is near to *Promethichthys* Gill (?*Dicrotus* Günther) differing principally in the character of the ventral fins and in the configuration of the lateral line. It includes, as the type of the genus, the species described below, also *Thyrsites promethoides*[42] Bleeker *T. micropus* McCoy[43] and possibly *T.* (*Promethichthys*) *bengalensis* Alcock.[44] (See discussion below).

(42) Bleeker, Act. Soc. Sc. Indo-Nederl. I. Amboina, p. 42 (*vide* Günth).
(43) McCoy, Ann. Mag. Nat. Hist. (4) xi. 1873, p. 338.
(44) Alcock, Journ. Asiat. Soc. Bengal, lxiii. 1894, p. 117, pl. vi., fig. 1.

Rexea furcifera Waite

King Fish.

Rexea furcifera Waite, Proc. N.Z. Inst., 1911, p. 49.

Plate LII.

Stations 1, 2, 3, 4, 7, 11, 12, 13, 17, 18, 19, 32, 36, 39, 44, 81, 83, 88, 89, 90, 92, 95.

B. vii.; D. xviii. ii., 15, ii..; A. ii., 14, ii.; V. iv.; P. 14; C. 18 + 8.

Length of head 3.2, height of body 4.1, and length of caudal 6.9 in the length. Diameter of eye 4.8, interorbital space 4.6, and length of snout 2.4 in the head.

The head is sub-quadrangular in section, conical and acutely pointed, flat above, the edges rounded and a depression between the eyes; the latter are almost circular, and lie a trifle nearer the opercular margin than the tip of the snout.

The anterior nostril opens an eye diameter in front of the orbit and is directed forward from a horizontal tube, much as in the petrels (Tubinares), the posterior nostril lies half-way between it and the front margin of the eye: the length of the maxillary is half that of the head, its distal extremity is rounded and its greatest width is half the diameter of the eye, it extends to the anterior fifth of the orbit: the lower jaw markedly projects and its extremity forms and completes the anterior contour of the head: the tongue is slightly roughened: gill-rakers are replaced by teeth like those in the jaws; one, two or three being developed from the same base; of these bony bases there are ten on the upper and seventeen on the lower limb of the first arch. Pseudobranchiæ present.

Teeth.—The maxillary bears about twenty acute flattened distantly set teeth, largest in the middle: the vomer has three large dagger-like teeth, each with the tip of a similar one at its base, possibly destined to replace them: the palatine teeth are similar to the maxillary ones but smaller: the two large and widely separated teeth at the symphysis of the lower jaw are directed upwards and backwards and remain without the upper jaw when the mouth is closed: the lateral teeth are much larger than those in the maxilla.

Fins.—The first dorsal fin arises within the vertical of the opercular margin, the middle spines are longest, a third longer than the diameter of the eye: the fins are sub-continuous and the longest rays are slightly higher than the middle spines; the anal is placed a little further back than the soft dorsal but is otherwise similar: the length of the pectoral is half that of the head; the ventrals are composed each of four weak spines, of which the first measures one-fourth the diameter of the eye: the caudal is forked and the peduncle is compressed, its depth less than the diameter of the eye.

Scales.—Cheeks opercles and body scaly, the scales small, the lateral line passes almost straight from above the opercle. near to the dorsal edge, to beneath the middle of the soft dorsal: beneath the base of the 5-6 dorsal spines it sends off a downward branch which descends suddenly to the mid line of the body, thence straight to beneath the origin of the soft dorsal; it then forms three waves, terminating in advance of the middle caudal rays.

Colours.—Iridescent blue above, silvery beneath; a deep black blotch on the dorsal between the i-iii spines, and the fin narrowly edged with black: soft dorsal, anal and caudal orange.

Length.—514 mm, the largest example preserved measures 711 mm.

Though taken generally between the extreme limits of the operations, this species was not obtained at Stations between Lyttelton and southward of Cape Kidnappers. It occurred at all depths between 9 and 105 fathoms. At Station 88 five young of the same species were taken from the stomach of one individual. Many of the Stations yielded specimens under twelve inches in length. Squid was generally found in the stomach.

As will be gathered from the introduction, I had regarded this fish as *Promethichthys prometheus,* probably because that species appears in the New Zealand list, but an examination for record purposes shows it to be quite different. It is allied to the three species before mentioned, and may indeed prove to be identical with one or more of them; it may not be distinct from *R. micropus,* but McCoy describes that form as having six dorsal and four anal finlets, and he had ample opportunities of verifying this feature, for he states that it is taken in great quantities from Tasmania to the Melbourne fish shops. The popular name is Tasmanian kingfish: and it may be noted that kingfish in the name applied to our form in the South Island. Passing by minor differences Alcock describes *R. bengalensis* as having a thick scaleless silvery skin; the scales of *R. furcifera* though small are quite apparent, but one is tempted to ask if the nudity of the Indian specimens may not be due to immaturity, the examples, of only 5¼ inches in length being in all probability, very young. I am not aware of the condition of the skin in *R. promethoides*, for I have only Günther's epitomised description for guidance, and he does not mention the feature, which indeed may not be referred to by Bleeker. Supposing that the character has not been overlooked in regard to the ventrals fins, all the previously described forms differ from our specimens in the smaller number of spines or rays. I have chronicled the four components as spines, for they are all stiff, simple and do not exhibit any jointed feature. The comparative measurements given in the different descriptions are taken in such varied manner as to be useless for diagnostic purposes; I therefore supply the above description and figure for the use of those who may have access to further material.

The following table shows the comparatively close agreement in the radial formulæ.

	Dorsal.	Anal.	Ventral.
R. promethoides.	xviii. ii. 15. ii.	ii. 14. ii.	i.
R. micropus	xvii. iv. 12. vi.	ii. 11. iv.	ii.
R. bengalensis	xviii. ii. 13-14. ii.	ii. 11-12. ii.	i.
R. furcifera	xviii. ii. 15. ii.	ii. 14. ii	iv.

LEPIDOPUS Gouan, 1770.

Lepidopus caudatus Euphrasen.

Frost Fish.

Trichiurus caudatus Euphrasen, K. Vetensk. Acad. Nya. Handl. ix., 1788, p. 52.

Station 83.

This species was but once taken in the trawl, four small examples being netted in Hawke Bay, at a depth of 68-78 fathoms. The specimens range from 320 to 415 mm. in length, and are of the usual silver-grey colour, but the lateral line lies in a rust-coloured band, and there are similar narrower and fainter bands above and below it.

The name frost fish is applied in reference to its well known habit of going ashore in the winter months. I once witnessed such an occurrence. Coaching along the shores of the Bay of Plenty in July, 1908, I witnessed the fishes in the surf; they seemed to be writhing helplessly, and were carried further and further inshore by each succeeding wave until finally stranded on the beach. Specimens were picked up in different parts of the beach for a distance of forty miles, and on arriving at my destination, I learned that other travellers had similar experiences in different parts of the extensive Bay. Even before they were finally cast ashore, the fishes were more or less mutilated by gulls, most of them having their eyes picked out. Many theories have been advanced to account for the peculiar behaviour of the fishes. I believe that von Lendenfeld[45] considers that they approach the surface for spawning purposes, but not having access to his paper I am unaware if this is merely a theory or a proven fact.

Family LEPTOSCOPIDÆ.

CRAPATALUS Günther, 1861.

Crapatalus novæ-zelandiæ Günther.

Crapatalus novae zelandiae Günther, Ann. Mag. Nat. Hist. (3) vii., 1861, p. 87, pl. x.

Leptoscopus angusticeps Hutton, T.N.Z.I. vi., 1874, p. 106, pl. xix.

Station 17.

B. vi.; D. 33; A. 39; P. 21; V. i. 5; C. 10 + 4; L. lat. 50; L. tr. 16 + 18.

Length of head 4.1, height of body 8.8, length of caudal 7.6 in the length; diameter of eye 9.1, interorbital space 6.2, length of snout 4.5 in the head.

The opercles mark the widest part of the fish, and the head tapers to the snout, which is obtusely rounded; the top of the head is quite flat with a ridge on the inner side of each eye forking behind: the mouth is oblique, the lower jaw being much the longer with a prominent chin: both upper and lower lips bear long fringes. The body is rounded passing into the long and compressed tail.

Teeth.—The teeth are depressible, and arranged in bands; they are uniformly short in the mandible, but the median teeth of the premaxilla are twice as long as the others.

Fins.—The dorsal fin arises at a point one-third the distance to the end of the caudal rays; it is low, the median rays being longest and nearly-one-fourth the length of the head; the anal arises close behind the vent, whose distance from the tip of the snout is one-fourth the total length (caudal included), and extends closer to the caudal than does the dorsal: its rays are longer and thicker than those of the dorsal, and all are undivided; the pectoral extends to the fourth dorsal ray, and its

(45) Lendenfeld, Zool. Anzeiger, 1883, p. 559.

length is 1.3 in the head; the eight upper rays are divided, the lower ones are simple; these latter rapidly decrease in length, forming a lower concave margin; the ventrals are very short, not reaching the vent by an eye diameter, and are contained thrice in the length of the head; the caudal is truncated and the depth of its peduncle equals the interorbital space.

Scales.—The head is entirely naked as is also the space behind the pectorals and between the ventrals; the scales are small and deeply imbedded on the occiput, but they become larger, and imbricate, those on the tail being largest. The lateral line arises above the opercle and gradually descends to the mid line, thence running straight to the caudal: its scales are very large and leaf-shaped with a central ridge the line is therefore extremely conspicuous.

Colours.—Except quite anteriorly the lateral line sharply divides the colouration, that above being brown, each scale with a darker dot, the upper part of the head is brown dotted, the entire lower parts are white: a row of about five brown spots is found on the front of each ray of the dorsal, but the other fins are without markings.

Length.—378 mm.

The only specimen obtained was taken off Otago Heads, in 55-102 fathoms. While *L. robsoni* Hector,[46] and *L. canis* Arthur,[47] are without doubt synonyms of *L. angusticeps*, and with which my specimen quite agrees, this latter species does not conform to either Günther's description or figure, which, however, are not in themselves entirely consistent: thus the body is illustrated as far deeper than described. In my specimen the ventrals do not reach the anal by fully half their length, and the shortness of these fins is indicated by Hutton's figure. Günther describes the ventrals as extending to the fourth anal ray: he also describes and figures the interorbital space as much narrower than found by Hutton and myself. The transverse rows of scales are rendered as 7/7, but they are much more numerous in my specimen, counted from the origin of the dorsal fin. It is possible that there are two allied species in our waters, but for the present I follow authors in regarding the genus as monotypic, indicating the essential features of the Otago specimen as above.

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(46) Hector, T.N.Z.I. vii. 1875, p. 248.
(47) Arthur, *ib.* xvii. 1885, p. 165.

Family URANOSCOPIDÆ.

The three genera of this family, known from New Zealand, may be recognised by the following characters:—

a. A strong forwardly directed spine in front of each ventral fin .. .. *Kathetostoma.*
aa. No forwardly directed spines in front of the ventral fins.
    b. Lower jaw normal .. .. *Geniagnus.*
    bb. Lower jaw with a pair of dilated processes which meet in front of the chin .. .. *Gnathagnus.*

KATHETOSTOMA Günther, 1860.

KATHETOSTOMA GIGANTEUM Haast.

Kathetostoma giganteum Haast, T.N.Z.I. v., 1873, p. 274, pl. xvi., fig. 2.

Stations 39, 47, 48, 49, 50, 67, 68, 83, 91.

D. 18; A. 18; V. i., 5; P. 21; C. 11.

The head is measured from the chin to the opercular margin, and its length is one-fourth the total, depth of body 5.2 and length of caudal 4.3 in the length. Diameter of eye 5.4, interorbital space 2.7 and length of snout 6.1 in the head.

The head is very broad and flat, its breadth greater than its length, or about one-third the total: the bony armature consists generally of raised ridges which radiate from several centres, the most conspicuous is a pair placed at the inner hinder margin of the eyes and another pair on the occiput; the former embraces the inner and hinder edges of the eyes, while the hinder rays of the occipital pair are truncated and form a straight line; another plate is placed before the eye, and there are less regular patches in a series from below the eye to the preopercle and opercle; a final series occurs between the eye and the humeral spine; the latter is very strong, and is curved outwards and backwards. Mouth large and vertical, lower lip incised in the middle to receive a protuberance of the upper one: maxilla broad, its distal end wider than the eye; chin with numerous transverse ridges which posteriorly become distinct folds with fringed edges: five blunt spines on the lower preopercular edge, the first two lying below the maxilla; two strong spines in front of the ventral fins, directed forwards.

Teeth.—There are several rows of sharp teeth in the jaws and a closely plicated membrane behind them.

Fins.—The dorsal fin commences midway between the edge of the upper jaw and the base of the caudal, its longest rays are twice the length of the eye; the anal has a slightly more anterior insertion and is continued further back, its posterior rays are longer than the corresponding ones of the dorsal and attain nearly to the base of the caudal rays: the pectorals are connected to the body by membrane beneath the humeral spine, and are of great size, reaching to beneath the base of the 5th dorsal spine, the lower nine rays are thickened, and are successively shortened; the ventrals are separate, disposed horizontally and quite flat, the last or longest ray being 1.6 in the head; the caudal is rounded.

Scales.—Body scaleless. The lateral line arises above the humeral spine and passes along the upper edge near the dorsal fin, but suddenly drops on the caudal peduncle to the middle of the tail, and is continued nearly to the end of the caudal rays.

Colours.—Head and body above the lateral line, greyish brown mottled below, the lateral line is without markings, and the appearance of longitudinal stripes is thus produced: lower surfaces colourless: dorsal fin mottled, pectorals and caudal dark grey with white margins.

Length.—426 mm., the largest specimen preserved measures 555 mm.

Taken from the Canterbury Bight northward to the Bay of Plenty, at depths between 28 and 78 fathoms.

Hitherto *Kathetostoma laeve* Bloch and Schneider, has been regarded as a New Zealand species, and *K. giganteum* Haast placed as a synonym. Our specimens are, however, distinct, and I am obliged to Mr. A. R. McCulloch for comparing specimens with Australian examples: he mentions that the bony ridges on the head are not broken up into tubercles as in *K. giganteum,* and that the antero-posterior dimensions of the bony area is greater than the interorbital space, while it is equal to it in our form; the fringes between the chin and the ventral spines are neither so numerous nor so well defined in *K. laeve*, and in this species the lateral line is much better defined: lastly, the colour pattern of *K. laeve* tends to form transverse bars, while in *K. giganteum* they are longitudinal. The New Zealand species grows to an enormous size, the type being 740 mm. in length. Gill placed this species as a synonym of *Geniagnus maculatus*, but I find it to be a true *Kathetostoma*, allied to

K. laeve, but distinct. In large specimens the markings become ill-defined resulting in a general mottling, but in young specimens the ornamentation is very striking. The upper half of the body is warm brown, and there is a median white line in which the dorsal fin stands, and another on each side occupied by the lateral lines, the sides are ornamented with large white spots.

An examination of the type specimen shows that the formula of the fin rays has been incorrectly rendered in the description, my count being as below.

D. 18; A. 17 or 18; v. i. 5; P. 22; C. 11.

GENIAGNUS Gill, 1861.

Geniagnus maculatus Forster.

Uranoscopus maculata Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 49.

Anema monopterygium Günther, Cat. Fish. Brit. Mus. ii., 1860, p. 230.

Kathetostoma monopterygium Hutton, Cat. N.Z. Fish., 1872, p. 23.

Synnema monopterygium Haast, T.N.Z.I. v., 1873, p. 274

Genyagnus maculatus Gill, Mem. Nat. Acad. Sci. vi., 1893, p. 118.

Stations 1, 2, 13, 16, 23, 30, 31, 35, 39, 47.

This species appears to be a southern form, having been trawled from Stewart Island, northward to Lyttelton.

It may readily be mistaken for *Kathetostoma,* its general form, colour, and markings being very similar. The small eyes, inconspicuous humeral spine and the absence of any spines in front of the ventral fins are sufficiently striking, the bony ornamentation on the top of the head also is quite different; it is formed of compact masses, and there is a hinder median boss not represented in *Kathetostoma,* in which also the rugosities are much more open. The upper half of the body is brown with large white spots, which do not form lines as in *Kathetostoma*.

GNATHAGNUS Gill, 1861.

Gnathagnus innotabilis Waite.

Gnathagnus innotabilis Waite, Rec. Aust. Mus. v., 1904, p. 238, pl. xxvi., fig. 1.

Stations 89, 91, 92, 94, 95.

All the specimens obtained were taken in the Bay of Plenty, where nine, practically continuous, hauls were made, and the species was represented at five of them. The bottom was sand and mud, and the registered depths 25 to 94 fathoms.

The largest example previously known was 152 mm. in length, but specimens taken by the trawler show that it attains a considerable size, up to at least 560 mm.

Three specimens were originally taken off Narrabeen, New South Wales, and those now recorded constitute a record for New Zealand, the genus not being previously known from our waters.

Family PARAPERCIDÆ.

PARAPERCIS Bleeker.

Parapercis colias Forster.

Blue Cod.

Gadus colias Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 54.

Stations 23, 25, 49.

As this species inhabits the vicinity of rocks it is not usually taken in the trawl, and at two of the three recorded Stations the net was fouled with rocks. The Blue Cod was freely taken at the Chatham Islands on hand lines, the specimens being of large size and excellent market fish, a matter I have previously referred to (pp. 53 and 56).

Parapercis gilliesii Hutton.

Plate LIII.

Percis gilliesii Hutton, Ann. Mag. Nat. Hist. (5) iii., 1879, p. 53.

Station 89.

B. vi.; D. v. 21; A. 17; V. i. 5; P. 20; C. 14 + 6; L. lat. 62; L. tr. 7 + 20.

Length of head 3.7, height of body 4.8, length of caudal 4.5 in the total; diameter of eye 2.6, interorbital space 9.0, and length of snout 3.0 in that of the head.

The upper part of the head and snout are declivous, while the under part is flat, the large eyes are quite near to each other and cut the upper profile: snout acute, mouth small, cleft horizontal, with the lower jaw slightly longer than the upper: the maxilla extends to beneath the anterior third of the eye, edge of preopercle smooth, a spine on the opercle.

Teeth.—A broad band of villiform teeth, and an outer pointed series in a single row in each jaw.

Fins.—The dorsal commences above the root of the pectoral, its fifth spine is the longest, equal to the diameter of the eye; the first and last rays are shorter than the others, which are subequal, and one-half longer than the eye; the anal is lower and arises beneath the fifth dorsal ray; the pectoral and ventral are of equal length, one-sixth shorter than the head, the latter reaches the second anal ray; the upper lobe of the caudal is pointed, the lower lobe rounded, and the depth of its peduncle is nearly equal to the diameter of the eye.

Scales.—The snout and lower parts of the head are naked, but the hinder part of the cheeks, opercles, and the whole of the body, are covered with ciliate scales of moderate size; the lateral line is slightly bowed over the pectoral and extends to the base of the caudal.

Colours.—Generally sandy with dark brown markings, two lines along the body, the upper of which crosses the lateral line at the middle of its length, a number of bands pass from the upper brown line across the back, they are generally in pairs, one across the occiput, one at the first dorsal spine and another at the first ray, three more beneath the rays and a last one on the caudal peduncle; the base of the dorsal has a brown mark where crossed by each band and an intramarginal line of the same colour, the other fins are colourless.

Length.—164 mm.

One specimen only was obtained, it was taken in the Bay of Plenty in 66-94 fathoms, and judging by the large size of the eye it is an inhabitant of moderately deep water.

This specimen is possibly only the third known, the type having been taken near Dunedin, while another is in the collection of this Museum.

Family TRICHONOTIDÆ.

HEMEROCŒTES Cuvier and Valenciennes, 1837.

HEMEROCŒTES ACANTHORHYNCHUS Forster.

Plate LIV., fig 1.

Callionymus acanthorhynchus Forster, in Bloch and Schneider, Syst. Ichth., 1801, p. 41.

Hemerocoetes acanthorhynchus Richardson, Voy. "Ereb. and Terr.," Fishes, 1848, p. 123, pl. liv., figs. 7-12.

Stations 5, 20, 48, 50.

B. vii.; D. 42; A. 40; V. i. 5; P. 18; C. 8 + 6; L. lat. 48; L. tr. 4 + 7.

Length of head 4.2, height of body 11.2, and length of caudal 6.7 in the total: diameter of eye and length of snout 3.3 in the head.

The interorbital space is so narrow that the orbits all but touch each other, the nostrils of each side are widely separated and are placed close in front of the eyes, the maxilla extends to beneath the middle of the eye, and each preorbital carries a spine directed over the premaxilla; gill membranes very wide, not attached to the isthmus, gill-rakers short and blunt, fifteen on the first arch, of which two are on the lower limb.

Teeth.—Villiform teeth in bands in the jaws and on widely separated patches on the expanded ends of the vomer.

Fins.—The dorsal commences close behind the base of the pectoral, its rays are of uniform height, the few anterior and posterior ones excepted; their length is equal to the height of the body: the length of the anal is twice the distance of its origin from the end of the snout, it arises below the 5-6 rays of the dorsal and is continued posterior to that fin, its rays are one-fourth shorter than those of the dorsal; pectoral rounded 1.6 in the head; the ventral just reaches the vent, and it is a little shorter than the snout and eye together; the caudal is rounded, but the second and third upper principal rays are elongate, the third being the longest, and one-half longer than the fourth: the peduncle is low, one-half the diameter of the eye.

Scales.—Snout naked, upper part of head, cheeks and opercles with scales a little smaller than those on the body, which are large, cycloid and carry small auxillary scalelets at their bases; the scales of the lateral line are crenulate but not spinous. The lateral line is slightly depressed over the pectoral, otherwise runs straight along the middle of the body.

Colours.—All the colours have faded in the preservative, but during life they were very striking, the head and body being marked with blue lines and some red spots on the fins; subvertical lines on the cheek, and two lines on the dorsal may still be traced. I have, unfortunately, lost my drawings made on board the trawler.

Length.—194 mm.

This species was taken at the southern Stations, between Foveaux Strait northward to Pegasus Bay in 20 to 67 fathoms, and was also found in the stomachs of Barracoutas (*Thyrsites atun*) at Station 20.

With the exception of a slightly larger eye and a difference in the caudal rays, the specimens agree well with Richardson's figure; this writer mentions that the tail in his specimen was not perfect, and states that Forster drew the tail as being lunate at the end, and that Dr. Dieffenbach described the fin as being truncated with an elongation of the upper angle.

HEMEROCŒTES MICROPS sp. nov.

Plate LIV., fig. 2.

The specimens below described were not taken by the trawler, nor within the sphere of its operations; they were caught by myself on a hand line in the various Sounds on the south-west coast, and present several differences from what I have considered or have chosen to consider as typical of *H. acanthorhynchus*: the principal features in which the specimens differ may be expressed as follows:—

D. 40; A. 39.

Length of head 3.7, height of body 10.4, and length of caudal 5.6 in the total: diameter of eye 4.5 and length of snout 2.5 in the head.

Compared with *H. acanthorhynchus*, the head is larger, while the eye is very much smaller, both vertically and horizontally, so that the interorbital space is wider and the snout much longer; in the older species the eye and the snout are of almost equal length, but in *H. microps* the eye is but half the length of the snout; there is a prominent knob above the tip of the upper jaw.

Fins.—The vertical fins are very much higher than in the type species, the dorsal being more than a third higher than the body: the lunate caudal, when compared with Richardson's figure, would also appear to be different, but the shape is really determined by the degree to which the outer rays are produced, a feature which may depend upon age, sex or other condition.

Colours.—The once brilliant colouration has quite disappeared in preservative, the general disposition of the markings alone remaining. The upper part of the head and the body above the lateral line are brown, the underparts are colourless; a blue line from below the preorbital spine, passes backwards beneath the eye, there are some oblique bars on the cheeks and opercles: and seven dark brown bars across the upper half of the back, the first being in advance of the dorsal fin and the last behind it on the caudal peduncle: all the fins are smoky; the dorsal has three darker horizontal lines.

Length.—217 mm.

The brilliant colouration and striking markings of this fish excited the interest of all who saw it alive, but not recognising it as different from the specimens previously trawled, and of which I had made careful colour sketches—since lost—I did not take note of its characters.

Presuming that the specimen described and figured by Richardson is co-specific with Forster's examples, I have given a new name to the smaller eyed, longer snouted, and longer rayed form taken on the west coast, and have figured specimens of each.

Family BLENNIIDÆ.

TRIPTERYGION Risso, 1826.

Tripterygion varium Forster.

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

Station 48.

Living examples were trawled in Pegasus Bay in 44 to 46 fathoms, and at the same time specimens were taken from the stomach of a Trumpeter (*Latris lineatus*). I have recently described specimens taken at the Auckland Islands.[48]

Family OPHIDIIDÆ.

GENYPTERUS Philippi, 1857.

Genypterus blacodes Bloch and Schneider.

Ling.

Ophidium blacodes Bloch and Schneider, Syst. Ichth. 1801. p. 484.

Stations 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 26, 27, 29, 31, 32, 34, 35, 36, 38, 39, 40, 41, 42, 43, 44, 45, 47, 48, 49, 50, 52, 53, 54, 57, 61, 62, 65, 66, 67, 77, 78, 86.

Represented in almost every haul from Stewart Island to Gisborne and at depths from 9 to 183 fathoms, this species was more plentifully taken at the southern Stations. At Half-moon Bay, Stewart Island, the Ling was commonly seen swimming round the piles of the jetty in four feet of water: it was also represented in the hauls made at the Chatham Islands. I have previously (p. 54) referred to the extreme buoyancy of this fish when drawn to the surface, remarking that when the air bladder and tissues are distended it resembles an elongated barrel, and comparatively few are required to float the net and its contents. Cephalopods, crustaceans, eels and other fishes were commonly removed from the stomachs, while all the examples netted at Station 7 in 43 fathoms had the intestinal tract crowded with the crustacean *Munida gregaria*.

(48) Waite, "Subantarctic Islands of N.Z." 1909, p. 597.

Family SCORPÆNIDÆ.

SCORPÆNA Linnæus, 1758.

Scorpæna percoides Richardson.

Sea Perch.

Sebastes percoides Richardson, Ann. Mag. Nat. Hist. ix., 1842. p. 384.
Scorpaena barathri Hector, T.N.Z.I. vii., 1875, p. 245.

Stations 18, 19, 22, 23, 24, 25, 26, 30, 36, 38, 46, 49, 71, 83, 84, 88, 89.

This common species was freely taken, the depths ranging from 13 to 105 fathoms. Günther states that it descends to 400 fathoms.

In 1887 *S. barathri* was pronounced by Günther[49] to be synonymous with this species. Being possibly unaware of this, Gill[50] catalogued it as *Sebastapistes barathri,* and it therefore appeared in Hutton's "Index" and consequently in my "Basic list" also.

Specimens taken on hand lines at Pitt Island, one of the Chatham Islands group, measure 398 mm. in length.

In common with many other Sebastoid fishes, this species is viviparus, a fact first made known to me by Mr. Anderton. The young are very small, but are produced in large numbers.

CONGIOPODUS Perry, 1871.

Congiopodus leucopæcilus Richardson.

Pig Fish.

Agriopus leucopaecilus Richardson, Voy. Ereb. and Terr., 1846, p. 60, pl. xxxvii., fig. 4, 5.
Congiopodus leucopoecilus Gill, Mem. Nat. Acad. Sci. vi., 1893, p. 118.

Stations 16, 20, 21, 22, 23, 24, 25, 26, 29, 30, 31, 33, 34, 36, 46, 49, 50, 51.

The localities at which this species was taken are all southern ones, no examples being netted north of Pegasus Bay: it was found to be extremely common where it occurred, and was obtained at depths between 13 and 50 fathoms.

The South American species *C. peruvianus* Cuvier and Valenciennes appears to have been first recorded for New

(49) Günther, Chall. Rep. xxii. 1887, p. 17.
(50) Gill, Mem. Nat. Acad. Sci. vi. 1893, p. 117.

Zealand by Hutton,[51] who writes: "Distinguished by having a small spine before each orbit," which indeed is the only expressed difference rendered in Günther's work. I have compared the specimens used by Hutton with the fine series now at my command, and I find them to be identical. It may be noted that small examples possess the preorbital spines, whereas larger ones do not, the spines are therefore characteristic of immaturity. I am not in a position to decide if *C. leucopaecilus* is distinct from *C. peruvianus;* if not the latter name should be employed. It is certain, however, that we know but one species from New Zealand.

The Pigfish was found to be feeding largely upon a minute hermit crab, which Dr. Chilton identifies as *Eupagurus stewarti* Filhol; the crustacean was not extracted by the fish, but the shell of the mollusc or the small mass of calcareous polyzoon in which the crab resided was swallowed whole, and the crustacean was doubtless dissolved out by the juices of the fish's stomach.

I may here refer to another extremely doubtful New Zealand member of the family. *Perca cottoides* Linn. (= *Cottapistus cottoides*) was entered as a member of our fauna on the evidence of a specimen in the Haslar collection received at the British Museum, but in giving the range of the genus (*Prosopodasys*) Günther placed New Zealand within brackets evidently to express doubt. The species, however, found a place in the New Zealand lists, but in 1890, Hutton[52] marked the entry with a ?, and, in a working copy which he used, I find the species scored out and *Agriopus peruvianus* substituted. As far as I am aware, no further specimen has been identified from New Zealand, and I think that the species may be placed with those which remain to be rediscovered.

Family COTTIDÆ.

NEOPHRYNICHTHYS Günther, 1876.

Neophrynichthys latus Hutton.

Toadfish.

Psychrolutes latus Hutton, T.N.Z.I. viii., 1876, p. 214.

Neophrynichthys latus Günther, Ann. Mag. Nat. Hist. (4) xvii., 1876, p. 396, (not P.Z.S., 1881, p. 20, pl. i.) Gill, P.U.S. Nat. Mus. xi., 1888, p. 327, pl. xli.

Stations 5, 28, 31, 32, 40, 43, 44, 50.

This appears to be a southern species, not being taken northward of Pegasus Bay, though obtained from our most southerly

(51) Hutton, T.N.Z.I. xxviii. 1896, p. 314.
(52) *id.*, *ib.* xxii. 1890, p. 277.

Station; it shows considerable vertical range, having been trawled between 9 and 183 fathoms.

This fish formed the principal subject of the paper by Dr. Gill, above listed, but having but a single specimen, the author was unable to sacrifice it to ascertain its anatomical structure. He writes:—"We may hope that perhaps Professor Parker, to whom we are indebted for excellent memoirs on the anatomy of several fishes of his adopted home, may give himself, or depute a student to give us, some details as to the anatomy of a fish which does not appear to be excessively rare in New Zealand." I was particularly unfortunate in my selection of a specimen for anatomical examination, for choosing one which was unsatisfactory as regards its exterior I found that the skull was broken to pieces and so crushed as to render it impossible to ascertain the original condition of the bones. Moreover the specimen was preserved in formaline, a medium which so hardens the tissues as to make dissection from bones which appear to be semi-cartilaginous, a rather difficult matter under the best conditions. I possess only one example preserved in spirits, and this I have sent to Dr. Gill with the request that he will examine it, so that we may have the benefit of his wide experience in all matters connected with the anatomy of fishes.

The following are the few notes revealed by an examination of the imperfect specimen above referred to:—

B. vii.; D. xii., 15; A. 14; V. i. 3; P. 25; C. 10 + 8.

The vertebræ number 33, there are four gills, no slit behind the fourth, gill-rakers ten, eight being on the lower limb of the first arch, they are very small and widely spaced, the upper pharangeal teeth are two rounded masses, the lower ones are smaller and flat.

Though known to attain a length of 407 mm. (= 16 inches), all the examples taken in the trawl are much smaller, and specimens 188 mm. in length have the ova fully developed.

Family TRIGLIDÆ.

The three genera of Gurnards known in New Zealand waters may be thus identified:—

a. Scales very small.
  b. Spiny scutes at the bases of both dorsal fins.. .. .. *Chelidonichthys.*
  bb. Flat scutes at base of first dorsal only .. .. .. *Pterygotrigla.*
aa. Scales large, lateral line with 75 or fewer scales .. .. .. *Lepidotrigla.*

CHELIDONICHTHYS Kaup, 1873.

Chelidonichthys kumu Lesson and Garnot.

Red Gurnard.

Trigla kumu Lesson and Garnot, Voy. Coquille, Poiss, 1826, p. 214, pl. xix.
Chelidonichthys kumu Jord. and Evern., Rep. U.S. Fish. Comm., 1896, p. 488.

Stations 25, 31, 34, 39, 42, 43, 44, 51, 53, 54, 61, 62, 64, 65, 67, 69, 70, 72, 73, 74, 76, 77, 78, 80, 81, 85, 86, 87, 90, 92, 93, 94, 95.

This common species was first encountered off Oamaru and was thence taken generally throughout the remainder of the cruise, the depths ranging from 10 to 105 fathoms.

PTERYGOTRIGLA Waite, 1899.

Pterygotrigla picta Günther.

Spotted Gurnard.

Plate LV.

Trigla picta Günther, Chall. Report, Shore Fishes, 1880, p. 24, pl. xiii., fig. A.
Pterygotrigla andertoni Waite, Proc. N.Z. Inst., 1910, p. 26.

D. vii.-viii. 12; A. i. 11; V. i. 5; P. 12 + 3; C. 11 + 8; Sc. 117; Vert. 10 + 16 = 26.

Length of head (exclusive of spines) 2.9, height of body 3.8, length of caudal 4.8 in the total; diameter of eye 3.2, interorbital space 3.0, length of snout 2.1 in the head.

Profile of snout very declivous, supraorbital edge most prominent, rising far above the contour of the head, producing a concave interorbital area; the maxillary reaches to below the anterior margin of the orbit: a single flat rostral spine on each side, a sharp spine on the temporal and another on the opercle, both directed backwards, a smaller one at the angle of the preopercle, a deep notch below it; a large spine on the supraclavicle directed upwards and backwards. Gill-rakers short and stout, fifteen on the first arch.

Teeth.—Teeth in narrow bands in the jaws, divided on the mid line, and on the head of the vomer; none on the palatines.

Fins.—The dorsal spines are strong and sharp with acute edges, the first, which stands wholly behind the head, slightly exceeds the orbit in length, the third spine is the longest, but does not extend as far as the fourth or fifth when depressed; its length is nearly twice that of the orbit: the two first spines stand on a slight eminence, the others in a depression: the base of the soft dorsal is one half longer than that of the first, and its fifth or longest ray is shorter than the second spine: the anal arises in advance, and terminates posterior to the soft dorsal and its corresponding rays are lower; the pectoral is very long, reaching to below the middle of the base of the second dorsal; of the three detached rays the upper one reaches to the base of the first anal ray, or to the tip of the ventral, which fin reaches the base of the first anal ray; caudal fin deeply cleft with pointed lobes, the outer margins of which are quite straight, the peduncle is very low, its depth being one-half the diameter of the orbit, its thickness is but slightly less; the rays leave it at a very marked angle.

Armour.—The striæ on the head plates arise from certain centres and extend radially, they are especially rugose on the upper plates; the occipital plate is deeply incised, the temporal spines forming its outer border; the flattened area whence the spinous dorsal arises bears eleven rugose plates, the first is large, crescentic with straight lateral sutures, extending across, in front of the first spine; the others become successively smaller, the last pair being at the base of the sixth spine.

Scales.—Scales very small, deeply imbedded, lateral line well marked, anterior portion of body, below the dorsal plates and including the lower surface, naked.

Colours.—General colour pink, yellow above and white beneath; bony plates ochreaceous; fins yellow. The whole of the upper half of the head and body with black spots of different sizes and irregularly arranged; similar spots on the dorsals and caudal fins, those on the upper edge of the caudal are elongate and form a margin; the inner side of the pectoral is brown with seven black bars, these show through to the outer side, but no markings are visible when the fin is closed, the only spots then seen are those on the first ray and some smaller ones at the base of the fin, the lowest ray is without colour or marks, a few spots on the detached rays: the outer surfaces of the first three rays bear three rows of large spots; the fin is broadly margined with white.

Length.—294 mm.

This species, represented by several specimens, was taken in the Bay of Plenty after I left the trawler, and was sent to me by Mr. Thomas Anderton, Curator of the Portobello Marine Fish Hatchery.

It differs from *P. hemisticta* in comparative proportions also in colour markings, as ascertained from the description by Jordan and Starks.[53] The maxillary is much shorter, not extending beyond the anterior margin of the eye; there are more plates at the base of the first dorsal fin and the rays are relatively higher: both ventral and pectoral fins are longer and the detached rays of the pectoral (which may be called Chiropods) are relatively shorter.

In regard to colour, the large black spot on the dorsal fin of the Japanese species is replaced with small scattered spots, not dissimilar from those on the body, the dorsal rays bear three rows of spots and the ventrals and chiropods are also spotted. Fresh specimens of *P. hemisticta* may exhibit markings on these fins also, as the one described was "apparently faded." Judging from our examples, however, I shall be quite prepared to hear that the colouration of the specimen was not far from normal. It is unlikely that there is any agreement in the colour of the pectoral in the two species; in *P. hemisticta* the markings are in the form of two rows of milk white spots, while in the New Zealand form there are seven black bars.

The name *P. andertoni* was published, the above description written, and the accompanying plate prepared before I discovered that the species was in all probability identical with *Trigla picta,* described from Juan Fernandez.

Having communicated these facts to Mr. A. R. McCulloch, he informs me that the same species was trawled by the "Endeavour" in Southern Australia; the three known habitats of this handsome fish are therefore in approximately the same latitude.

The genus *Otohime,* of which *O. hemisticta* is the type, is a synonym of *Pterygotrigla.*

LEPIDOTRIGLA Günther, 1860.

a. Pectoral long, more than one-third the total length, a black mark on the first dorsal .. .. *vanessa.*
aa. Pectoral shorter, less than one-third the total length, dorsal without markings *brachyoptera.*

Of the two described New Zealand species, one only was obtained.

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(53) Jordan and Starks, P.U.S. Nat. Mus. xxxii. 1907, p. 132.

Lepidotrigla brachyoptera Hutton.

GURNARD.

Lepidotrigla brachyoptera Hutton, Cat. Fish. N.Z., 1872, p. 27, and T.N.Z.I v., 1873, pl. xv., fig. 41.

Stations 21, 26, 30, 36, 39, 50, 67, 74, 75, 83, 84, 88, 89, 90.

B. vii; D. viii. 16; A. 16; V. i. 5; P. 11 + 3; C. 12 + 20; L. lat. 64.

Length of head 2.7, height of body 4.0, and length of caudal 4.1 in the total; diameter of eye 3.0, interorbital space 3.7, and length of snout 2.7 in that of the head.

Snout emarginate, the lateral prominences rounded with about six denticles, interorbital space flat in the middle, but the supraorbitals are much raised; supraocular and postocular spines very small, a cross furrow behind the latter, the nuchal spine reaches to the base of the third and the humeral to that of the fifth dorsal spine; opercular spine short, the third dorsal spine is the longest and is half the length of the head.

Fins.—The pectoral extends to the third, fourth, fifth or sixth anal ray, it is 1.1 in the head or 3.1 in the total: the upper chiropod does not nearly reach the tip of the ventral.

Scales.—The scales are spinous, spines of dorsal scutes strong and sharp.

Colours.—General colour red, the outer rays of the pectoral are colourless, the inner ones, including the membrane are black on the inner side, the colour showing through on to the outer side as bluish grey.

Length.—163 mm.

Taken from Otago to the Bay of Plenty at depths between 20 and 105 fathoms, and freely trawled at the Chatham Islands also.

PLECTOGNATHI.

Family MONACANTHIDÆ.

PSEUDOMONACANTHUS Bleeker, 1866.

Two distinct species of the genus have been previously confused they may be identified by the following characters:—

a. Gill opening under hinder half of eye, pectoral behind posterior margin of orbit, skin very rough when rubbed forwards .. .. .. *scaber.*

aa. Gill opening under front half of eye, pectoral below middle of orbit, skin velvety .. .. *convexirostris.*

Pseudomonacanthus scaber, Forster.

Rough Leather Jacket.

Plate LVI.

Balistes scaber, in Bloch and Schneider, Syst. Ichth., 1801, p. 477.

Station 28.

D. ii. 35; A. 35; P. 13; C. 12.

Length of head 3.2, height of body at the vent 2.1, length of caudal 3.4 in the total; diameter of eye 3.4, length of snout 1.3, and interorbital space 3.0 in the head.

The gill opening is oblique and placed under the hinder part of the eye, being separated therefrom by an interval less than its diameter; the nostrils are close together, placed in front of the upper part of the eye. The head is deeper than long, and the upper profile is sinuous, being concave over the snout; the interdorsal space is also concave; the ventral process is markedly extensible.

Fins.—The dorsal spine stands over the hinder half of the eye, midway between the end of the snout and the origin of the dorsal rays; its length is 1.7 in the head; the hinder barbs are large, six or seven in number; the anterior ones are small; the middle rays of the dorsal are the longest, about one-third longer than the eye: the anal rays are similar, but lower; they originate and terminate relatively posterior to those of the dorsal: the ventral spine is fixed, large and with prominent spikes, one of which is directed forwards: the pectoral has a long fleshy base and the actual rays arise behind the vertical of the eye; the caudal is rounded and the depth of its peduncle is one-half more than the diameter of the eye.

Scales.—The scales are furnished with sharp points which make the skin so rough that the finger cannot be freely rubbed in a forward direction.

Colours.—The general colour is warm yellow, the upper parts reddish with brown markings, which are variable: the specimen described and figured is marked as follows:—A brown stripe from above the nostrils passes over the eye to the caudal; two dark marks below the dorsal rays and two similar ones at the base of the anal: a dark line from the eye to the mouth, and another below it; a wider one in front of the gill opening; all reach the ventral profile; there is also a clouded area beneath the pectoral fin, the colour spreading fanwise below.

Length.—196 mm.

This species was taken only at Station 28, six miles east of Oamaru, in 19-22 fathoms. I also have examples taken in Lyttelton Harbour.

Writing under *Monacanthus peronii* Günther[54] has the following note:—"*Balistes scaber* (Forst.) from Queen Charlotte's Sound, New Zealand, appears to be allied to this species; but the manuscript drawing made by Forster represents the dorsal spine as much more slender, without strong anterior barbs, which are most characteristic of *M. peronii.* The outline of the snout of *B. scaber* is concave."

Hutton[55] also refers to this species of Forster, and, placing it under *M. convexirostris* Günther, remarks that it "was most likely this species," and again[56] "This is certainly the *Balistes scaber* of Forster." Since that time *Balistes scaber* has disappeared from the New Zealand list, but I feel quite justified in identifying the present specimens with Forster's species, and in pronouncing the two as distinct as will be evident from a comparison of the accompanying illustrations, if my interpretations are correct.

PSEUDOMONACANTHUS CONVEXIROSTRIS Günther.

SMOOTH LEATHER JACKET.

Plate LVII.

Monacanthus convexirostris Günther, Cat. Fish. Brit. Mus. viii., 1870, p. 248. Hutton, Cat. Fish. N.Z., 1872, p. 71, and Hector, *ib.*, p. 120, pl. xii., fig. 114.

Stations 70, 78.

D. ii. 36; A. 36; P. 12; C. 12.

Length of head 3.4, height of body at the vent 2.3, length of caudal 4.3 in the total; diameter of eye 4.0, length of snout 1.1, and interorbital space 3.3 in the head.

The gill opening is oblique, placed under the anterior half of the eye, its distance therefrom is less than the vertical diameter of the orbit: the nostrils are close together, placed in front of the middle of the eye. The head is deeper than long and the upper profile is almost flat; the interorbital space is convex: the ventral process is very extensible.

Fins.—The front edge of the dorsal spine stands over the middle of the eye, and midway between the end of the snout and the dorsal rays; its length is 1.46 in the head; two rows of

(54) Günther, Cat. Fish. Brit. Mus. viii. 1870, p. 249.
(55) Hutton, Cat. N.Z. Fish, 1872, p. 71.
(56) *id*, T.N.Z.I. ix. 1877, p. 354.

about sixteen barbs behind, of moderate size, and two rows of smaller ones in front: the longest rays of the dorsal, anal and pectoral are equal, and are 2.7 in the head or one-half longer than the eye: the base of the anal is but little shorter than that of the dorsal, but it has a more posterior insertion: the ventral spine is fixed, rugose, with small spines: the base of the pectoral is short and is placed below the middle of the eye: the caudal is rounded and the depth of its peduncle is one-half greater than the diameter of the orbit.

Scales.—The scales have each about six or seven spines on their margins, but the spines are so small and soft that the skin feels velvety when rubbed either forwards or backwards.

Colours.—The general colour of the body is brownish-grey, the portion behind a line drawn from the eye to the origin of the anal is ornamented with regular dark blotches somewhat smaller than the eye.

Length.—309 mm.

The Smooth Leather Jacket was taken to the northward of Cape Turnagain, in 18 to 24 fathoms, it was also trawled in Hanson Bay, at the Chatham Islands, in 33 to 45 fathoms.

THE OUTCOME OF THE EXPEDITION.

The stated objects of the expedition have been referred to in the introduction, and it will be seen that they were of purely economic import.

Investigations were to be made only in direct connection with the food fishes, their distribution and the grounds suitable for their capture, and to place the information obtained on record for the guidance of those interested in the trawling industry.

These objects have been well attained, as will be evident by a study of the official report to which I have previously alluded. The report is very exhaustive; it contains information which can be obtained from no other source; and it should be in the hands of all who are interested in the fishing industry of the Dominion.

The information contained therein relative to the nature of the sea bottom in the areas prospected, and their suitability or otherwise for working the trawl is extremely valuable, and it is almost unnecessary to mention that it is nearly as important to know the rocky stretches, or those strewn with river drift-wood or other obstructions, so as to be made aware of satisfactory trawling grounds. It requires but a small fixed object to do irreparable damage to the net, or if it can be mended it may involve the expenditure of valuable time in its reparation. Two sets of gear are usually carried on trawlers, but it sometimes happens, as was once our experience, that the nets are badly ripped at successive hauls, when work has to be suspended until one of them is again made good.

Another feature of the report is the approximate number of marketable fish taken in the different hauls at the various localities exploited. I have used the term "marketable" in preference to "edible," because there is an abundance of good wholesome fish-food regularly taken in our waters, and thrown overboard again, being regarded as unsaleable. A bountiful supply of fish, even if it is second rate, might tend to lower the price of the commodity as a whole, and its introduction would not therefore be regarded with favour by those who conduct the sale of fish in our centres, though increased sales would doubtless more than restore the balance. I know no reason why the Red Cod (*Physiculus bachus*) should not be more freely eaten: this species was taken by tons, but it is not in much demand in the markets; yet, when eaten fresh, as all fish should be, it is extremely palatable, and considering its plenitude could be sold at a moderate price.

Though excellent as food, there is considerable prejudice against eating the flesh of eels; this is doubtless largely due to the interpretation of the biblical injunction against eating fishes devoid of fins and scales:—

"And whatsoever hath not fins and scales ye may not eat."

All eels are generally regarded as being scaleless, but this is not so, for members of the family of fresh-water eels (*Anguillidae*) have true scales imbedded in their skins, which become quite apparent when the skin is dried; they also have ample pectoral fins, so that even those who desire to conform to the Mosaic law, need have no compunction in eating the fresh-water eel, under the belief that it is scaleless and finless.

Personally, I prefer the Conger Eel (*Leptocephalus*), a species which, though possessing fins similar to the fresh-water eel, is absolutely devoid of scales. This fine sea eel is not uncommon in our waters, and attains to a length of at least seven feet; it possesses the recommendation of being very fleshy, and the large bones cannot be overlooked. The fresh-water eel abounds in our lagoons, and is a very great favourite with the Maoris. It is so plentiful in Lake Ellesmere, for example, that a boat may be filled with them in a night by a few sportsmen furnished with torches and eel-spears. Eels are accounted of better flavour when taken in the estuaries than when drawn from fresh-water.

To those who have no innate prejudice against eels, but who dislike the flesh as such, it may be said that everything depends upon the way in which they are cooked.

"One more piece of advice, and I close my appeals—
That is—if you chance to be partial to eels,
Then—*Crede experto*—trust one who has tried—
Have them spitch-cock'd—or stewed—they're too oily when fried!"

Being desirous of tasting as many different kinds of fish as possible, it will be understood that our *menu* on the trawler was somewhat varied as far as fish is concerned. On one occasion we had Elephant Fish (*Callorhynchus*) on the "saloon" table, and found it to be of quite delicate flavour and texture: the crew, however, to whom it was also served refused even to taste it, threw it overboard, and, if I mistake not, complained to the master that the cook was serving them with shark for meals; considering that there was plenty of prime fish on board one could not blame the men who could not, of course, be expected to treat their dinners experimentally, but the act was one of sentimental prejudice only. The flesh of the Elephant Fish is really good, and would be welcomed in a country poorer than New Zealand. I may add that in Canterbury Bight and Pegasus Bay this species formed quite a substantial percentage of the total takings of the net.

Few native born New Zealanders will eat Skate (*Raja nasuta*), yet in Britain where there are nine or ten species of the genus *Raja*, skate is an important food fish, and the New Zealand representative has a food value possibly equal to the best of them. It has the further recommendation of being very common and easily captured, for it is one of those ground forms which can scarcely escape the trawl.

The prejudice against eating the flesh of Dogfishes is not confined to New Zealand, but is fairly general, and may be traced to several sources. The Dogfishes are, of course, small sharks, and the general odium attached to the name shark is in itself calculated to arouse a certain amount of abhorrence. Then the names applied to the several kinds individually, suggest unpleasant associations. Our two common species are respectively known as Smooth Hound and Spiny Dogfish, while Dog Shark, Spotted Dog, Catshark, etc., are names by which other species are known, in contradistinction to Leopard Shark, Tiger Shark and other names applied to larger species.

The small Dogfishes are freely eaten by the poorer people in Britain, while there is reason to believe that American species are exported to England and sold freely, probably under disguised names. Possibly owing to the proximity of the famed fishery investigation establishment, it is said that the Plymouth Borough Council engaged the services of an expert chef to prepare dogfish for the aldermanic table. The flesh was tried both with and without sauce, and those who partook of the food pronounced it to be excellent in regard to colour, flavour and the firmness of the flesh. For this information I am indebted to an article published by Dr. Irving A. Field,[57] from which I make the following additional quotations:—

"The Dogfishes are not only palatable in the fresh condition, but are as good as many other fishes when preserved by the standard methods. The horned dogfish being in composition most like the salmon is best adapted for canning, and is considered as good as the medium grades of salmon. A packer in Petit de Grat, Cape Breton, in 1904 sent me a dozen cans of

(57) Field, Bull. U.S. Fish. Bureau, xxviii. 1908, p. 243.

dogfish he had packed. I passed them around to my friends, who prepared the contents in different ways (fried, scalloped, creamed, etc.). In these forms the canned article was highly praised in flavour and palatability. Samples were also sent to several hotels, where the fish was served to the guests as 'Japanese halibut,' and was pronounced most acceptable. An establishment at Halifax has been canning large quantities and putting them on the market labelled 'ocean whitefish.' A firm at Charlottetown, Prince Edward Island, has been successful in selling the canned articles as 'sea bass.'

"The smooth dogfish found south of Cape Cod is preserved best by salting and drying according to the same method employed for preparing dry salt cod. The product very much resembles cod, but has the advantage of being boneless. I have had creamed salt dogfish served in the mess hall of the Marine Biological Laboratory to a score or more of persons. They all reported that they could detect little or no difference between it and the ordinary salt codfish.

"The flesh of the dogfish is apparently just as digestible as that of other fishes, is palatable, nutritious, and easily preserved. The fish are so abundant and easily obtained that they are ridiculously cheap. But prejudice is barring this wholesome food from our menus. People seem more willing to starve than to eat this fish, just because it bears the name 'dog.' The problem now is how to put the fish on the market without an offensive label and at the same time meet the spirit and letter of our pure-food law."

I have heard it alleged that we rightly don't eat dogfishes because they are flesh feeders, as are lions, tigers, dogs and cats, and that man feeds only upon vegetable fed flesh as that of cattle and sheep. The speaker was unaware that nearly all the fishes we most prize for the table are carnivorous, and that the comparatively few kinds which feed upon algae, or seaweed, are not as a whole, in great demand, and require to be eaten quite fresh in consequence of the poor keeping qualities of the flesh.

The habits and food of our two dogfishes differ considerably: the smooth hound (see page 140, plate xiv., fig. 2) is a ground feeder, preying upon various kinds of crabs, and it may possibly become an enemy of the English lobsters which were imported and have thriven well and bred in the enclosures prepared for them at the Portobello Marine Fish Hatchery. If the lobsters multiply to such an extent as to warrant a number being turned adrift into the sea it would be well to choose the site very carefully to ensure all the necessary conditions being present, and if suitable shelters are absent to supply such under which the lobsters can retreat.

The spiny dogfish (see page 142, plate xvi., fig. 1) is, on the other hand, an active predaceous species, and follows up the shoals of herrings, pilchards, silversides and other fishes. Dr. Field says of the American species that the flesh of the smooth dogfish is free from oil, resembling most closely the cod, and that the flesh of the horned dogfish (allied to our spiny dogfish), contains a large percentage of oil, and in this respect most closely resembles the salmon.

Fashion in food as in other things may be determined by necessity; and hunger is a good cure for prejudice: though it may not be actual want which has brought about the change below referred to, there can be small doubt that the increasing scarcity of fish in the home markets, due to depletion of the trawling banks and consequent rise in price, has resulted in the greater consumption of the so-called coarser fish, for Mr. F. G. Aflalo[58] tells us that the smaller dogfishes find a ready market to-day at Brighton and elsewhere on the South Coast, where twenty years ago they would have been thrown away as offal.

Reverting to a consideration of the official report, the list of different fishes taken at the various stations, is also a useful feature, though as previously remarked, the value of the records is somewhat discounted by the fact that the determinations are too general and in some cases inaccurate; this will, however, be remedied to a considerable extent by the present publication, the *data* for which were independently obtained.

Though I have no direct evidence that extended trawling has been commercially undertaken as a result of the expedition, it would appear that the favourable report published as to the potentialities of the Chatham Islands for line fishing has been distinctly effective in placing capital into what it is hoped may be a remunerative venture. The company formed to exploit the Blue Cod and Hapuka fisheries is employing the "Nora Niven" to taken the catches to Wellington, but it is most disheartening to learn that the fishes are being shipped thence to Australia. Considering the high price of fish in New Zealand, one would have thought that the catches could have been disposed of here at prices at least equal to those of Melbourne or Sydney. As there is evidently something prejudicial to the sale of the fish in our own markets, some official enquiry should surely be made to ascertain the true condition of affairs. It seems anomalous that the people of this country should pay for a survey of the fishing grounds of the Dominion, and not be able to reap the benefit of the outcome thereof. It may of course

(58) Aflalo, British salt-water Fishes, 1904, p. 85.

be said that this undertaking is not the result of the work performed by the expedition, but it is at least significant that in the official report particular stress was laid upon the plenitude of fish at the Chatham Islands, and it was stated that "it is extremely probable that the Chatham Islands will in the near future become one of the most important sources of our fish-supply." In any case, this does not alter the fact, as stated in the public press, that the fish is not being consumed at our own tables.

Though the trawl is a selective instrument of capture, taking, as a general rule, only those animals living on or near the floor of the ocean, it secures most of the organisms within scope of its area of operations. It will be evident therefore, that though it will capture the food fishes which it encounters, it will also secure other fishes and other forms of animal life outside the limitations officially imposed on the undertaking. The present report is therefore another though indirect product of the expedition. It may be regarded as supplementary to the official report, dealing largely with a study of the products outside the official cognisance. At the same time the economic fishes have been treated more liberally than other forms, so that it may appeal to popular as well as to more purely scholastic circles. The species have been dealt with in the exact manner that science demands, the result being the recognition of many more, even economic species, than are enumerated in the official report.

The total number of fishes included is eighty-five of which eleven are described as new to science, some of these have been previously associated with Australian or other species, but are now found to be different. Others, though known elsewhere, are now recognised for the first time as belonging to the New Zealand fauna.

Though no attempt has been made to revise the synonomy of all the species included in the report, special attention has been devoted to the flatfishes, and with the aid of the synopsis supplied and the accompanying illustrations, there should now be small difficulty in identifying the several species of this family at present known from New Zealand seas. A glance at this portion of the report will show how very involved the literature of the subject is, as applied to New Zealand species, and suggests that a thorough revision of the whole of our fishes is necessary.

The records show that, as would naturally be expected with our extensive seaboard, fish is numerous and varied, but as the area between the extreme points of the Dominion stretches through thirteen degrees of latitude the range of water temperature, difference of food supply and other conditions operate in limiting the northern and southern distribution of some of the species, thus, for example, the Schnapper, Yellowtail (Northern Kingfish), John Dory, Cucumber fish, Mackerel, Trevally and Kahawai are commoner in the North Island, while the predominating southern forms are the Hake or Whiting, Kingfish, Blue Cod, Butterfish, Frostfish, etc.

Many species, however, range along the whole of the coast line, including Red Cod, Barracouta, Tarakihi, Ling, Hapuka, and many of the flatfishes, while one, the Black Flounder, is a fresh-water species. Considerable information was also gained as to the depths at which the different kind of fishes were most abundantly met with—it should be added—at the season at which the undertaking was conducted,—for it must not be supposed that the same results would be met with the year round.

The illustrations which accompany the report will be distinctly useful, and in the preparation of these I desire to acknowledge much help rendered by my assistant, Mr. Frank A. Pollard.

Fifty-two different kinds of fishes are illustrated, this number includes the sharks and rays, etc., which appeared in the first part of the report, and other fishes which are not directly of economic import, though many undoubtedly serve as food for edible species.

In keeping with the text, representations of the flat fishes have been more generously furnished and the whole of the species which, as far as I am aware, find a place in our markets have been illustrated.

Of the less economic portion of the report it may be noted that Professor Benham records five new species of Echinoderms, Mr. Henry Suter eight new species or varieties of Molluscs, while Dr. Chilton finds that though all the Crustaceans were previously known, one of them is an addition to the New Zealand fauna. The enumeration of the new forms does not, however, exhaust the interest of the communications, for several of the others had never been seen since they were first described, and were in danger of removal from the list as doubtful records. Dr. Chilton refers to the enormous numbers of Crayfish which we trawled at the Chatham Islands, and also mentions having seen them in shallow water at Dusky Sound in 1908. Being myself a member of the party which visited the South-west Sounds in that year I was also struck with the congregations of Crayfish mentioned by my friend, and cull the following from an article I wrote for the newspapers at the time:—

"Pulling over a sandy flat, large masses of brown seaweed were encountered, at least they were so regarded until the water glass was brought into requisition, it was then found that each seaweed-like mass was a great cluster of Crayfish, numbering from thirty to fifty individuals. Many were caught by means of a baited hook; while in very shallow water, isolated individuals were captured by hand, a somewhat sensational sport. It was observed that every example taken was a male, the females were possibly hiding beneath stones, engaged in maternal duties, this being their habit as observed at the Marine Fish Hatchery at Portobello.'' I have also the following note on *Munida gregaria* made about the same time: ''On one occasion what was thought to be a large frond of red seaweed was floating near the surface, the water glass showed it to be a school of red crustaceans known as whale-feed. Three fishes suddenly rose among them and the little creatures scattered in all directions.''

The reports on the Cephalopods and Nudibranchs, which were sent to England for examination have not reached me up to the time of going to press.

It is unfortunate that it was not found possible to have fuller observations made or collections preserved during the operations conducted on the extended cruise, and we may hope that in future the advisability of having at least one trained zoologist on board may not be lost sight of. I am simply stating a fact when I mention that no mere collection, however conscientiously made, can be got together by untrained men; the small differences which sometimes characterise allied species, or the outward similarity of forms which possess no close relationship to each other, are not appreciated. Further, it is not possible even for the trained man to recognise every species of a group with which he may be familiar, without careful comparison, made with the necessary tools and books to hand, and impossible on a commercial trawler. That this applies to the primest edible species as well as to those of lesser account will be evident from my remarks on the flatfishes to which I may again be permitted to refer.

While recognising the extremely useful work which the Government has so far done in adding to the knowledge of our marine resources, the operations to date should be looked upon as preliminary. They should not only be continued in the future but should be certainly extended to embrace further avenues of research. There are many problems which await solution before we can claim to have any adequate knowledge of our fish resources, but these can only be solved by patient and continued effort. We already know something of the various kinds of fishes which inhabit the waters within easy reach of existing markets, but of those which may frequent less accessible localities we are in almost total ignorance, and of the possibilities in this direction we cannot speak. Taking into account, however, only those kinds with which we are familiar, many pertinent questions may be asked to which we have no answer. Of how many of our common market fishes can we say we know the precise nature of their food, and if we know that a certain fish habitually feeds upon, say crustaceans, or upon molluscs or upon smaller fishes, we certainly cannot say exactly on our ocean floor where such are to be found: if we did we should be in a position to obtain the fishes of which we are in search. Fishes may, and do vary their haunts at different seasons, perhaps, on the whole, approaching the coasts in summer. At breeding time they may leave their usual feeding grounds and move inshore or into deeper water, according to their kinds, and this brings us to the important question of spawning: we require to know exactly at what season the fishes shed their ova, their relative fecundity, the position chosen for spawning, what the eggs are like, how those of different species differ, whether they sink, float or are attached to rocks, seaweed or other substances; the peculiarities of their development, the enemies to which both the eggs and the young fishes are subject, at what size the fry leave the breeding ground, and whence they migrate.

Not all this information can be obtained by trawling alone; though the trawl is *par excellence* the engine for securing fishes in bulk, it should be supplemented by the use of dredges, which are designed to secure the smaller organisms upon which they may feed, samples of the bottom whereon the fishes are found, also demersal or sunken ova: for similar reasons tow or surface nets should be employed to secure pelagic organisms (Plankton and Nekton) including floating eggs. It is also necessary to have a shore station where the development of the ova can be studied and various observations and experiments made. Fortunately the Dominion possesses such a station at Portobello, where, if somewhat more generously equipped, the most satisfactory investigations could be carried on.

In newer countries where no great depletion of food fishes has taken place, the needs for such investigations are not apparent, but, learning the lessons which older ones have taught, a time will come when our seas will be relatively less bountiful unless supplemented by artificial means or by importations from richer localities, and at such period it will be rather late to inaugurate observations which should now be commenced and continued towards the end in view.

It is not as though we had to grope our way trying to discover methods of research, Britain, America, Japan and other countries have done this for us, so that all we have to do is to collect the necessary *data* by means already known to us.

There may shortly be afforded an opportunity of witnessing the application of modern methods employed in collecting marine organisms and of collating the *data* obtained; the "Terra Nova," which left our shores a few months ago for the purpose of taking Captain Scott and his party to the shores of Antarctica, is shortly expected to return.

It has been proposed that before again going south, a cruise shall be conducted off the continental shelf of New Zealand for biological research purposes, and it is to be hoped that the project will receive the support of the Government.

In connection with the subject of sea fisheries, it may not be out of place to refer a little more fully to the Portobello Marine Fish Hatchery, the only one of its kind in New Zealand, which, though somewhat inadequately supported, has proved the medium by which it has been possible to publish some very valuable observations indeed. A general account of the hatchery has been supplied by Mr. George M. Thomson, F.L.S., M.P.[59] together with a preliminary notice of the development of some of the marine fishes; the work has been continued by Mr. Thomas Anderton,[60] Curator of the hatchery, who has issued a very carefully prepared article on the ova and larvæ of several important food fishes and crustaceans. As previously mentioned, my thanks are due to Mr. Anderton for assisting me with information gained in the hatchery or for specimens which his experience as Curator of the station enabled him to furnish.

Information of the nature supplied by Messrs. Thomson and Anderton is particularly valuable, and will enable workers to identify the eggs of fishes which may be found floating at the surface or drawn from the bottom by means of the dredge; it is by such auxiliary means that the breeding places and periods of the fishes may be ascertained, while, of course the *data* obtained as to the period of hatching and subsequent development is invaluable; unfortunately the hatchery is not sufficiently extensive at present to allow of post larval observations being made for any lengthy period, a matter which is deserving of the best consideration of the Government.

I have previously expressed my thanks to Mr. L. F. Ayson, Chief Inspector of Fisheries, and the several gentlemen who have so kindly examined the collections, it remains for me to render my grateful acknowledgment to the Hon. J. A. Millar, Minister for Marine, for his courtesy in permitting me to accompany the expedition, and further, for placing funds at the disposal of my Board, for the publication of the results in the "Records of the Canterbury Museum." I also desire to acknowledge my appreciation of the kind manner in which the official negotiations have been conducted by Mr. George Allport, Secretary to the Marine Department.

(59) Thomson, T.N.Z.I. xxxviii. 1906, p. 529 pl. lv.-lix.
(60) Anderton *ib.* xxxix. 1907, p. 477, pl. xvii.-xx.

As will be learned from the report on the Mollusca (p. 117), Sir Charles Eliot had kindly undertaken to examine the Nudibranchs collected on the cruise. The specimens were forwarded to him by Mr. Suter, and it is with deep regret that we read the following cablegram published in the New Zealand newspapers, as the foregoing pages were passing through the press:—

"London, May 29th.

"The death is reported of Sir Charles Eliot, Bart. Sir Charles succumbed to syncope, while attending an early communion service. He was 76 years of age, and served in India during the mutiny."

Sir Charles Norton Edgcumbe Eliot, K.C.M.G., F.Z.S., was Vice Chancellor of the University of Sheffield at the time of his death, and was formerly H.M. Commissioner for the East African Protectorate. In zoology he had specially directed his attention to the *Nudibranchiata*, upon which group he was a foremost authority. His published papers are very numerous, and include reports on collections from New Zealand.

EXPLANATION OF PLATES

PLATE XXIV.

Argentina elongata Hutton.
Slightly reduced.

PLATE XXV.

Chlorophthalmus nigripinnis Günther
About four-fifths natural size.

PLATE XXVI.

Centriscops humerosus Richardson, var. *obliquus* Waite.
Photograph of a specimen in the Dominion Museum.

PLATE XXVII.

Fig. 1. *Syngnathus norae* Waite.
Female, two-thirds natural size.
Fig. 2. *Syngnathus blainvillianus* Eydoux and Gervais.
Male, two-thirds natural size.
Fig. 3. *Myctophum humboldti* Risso.
Natural size.

PLATE XXVIII.

Hippocampus abdominalis Lesson.
Fig. 1. Male. Fig. 2. Female.
Both five-sixths natural size.

PLATE XXIX.

Fig. 1. *Coelorhynchus australis* Richardsor
About two-fifths natural size.
Fig. 2. *Coelorhynchus aspercephalus* Waite.
About two-thirds natural size.

PLATE XXX.

Fig. 1. *Macruronus novae-zelandiae* Hector.
Two-thirds natural size.
Fig. 2. *Merluccius gayi* Guichenot.
More than one-fourth natural size.

PLATE XXXI.

Fig. 1. *Physiculus bachus* Forster.
About half natural size.
Fig. 2. *Auchenoceros punctatus* Hutton.
Five-sixths natural size.

PLATE XXXII.

Cyttus novae-zealandiae Arthur.
Five-sevenths natural size.

PLATE XXXIII.
Capromimus abbreviatus Hector.
One and a halt times natural size.

PLATE XXXIV.
Caulopsetta scapha Forster.
Four-sevenths natural size.

PLATE XXXV.
Rhombosolea plebeia Richardson.
Nearly half natural size.

PLATE XXXVI.
Rhombosolea tapirina Günther.
Five-ninths natural size.

PLATE XXXVII.
Rhombosolea millari Waite.
Four-elevenths natural size.

PLATE XXXVIII.
Rhombosolea retiaria Hutton.
Five-ninths natural size.

PLATE XXXIX.
Ammotretis nudipinnis Waite.
One-third natural size.

PLATE XL.
Ammotretis guntheri Hutton.
Three-sevenths natural size.

PLATE XLI.
Pelotretis flavilatus Waite.
Five-eighths natural size.

PLATE XLII.
Peltorhamphus novae-zeelandiae Günther.
Two-fifths natural size.

PLATE XLIII.
Polyprion prognathus Forster.
Three-tenths natural size.

PLATE XLIV.
Cepola aotea Waite.
Natural size.

PLATE XLV.
Cheilodactylus macropterus Forster.
Three-fifths natural size.

PLATE XLVI.
Pseudolabrus coccineus Forster.
Three-sevenths natural size.

PLATE XLVII.

Pseudolabrus cinctus Hutton.
Seven-twelfths natural size.

PLATE XLVIII.

Pseudolabrus pittensis Waite.
Two-thirds natural size.

PLATE XLIX.

Coridodax pullus Forster.
One-third natural size.

PLATE L.

Seriolella brama Günther.
Four-sevenths natural size.

PLATE LI.

Seriolella punctata Forster.
Four-fifths natural size.

PLATE LII.

Rexea furcifera Waite.
About one-third natural size.

PLATE LIII.

Parapercis gilliesii Hutton.
Natural size.

PLATE LIV.

Fig. 1. *Hemerocoetes acanthorhynchus* Forster.
Fig. 2. *Hemerocoetes microps* Waite.
Both two-thirds natural size.

PLATE LV.

Pterygotrigla picta Günther.
Three-fifths natural size.

PLATE LVI.

Pseudomonacanthus scaber Forster.
Natural size.

PLATE LVII.

Pseudomonacanthus convexirostris Günther.
Three-fifths natural size.

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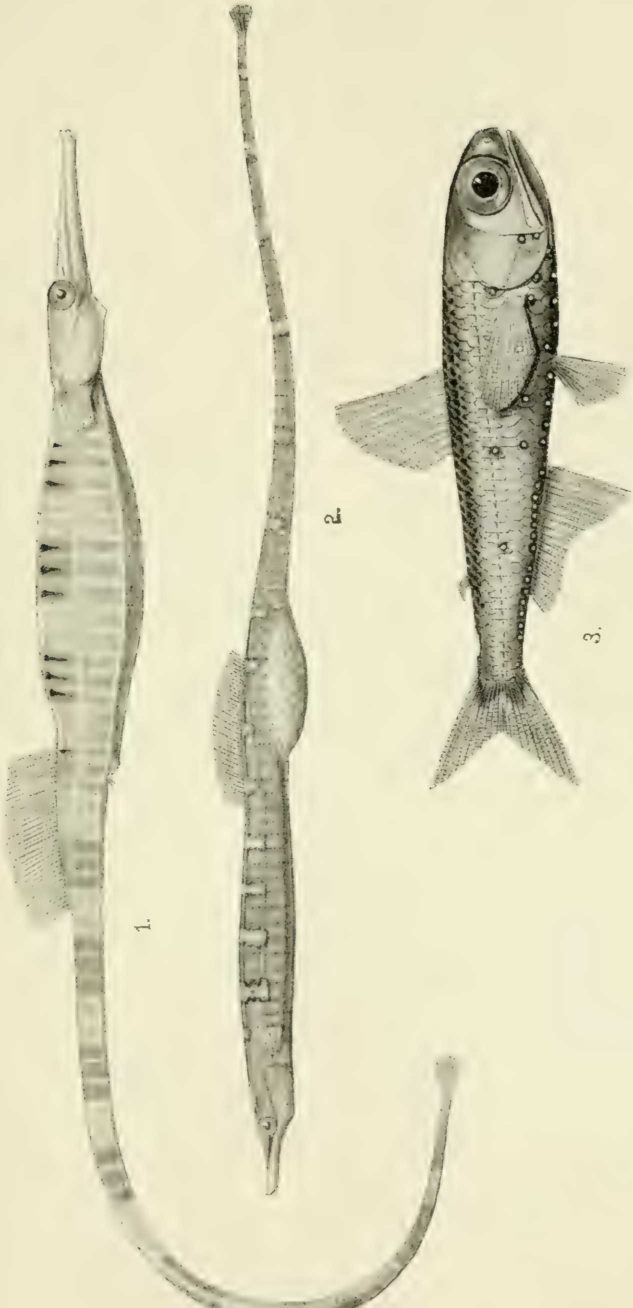
[A. Hamilton, photo.



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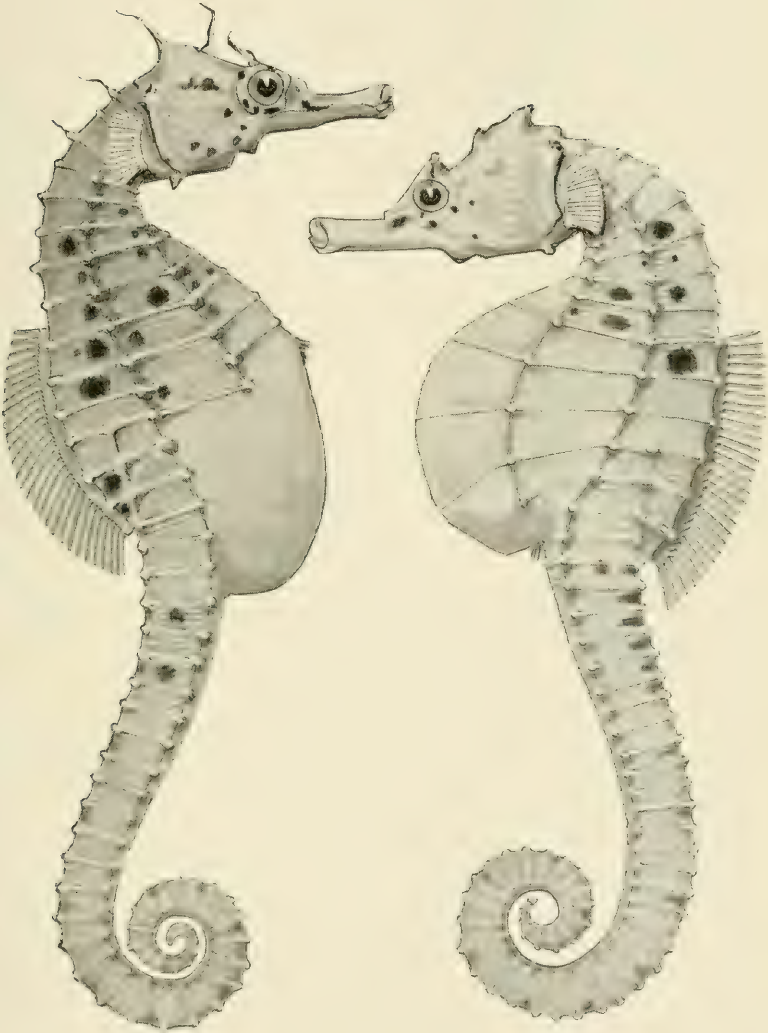

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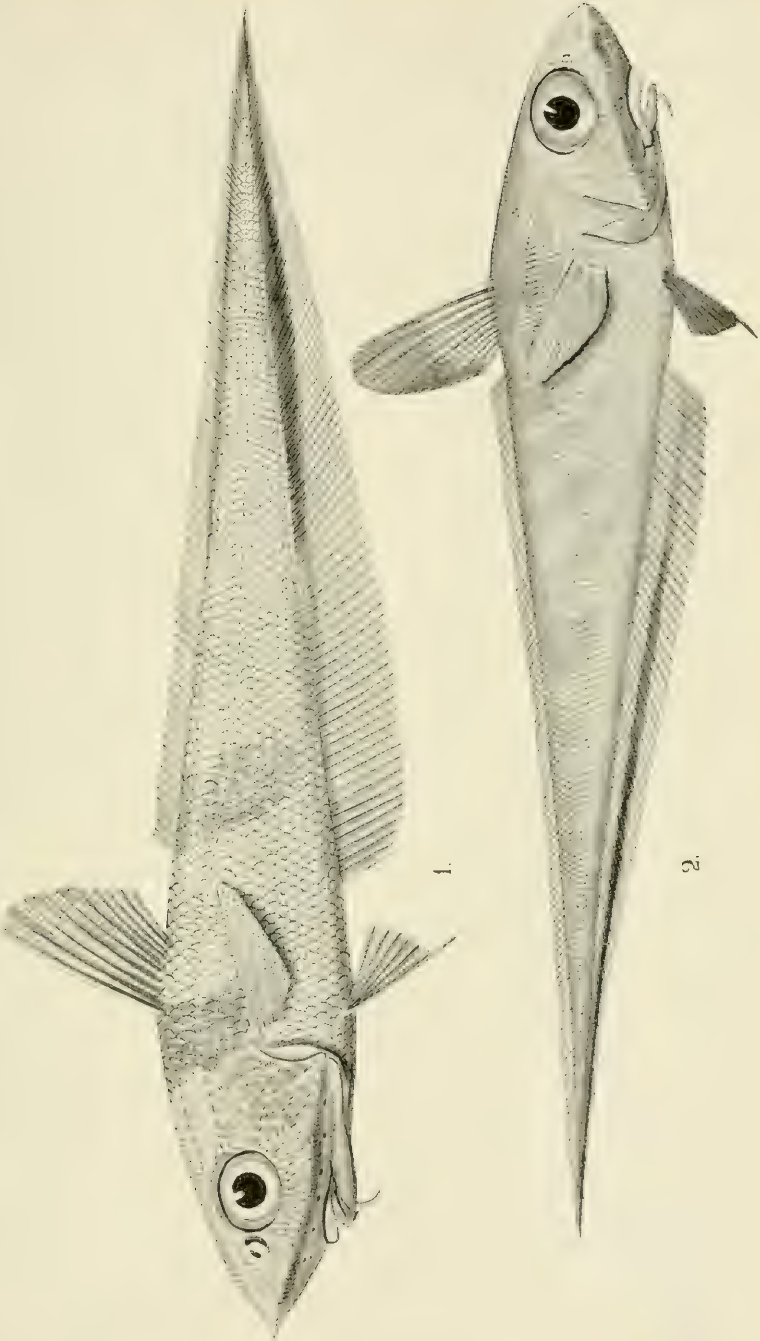

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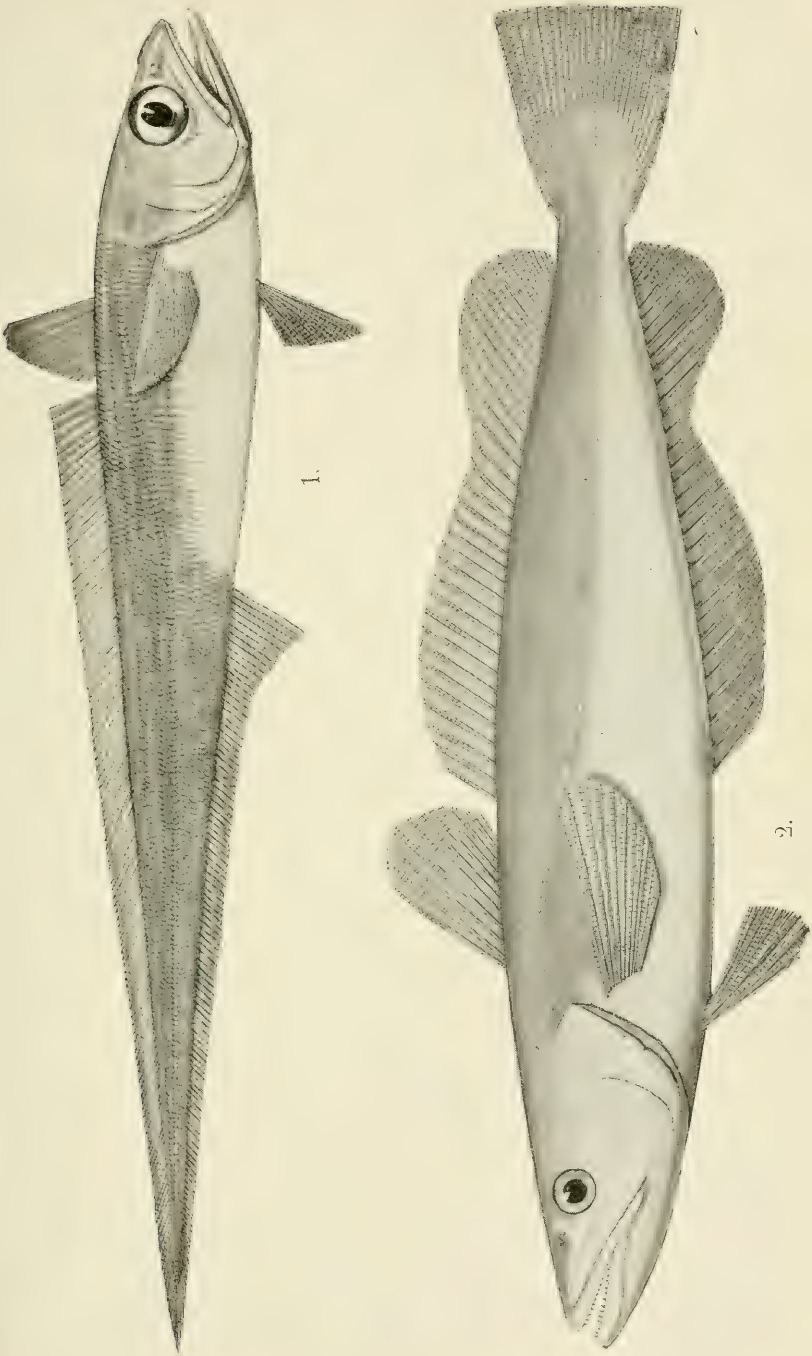

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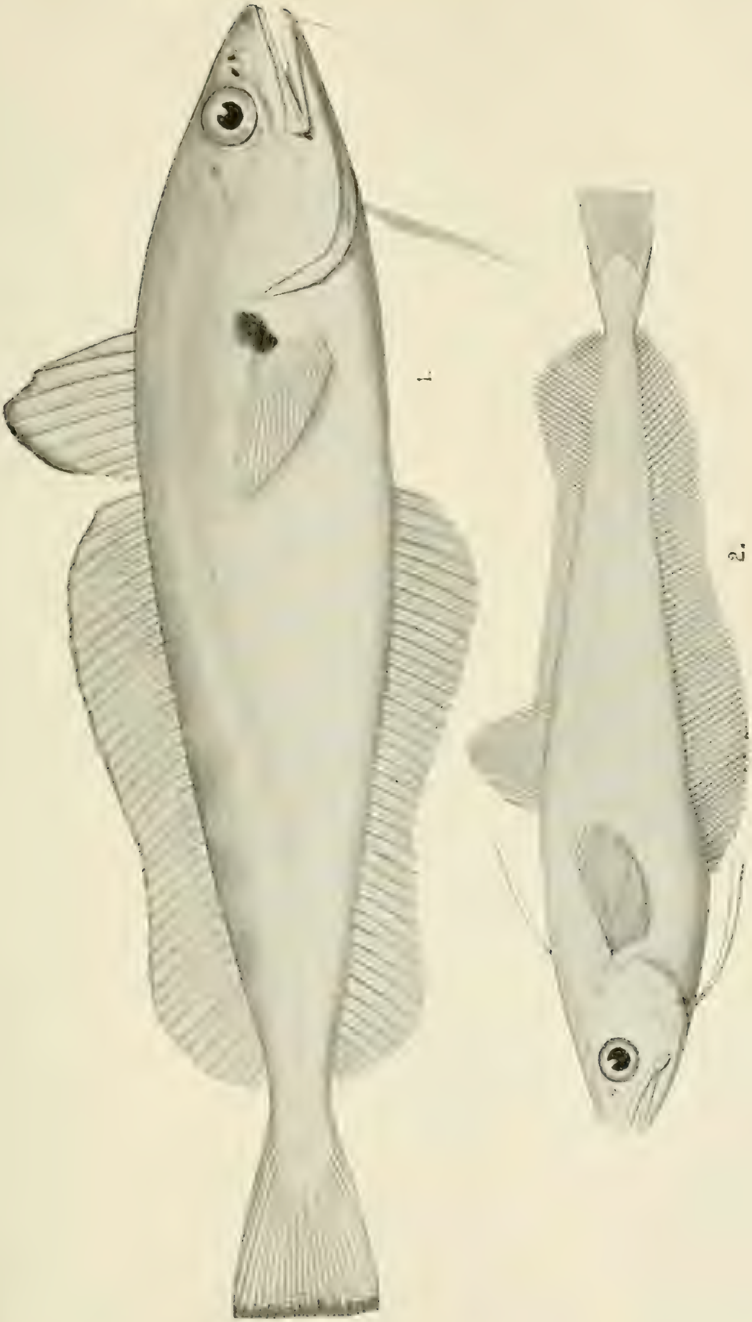

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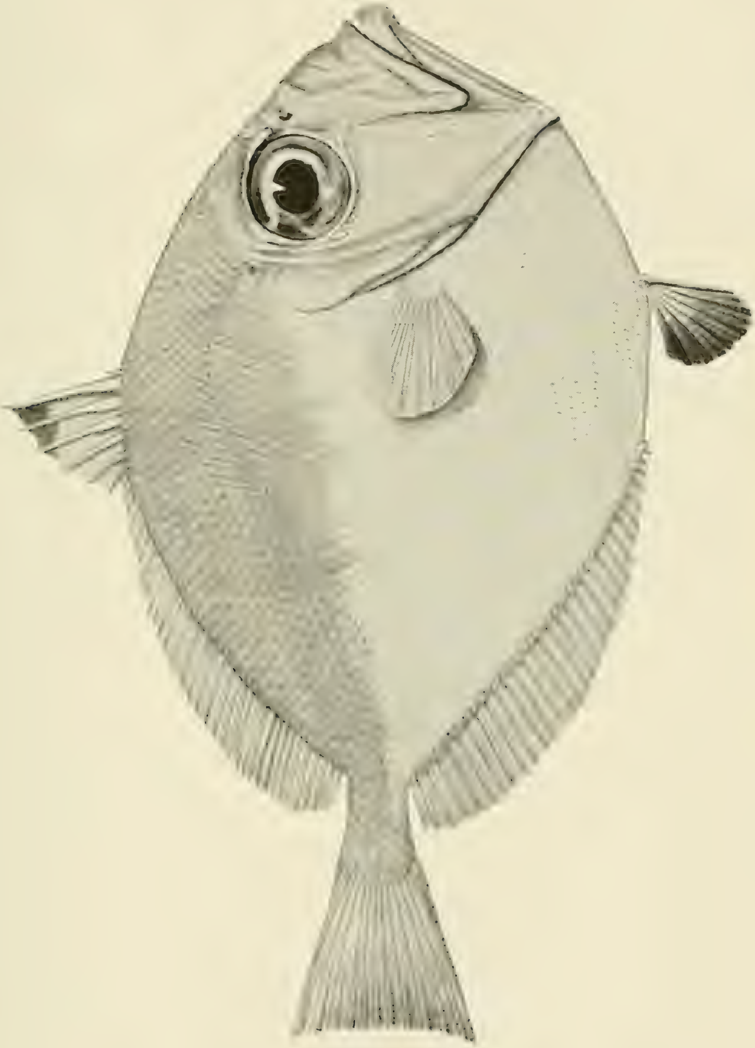

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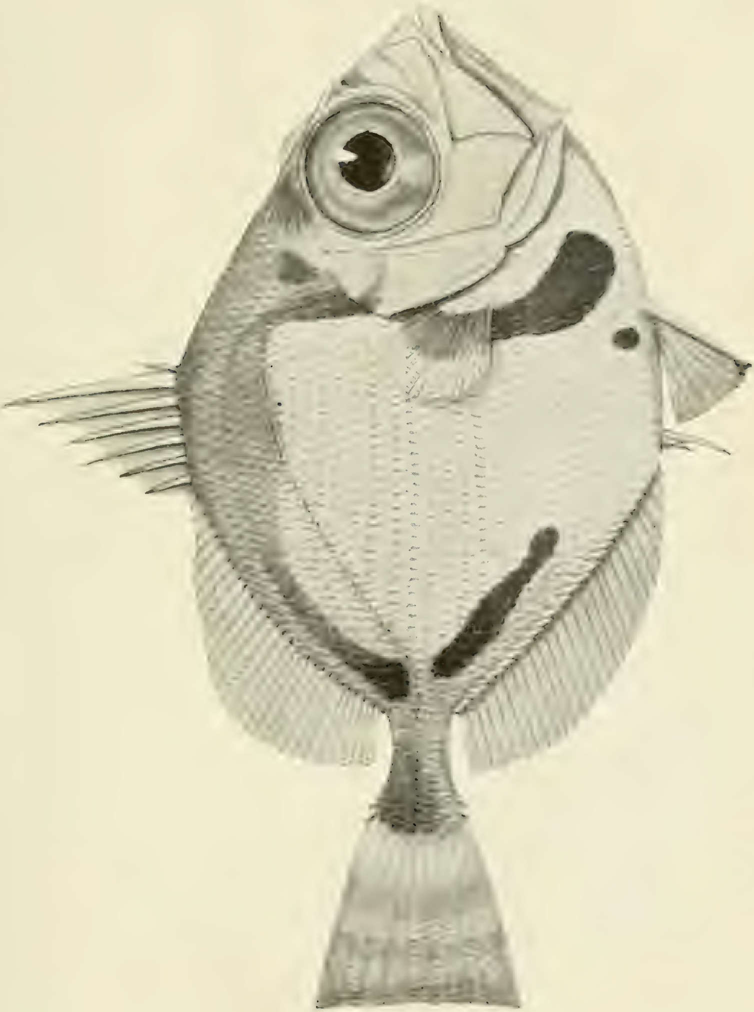

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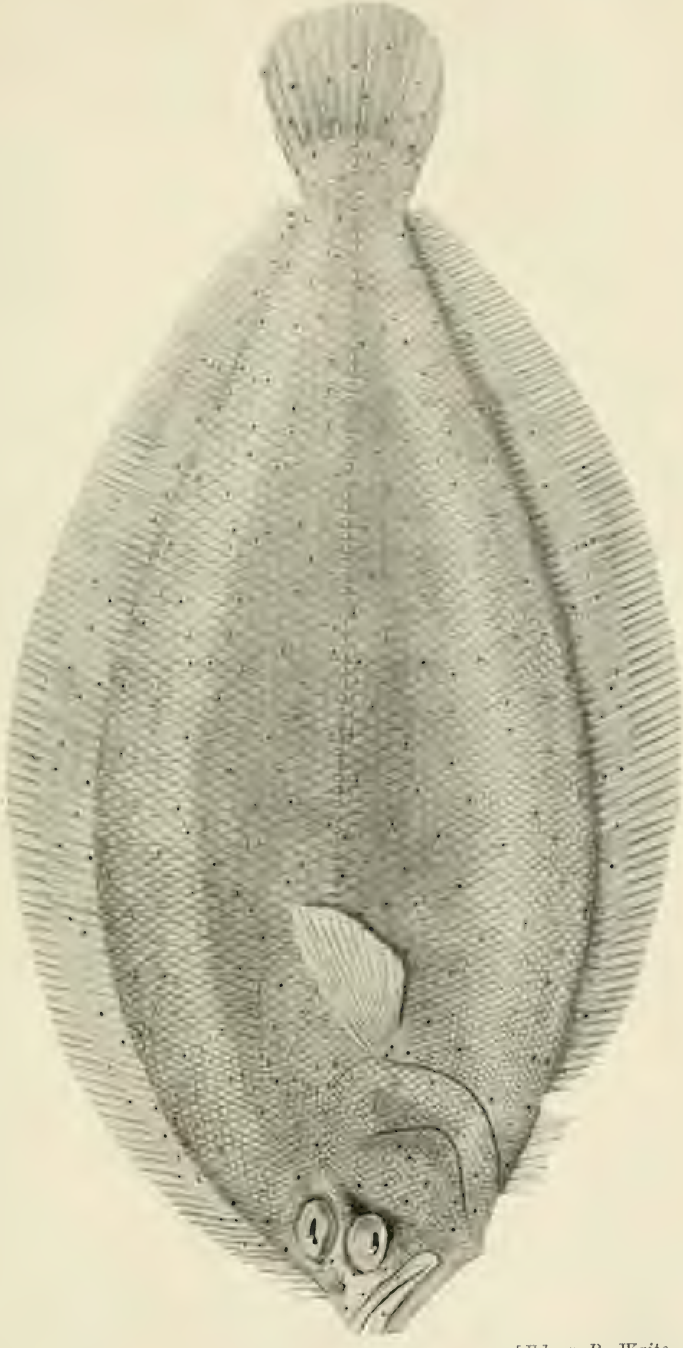

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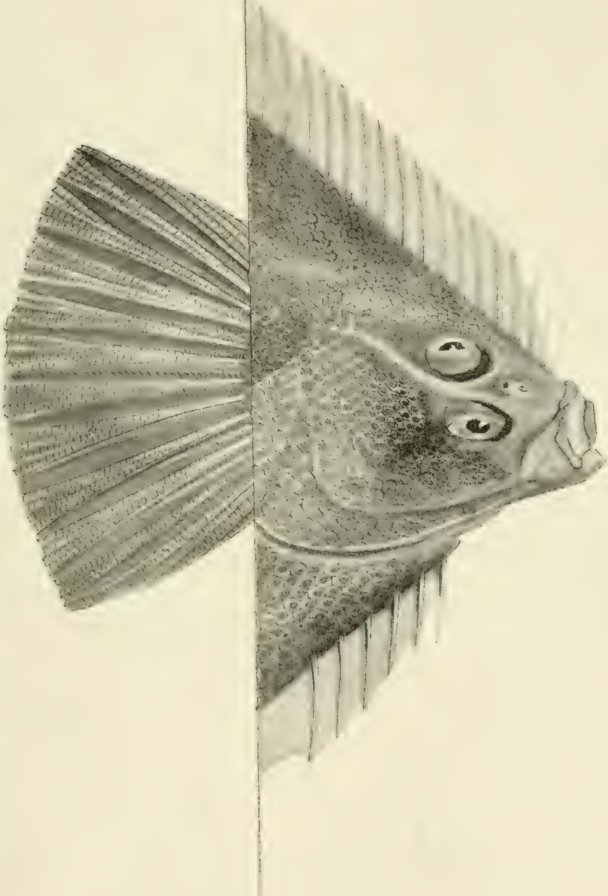

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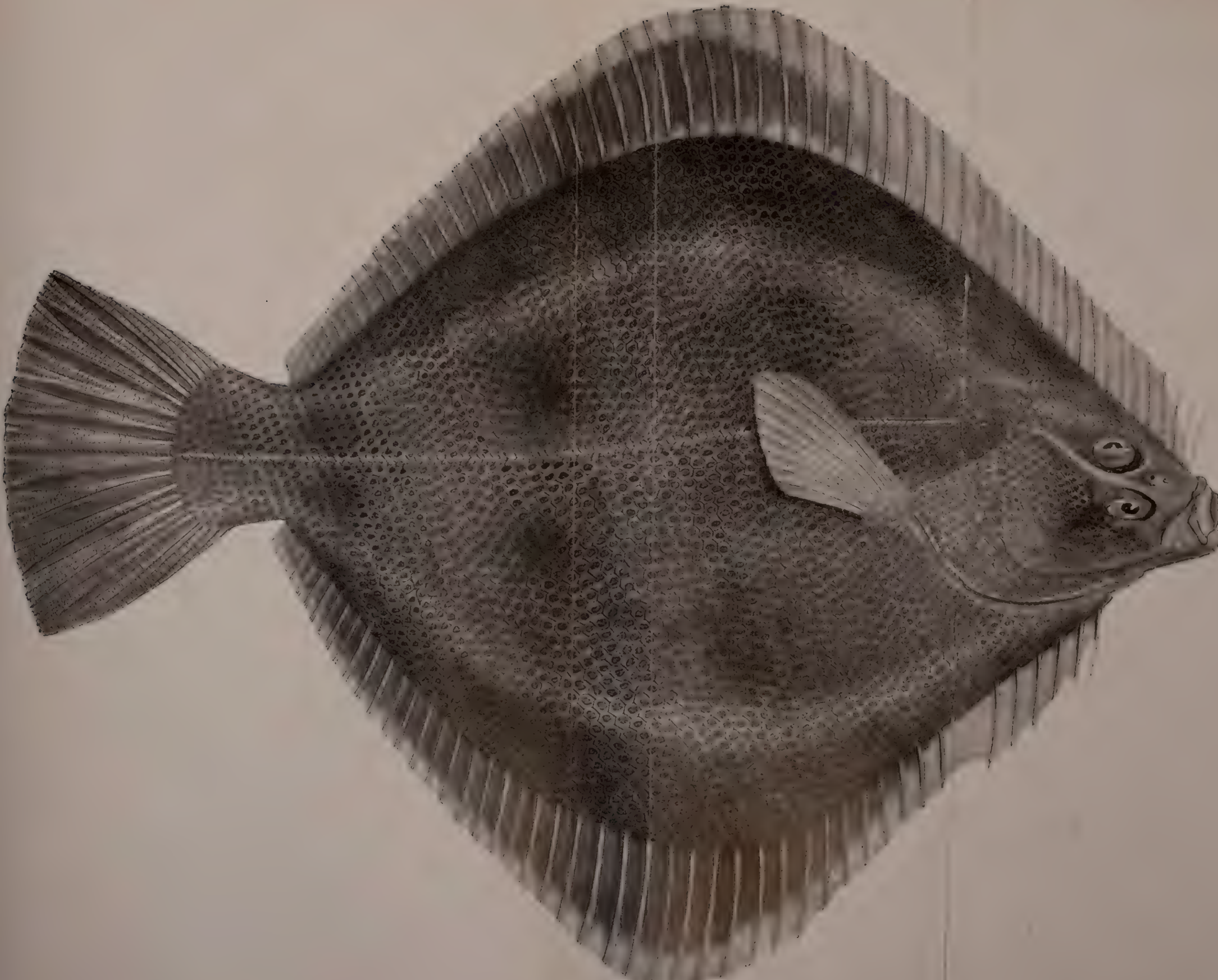

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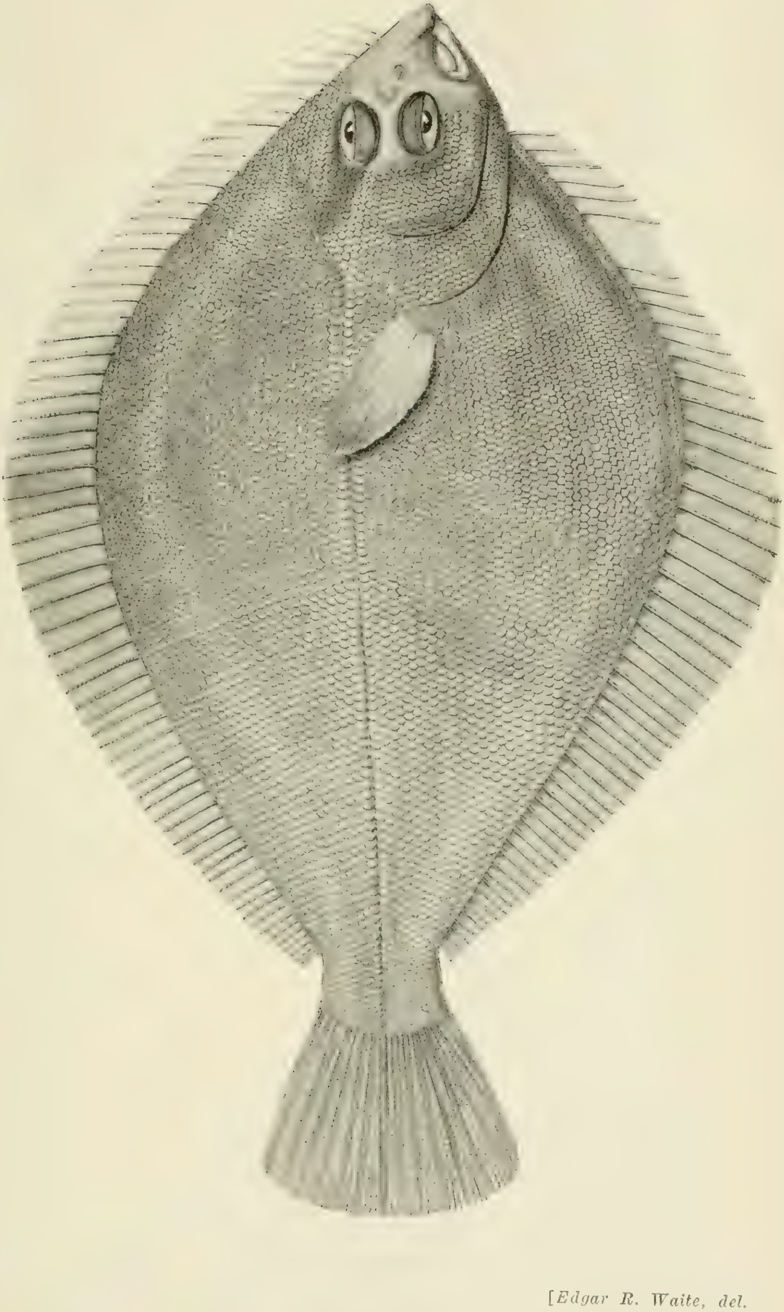

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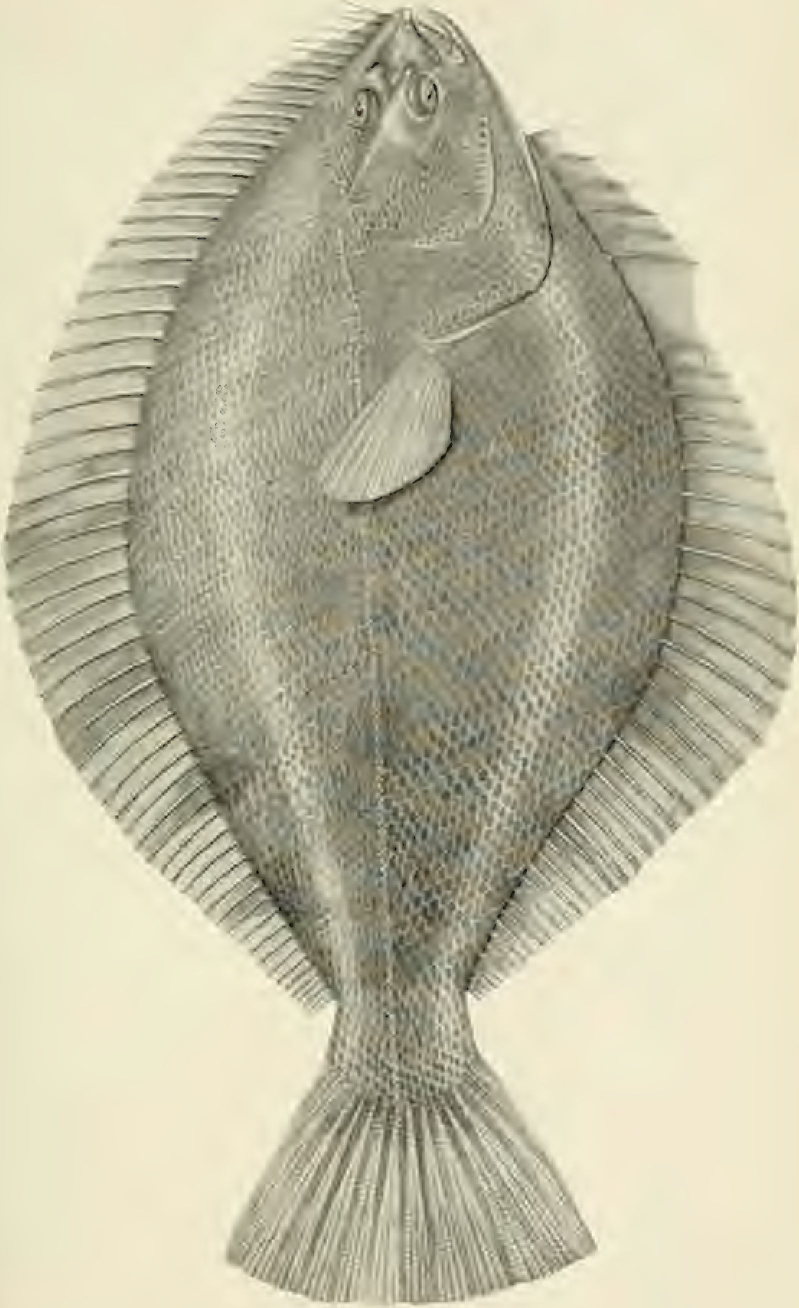

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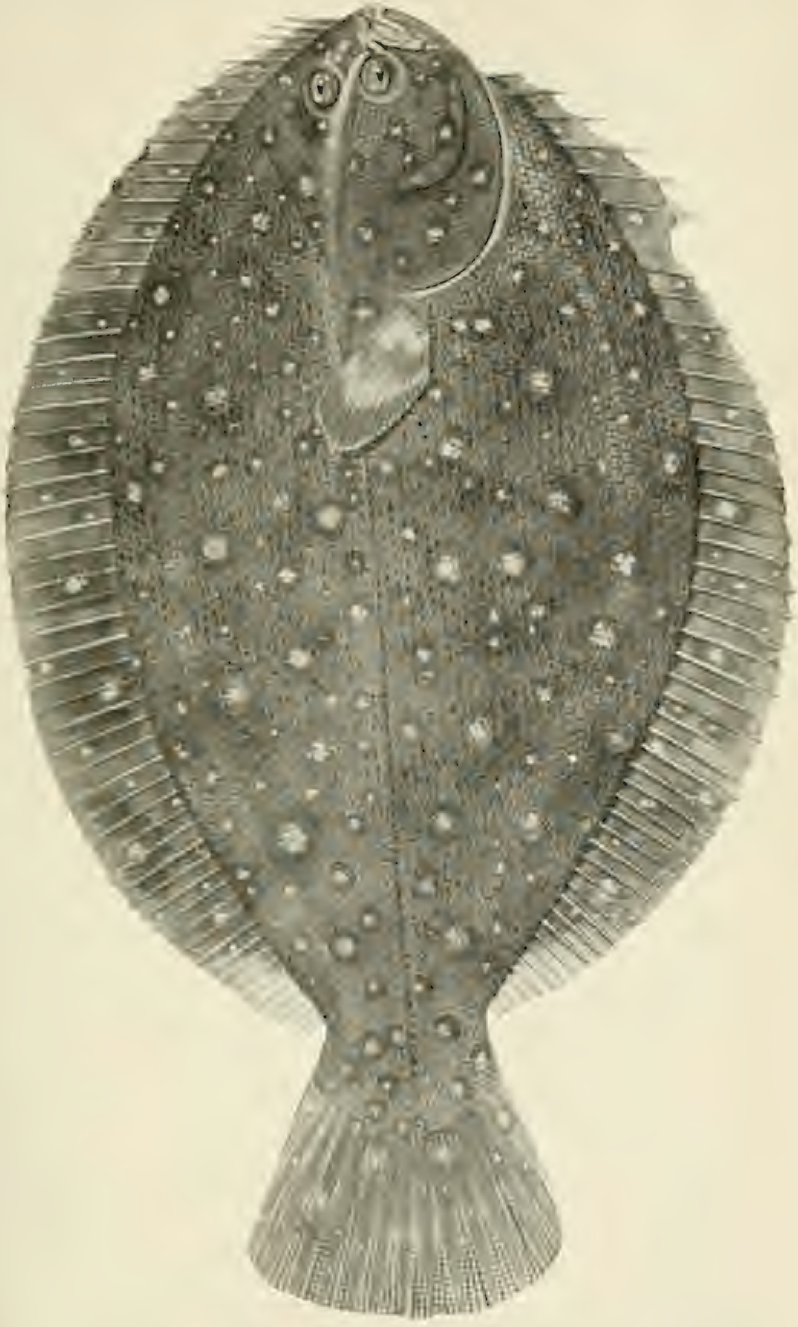

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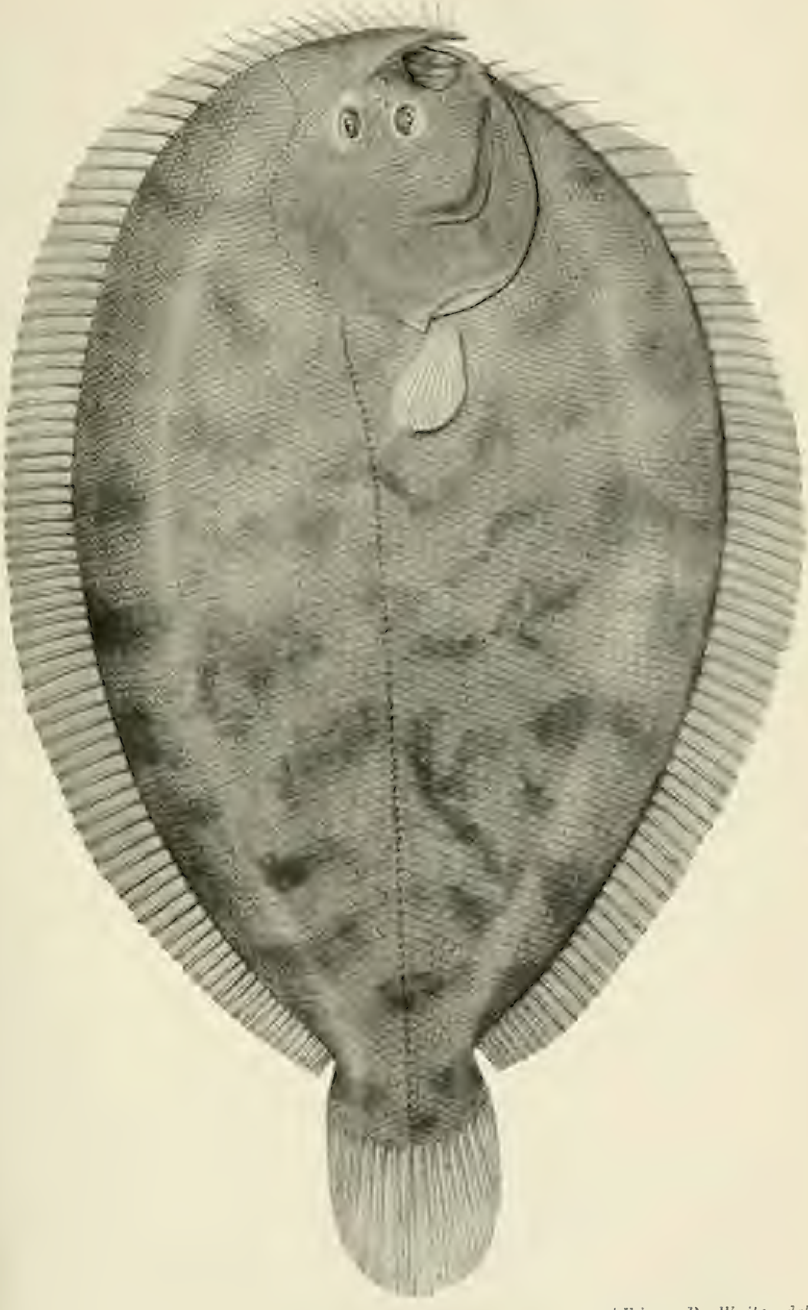

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PLATE XL.

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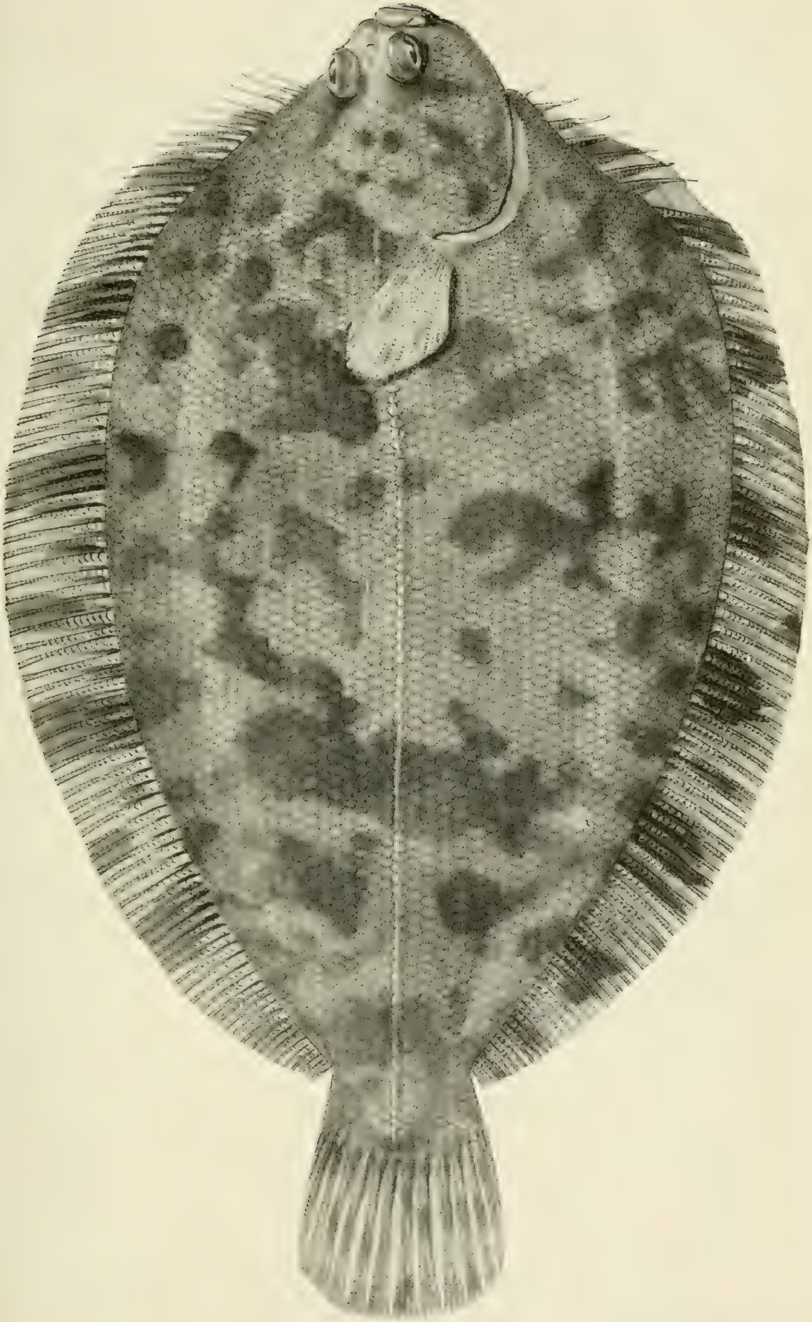

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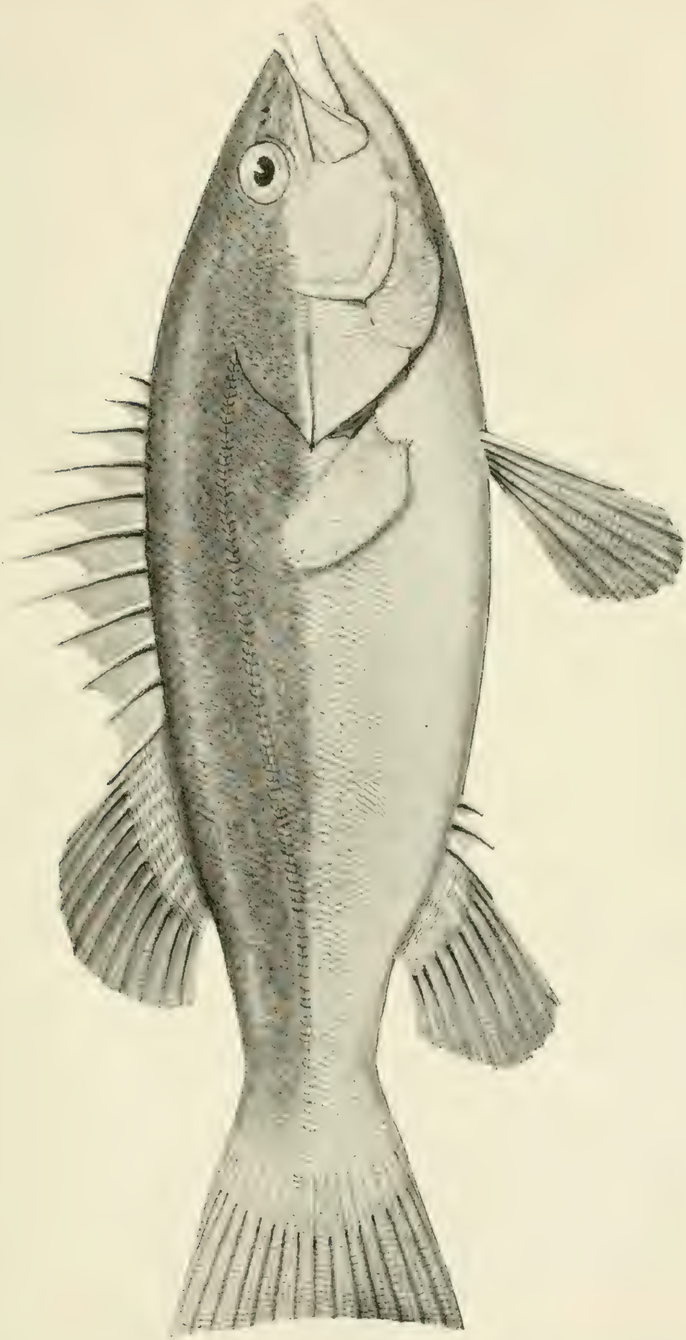

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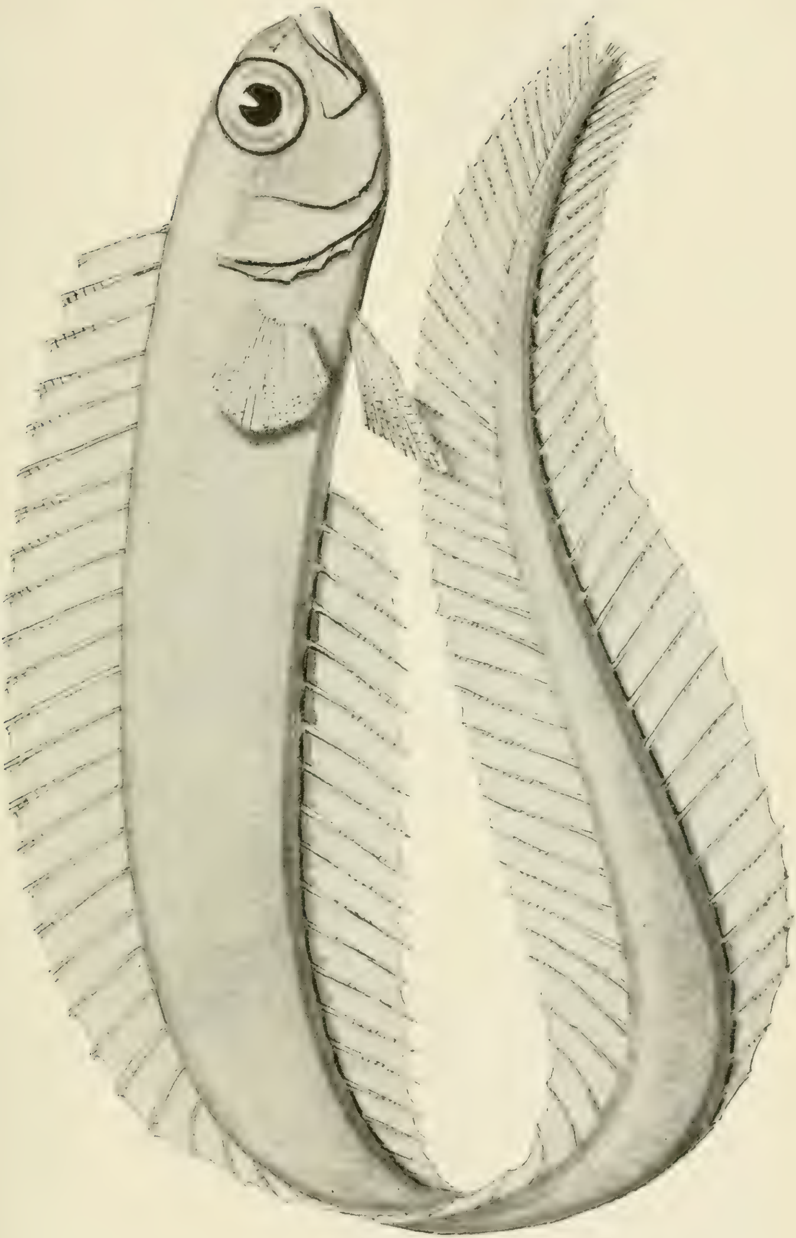

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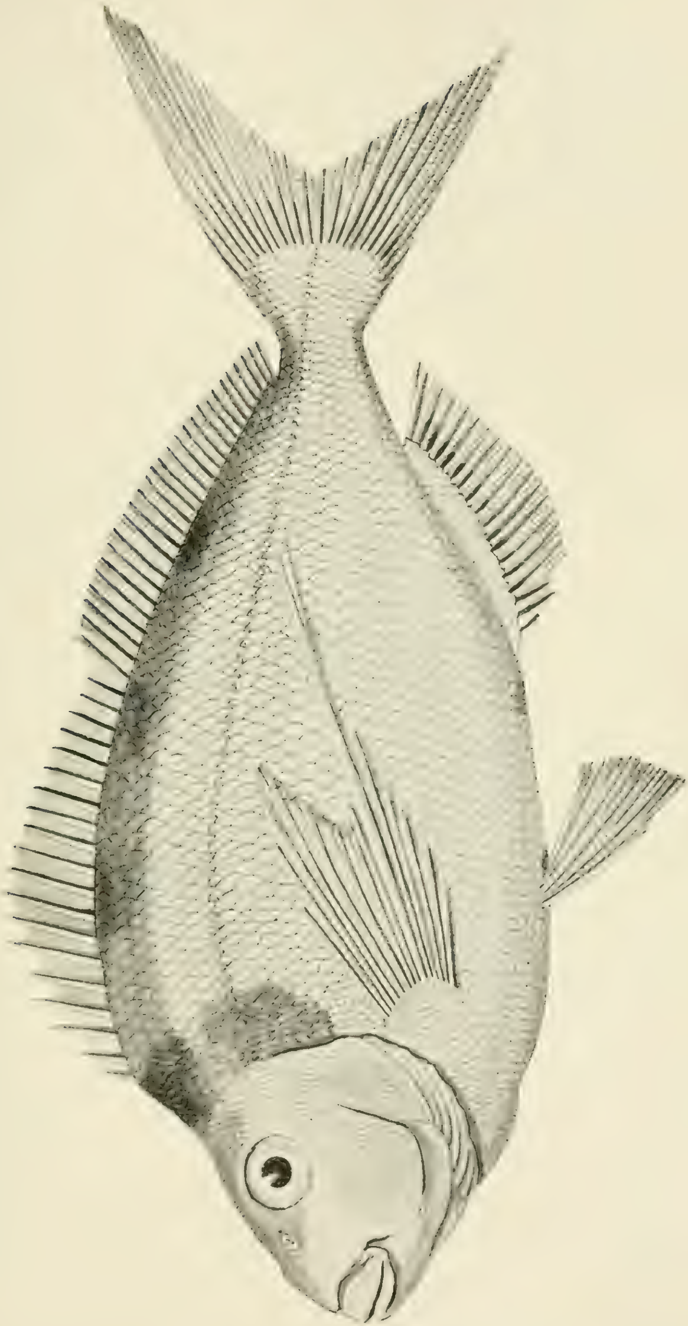

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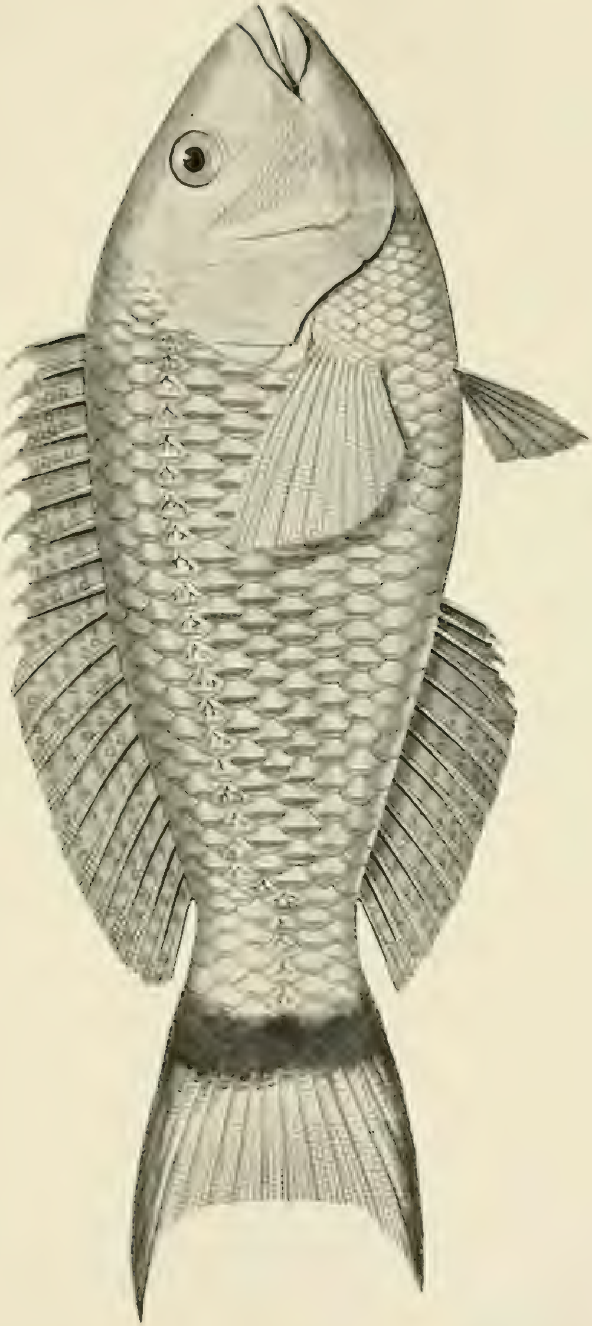

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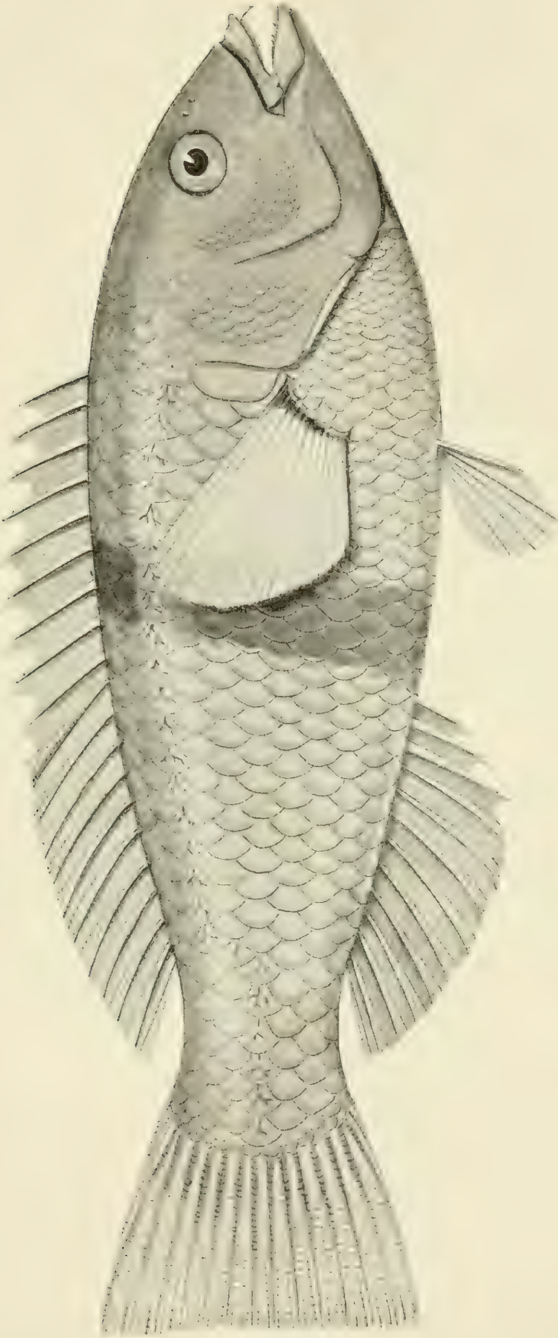

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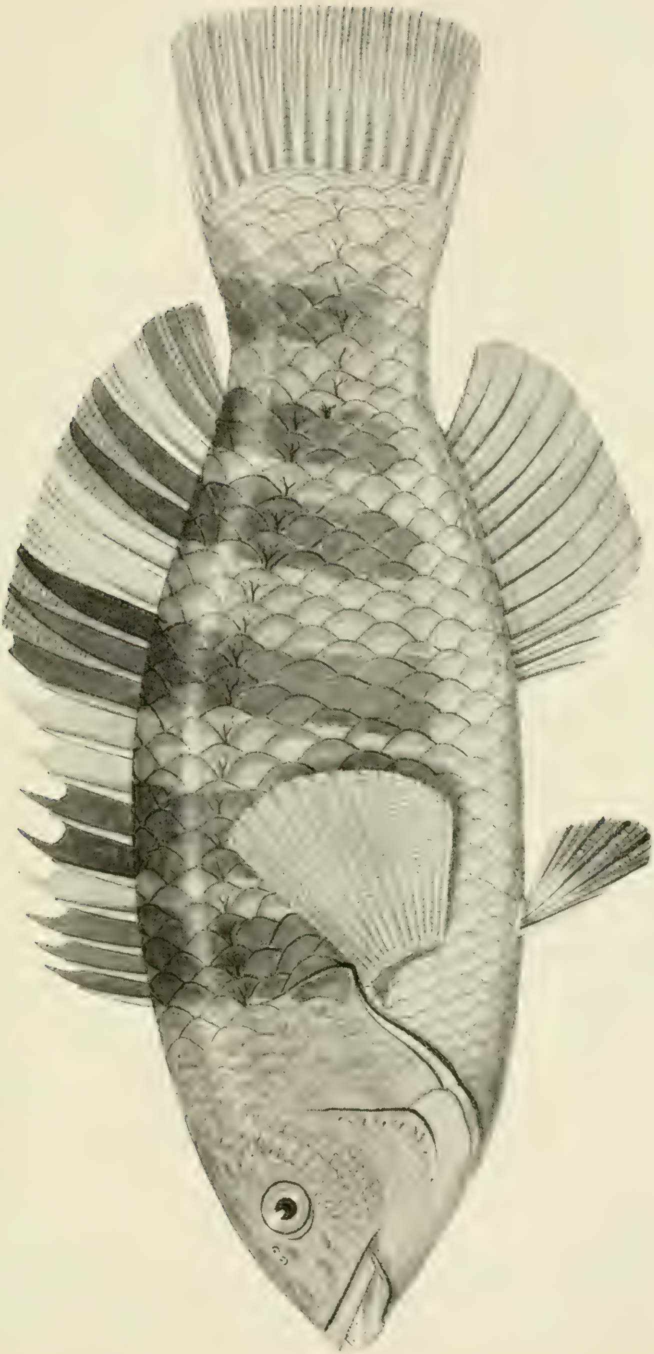

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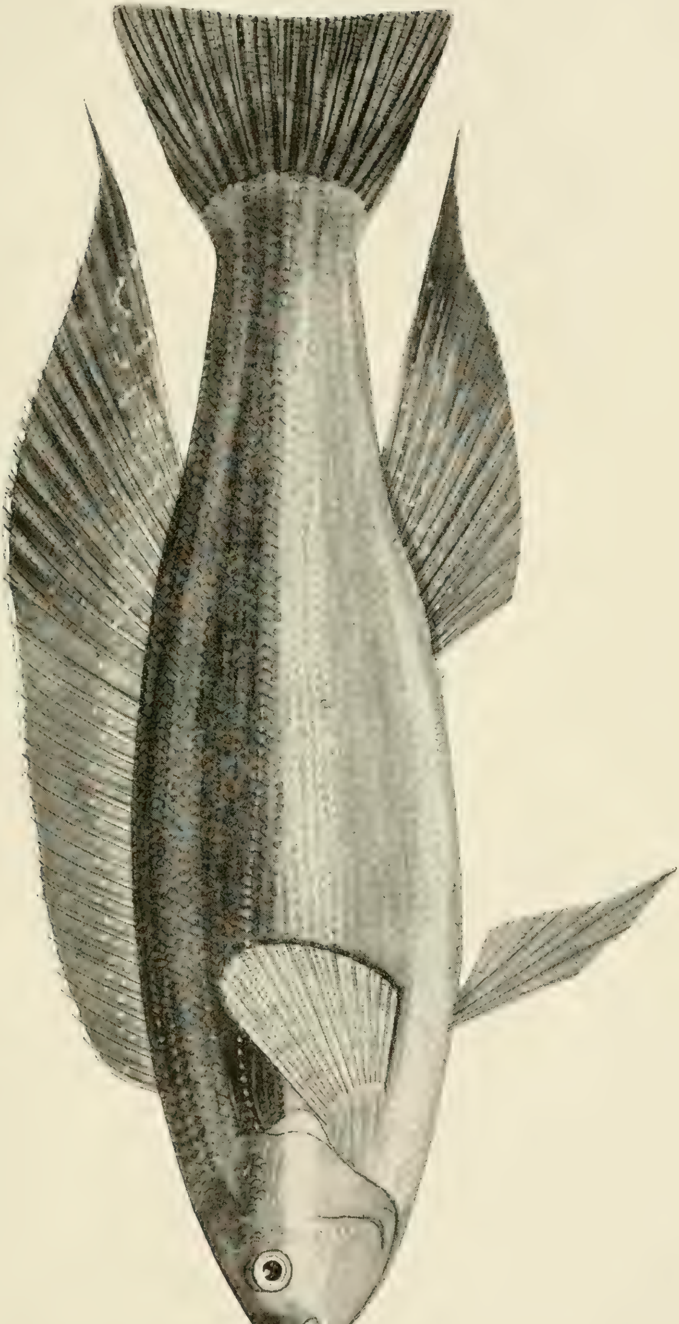

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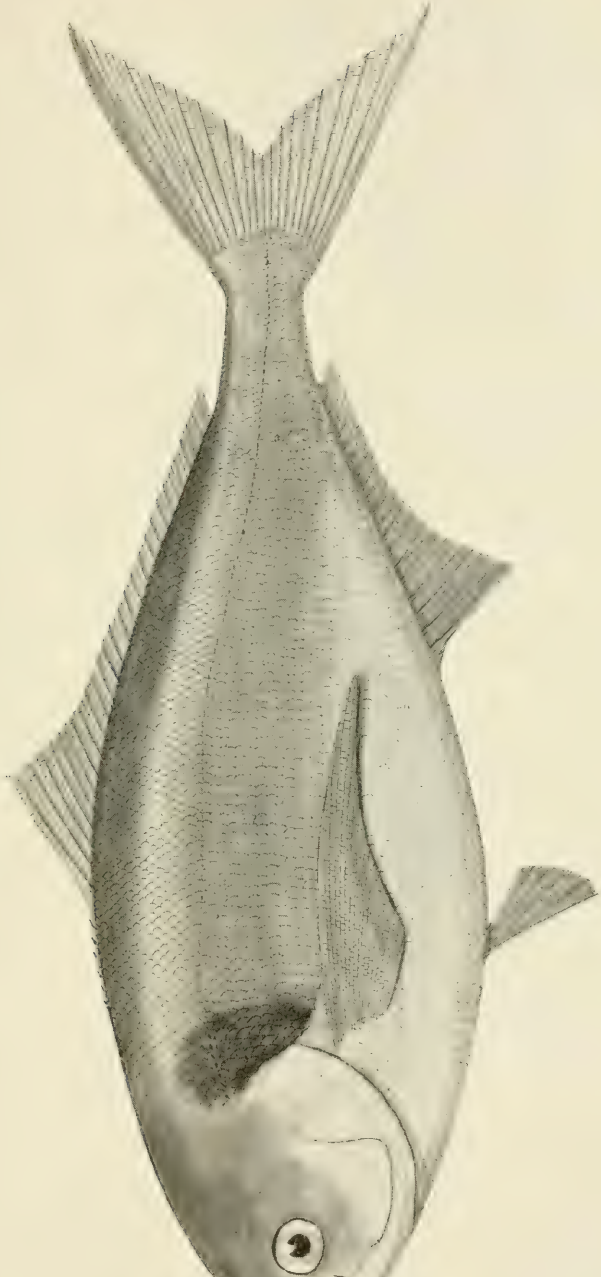

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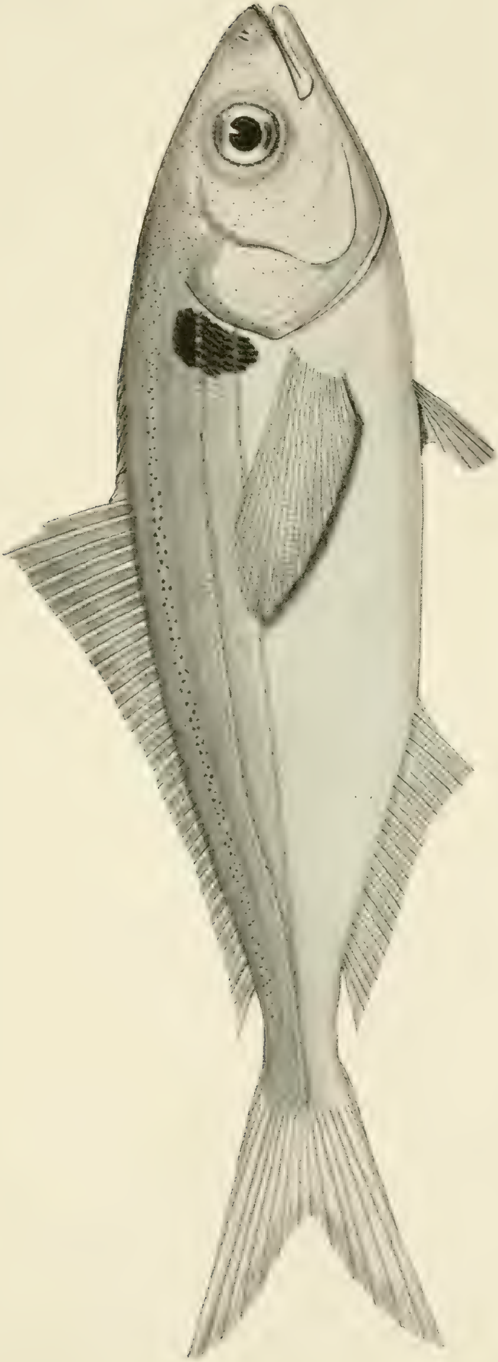

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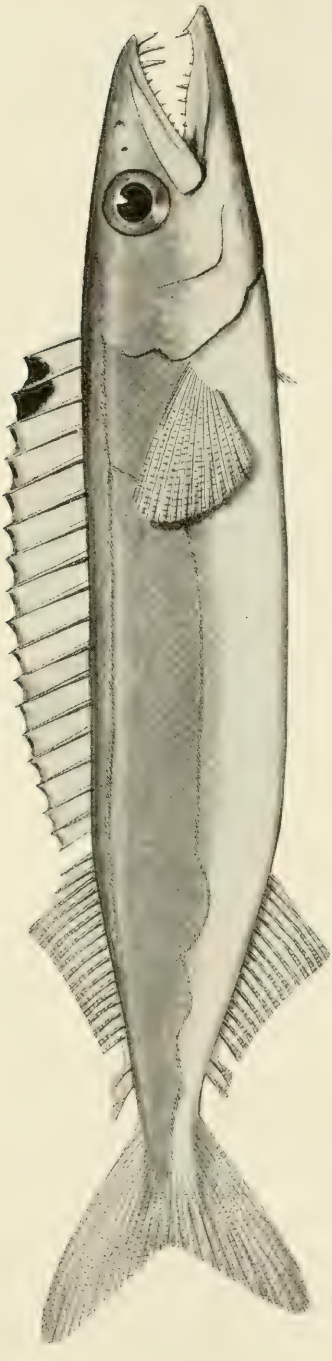

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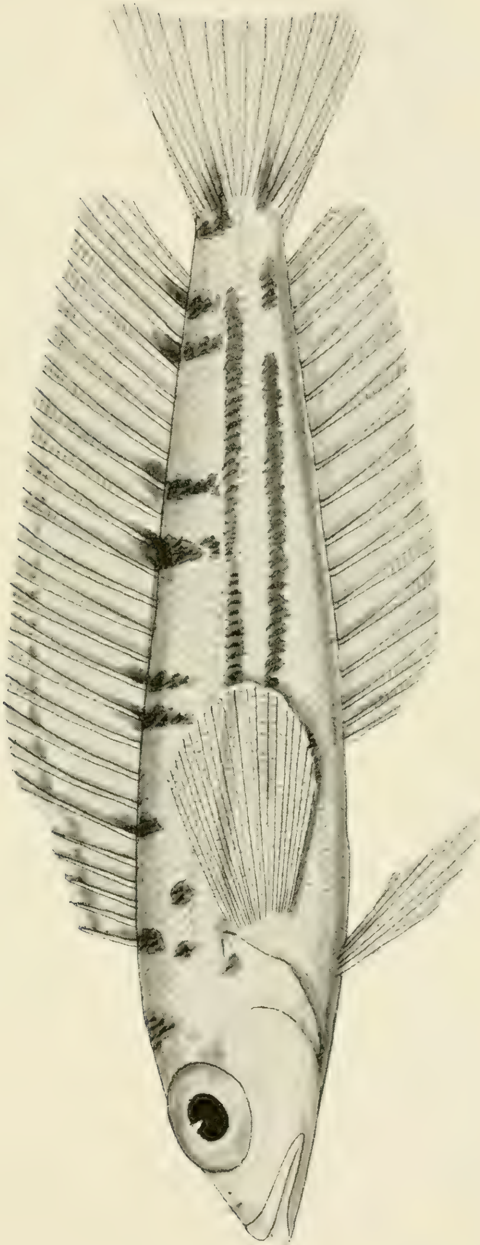

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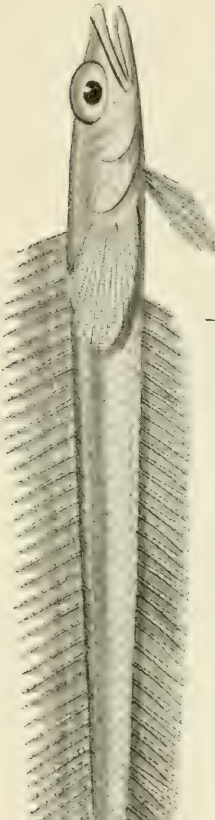

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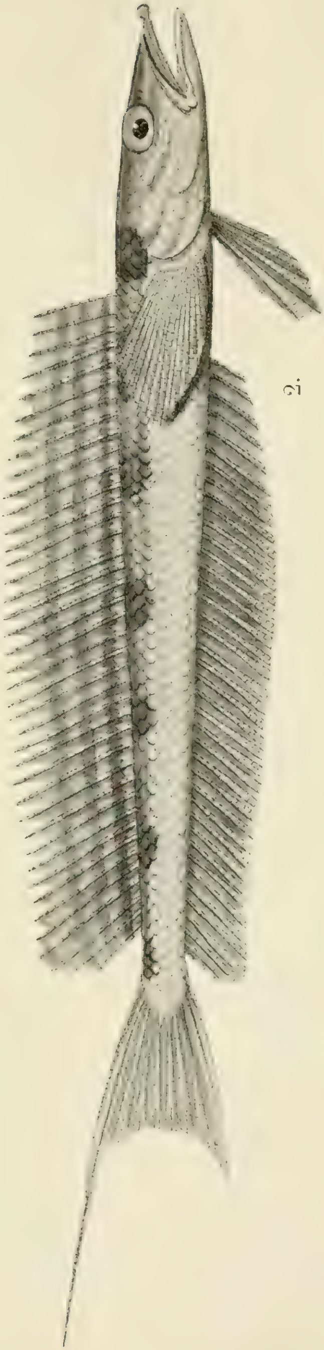

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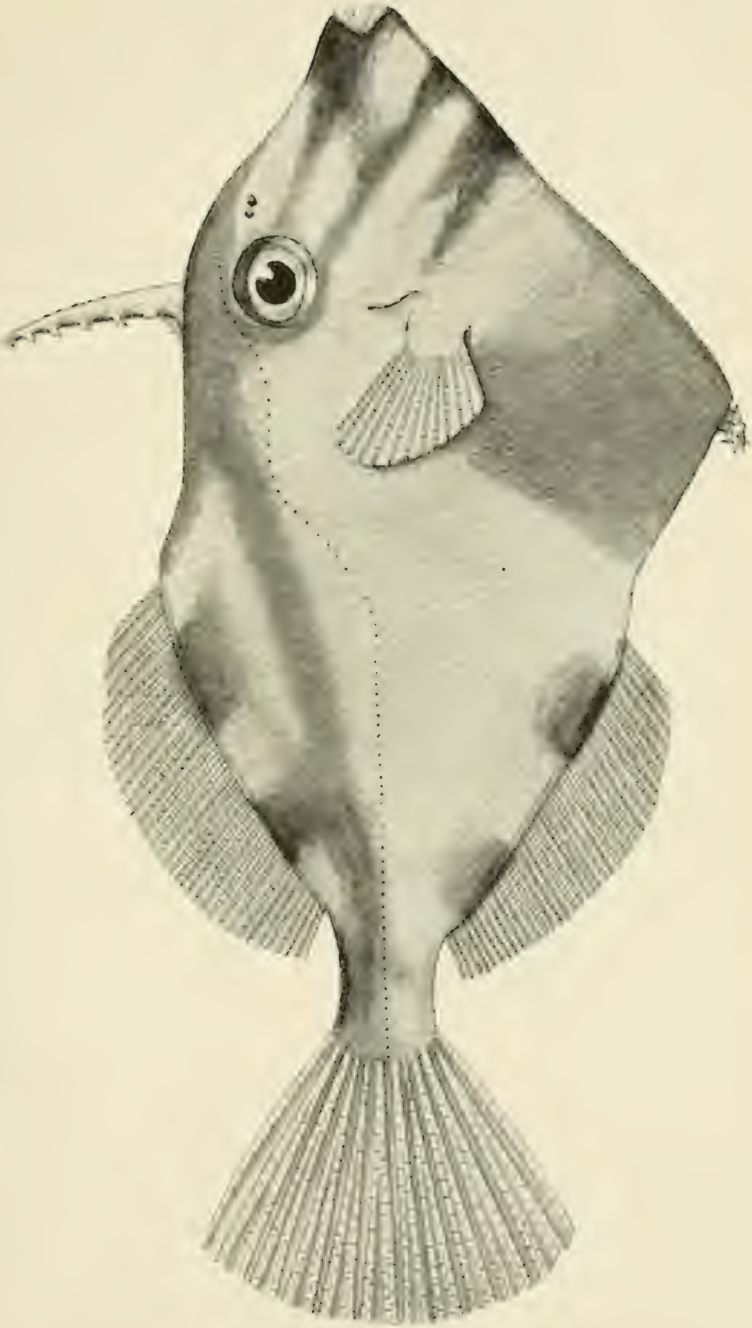

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MOLLUSCA.

PART II.—PELECYPODA AND BRACHIOPODA.

By Henry Suter.

Figures of the new species described in this part are not given, but they will be found in the new edition of the "Manual of the New Zealand Mollusca," which will be published by the Government this year.

Class PELECYPODA.

Family NUCULIDÆ.

NUCULA Lamarck, 1799.

Nucula hartvigiana Pfeiffer.

Nucula hartvigiana Pfr., Mal Blätter, 1864, p. 57.
N. sulcata A. Adams, P.Z.S., 1856, p. 53 (not of Brown).
N. consobrina Hutt., Cat. Mar. Moll., 1873, p. 80 (not of Adams & Angas).
N. lacunosa Hutt., Proc. Linn. Soc. N.S. Wales, ix., 1885, p. 528.

Dredge Station C.

Nucula nitidula A. Adams.

Nucula nitidula A. Ad., P.Z.S., 1856, p. 51.
N. margaritacea Hutt., Cat. Mar. Moll., 1873, p. 80 (not of Lamarck).

Station 4; Dredge Station C.

Family LEDIDÆ.

LEDA Schumacher, 1817.

Leda bellula A. Adams.

Leda bellula A. Adams, P.Z.S., 1856, p. 49.
L. australis Hutt., Cat. Mar. Moll. 1873, p. 81 (not of Q. and G.).
L. concinna Martens, Crit. List., 1873, p. 49 (not of A. Adams).

Station 2.

Family ANOMIIDÆ.

PLACUNANOMIA Broderip, 1832.

Placunanomia zelandica Gray.

Anomia zelandica Gray, Dieff. N.Z., 1843, p. 260.
Placunanomia ione Gray, P.Z.S., 1849 (1850), p. 123.
Anomia stowei Hutt., Cat. Mar. Moll, 1873, p. 83.

Station 5 (on a carapace of *Prionorhynchus edwardsii* J. and L.) Dredge stations A, B, C; all small young valves of white colour.

Family ARCIDÆ.

ARCA (Linné) Lamarck, 1799.

Arca (Barbatia) decussata Sowerby.

Byssoarca decussata Sow., P.Z.S., 1833, p. 18.
Barbatia sinuata Hutt., Cat. Mar. Moll., 1873, p. 79 (not of Lamarck).

Station 22.

Arca (Bathyarca) cybaea Hedley.

Bathyarca cybaea Hedley, Trans. N.Z. Inst. xxxviii., 1905 (1906), p. 71, pl. i., figs. 3, 4.

Dredge Station C.

GLYCYMERIS Da Costa, 1778.

Glycymeris modesta Angas.

Axinaea modesta Angas, P.Z.S., 1879, p. 418, pl. xxxv., fig. 4.
Pectunculus striatularis Hutt., Cat. Mar. Moll., 1873, p 80 (not of Lamarck).
Glycymeris velutina Suter, Trans. N.Z. Inst. xl., 1907 (1908), p. 354, pl. xxx., figs. 1, 2.

Stations 4, 26 or 30, 44; Dredge Station A.

Family PHILOBRYIDÆ.

PHILOBRYA P. Carpenter, 1872.

Philobrya costata Bernard.

Hochstetteria costata Bernard, Bull. des Natural. du Muséum ii., 1896.
Philobrya costata Bernard, Journ. de Conch., xlv., 1897, p. 15, pl. i., fig. 5; p. 33, fig. 7 in text.

Station 4; Dredge Station B.

Family MYTILIDÆ.

MYTILUS (Linné) Bolten, 1798.

MYTILUS (AULACOMYA) MAGELLANICUS Lamarck.

Mytilus magellanicus Lam., Anim. s. Vert., vi., 1819, p. 119.
M. polyodontes Gray, Dieff. N.Z., 1843, p. 259 (not of Quoy and Gaimard).
M. capensis Dunker, in Menke's Zeitschr. f. Malak., 1846, p. 108.
M. crenatus Krauss, die Südafrik. Moll., 1848, p. 24 (not of Lamarck).

Stations 3, 6, 20, 44.

MODIOLUS Lamarck, 1799.

MODIOLUS AUSTRALIS Gray.

Modiola australis Gray, App. to King's Voyage, ii., 1827, p. 477.
Mytilus (*Modiola*) *areolatus* Gould, Proc. Bost. S.N.H., iii. 1850, p. 343.

Stations 6, 7, 26 or 30, 44.

MODIOLARIA Beck, 1840.

MODIOLARIA IMPACTA Hermann, 1782.

Mytilus impactus Herm., Naturforscher, xvii., 1782, pl. iii., figs. 5-8.
Modiola discors Lam., Anim. s. Vert., vi., 1819, p. 114 (not of Linné).

Station 44.

Family PECTINIDÆ.

PECTEN Müller, 1776.

PECTEN (EUVOLA) MEDIUS Lamarck.

Pecten medius Lam., Anim. s. Vert., vi., 1819, p. 163.
P. laticostatus Gray, Yate N.Z., 1835, p. 310.
P. fuscus Sow., Thes. Conch. i., p. 47, pl. xvi., figs. 118, 119.
P. fumatus Reeve, Conch. Icon., viii., pl. vii., fig. 32.
P. fumatus albus Tate, Proc. Roy. Soc. Tasm., 1887, p. 113.
P. novæ-zelandiæ Reeve, *t.c.*, pl. viii., fig. 36.
P. filosus Reeve, *t.c.*, pl. xi., fig. 42.
P. meridionalis Tate, *t.c.*, p. 114.

Station 13.

PECTEN (CHLAMYS) DICHROUS Suter.

Pecten (*Chlamys*) *dichrous* Suter, Proc. Mal. Soc., viii., 1909, p. 264, pl. xi., fig. 31.

Stations 20, 26; Dredge Station C.

PECTEN (CHLAMYS) RADIATUS Hutton.

Pecten radiatus Hutt., Cat. Mar. Moll., 1873, p. 82.
Stations 6, 12, 20, 30; Dredge Station A. Chatham Islands.

PECTEN (CHLAMYS) ZELANDIAE Gray.

Pecten zelandiæ Gray, Dieff. N.Z., 1843, p. 260.
P. dieffenbachi Reeve, Conch. Icon., viii., 1852, fig. 88.
P. multicostatus Reeve, *t.c.*, fig. 173.
Stations 1, 14, 20.

PECTEN ZEALANDIAE, sub-sp. GEMMULATUS Reeve.

Pecten gemmulatus Reeve, Conch. Icon., viii., 1852, fig. 111.
P. australis Hutt., Journ. de Conch., xxvi., 1878, p. 54 (not of Sowerby).
P. asperrimus Hutt., Proc. Linn. Soc. N.S. Wales, ix., 1885, p. 531 (not of Lamarck).
Stations 5, 6, 20, 26 or 30.

Family LIMIDÆ.

LIMA (Bruguière) Cuvier, 1798.

LIMA (s. str.) LIMA Linné.

Ostrea lima Linné, Syst. Nat., ed. 10, 1758, p. 699.
Lima squamosa Lam., Anim. s. Vert., vi., 1819, p. 156.
L. zealandica Sow., P.Z.S., 1876, p. 754, pl. lxxv., fig. 1.
Station 26 or 30.

LIMA (MANTELLUM) ANGULATA Sowerby.

Lima angulata Sow., P.Z.S., 1843, p. 23.
L. basilanica Adams and Reeve, Voy. "Samarang," 1848, p. 75, pl. xxi., fig. 6.
L. orientalis Adams and Reeve, *t.c.*, p. 75, pl. xxi., fig. 7.
Dredge Stations A, B, C.

LIMA (LIMATULA) BULLATA Born.

Ostrea bullata Born, Mus. Cæs. Vindobon. 1780, p. 110, pl. vi., fig. 8.
O. inflata Gmelin, Syst. Nat., ed. 13, 1790, p. 3321.
Lima strangei Sow., Conch. Icon., xviii. 1873. pl. iii., fig. 15.
L. japonica Hutt., Journ. de Conch., xxvi., 1878, p. 55 (not of A. Adams).
Stations 4, 26 or 30; Dredge Station A.

Family OSTREIDÆ.

OSTREA Linné, 1758.

Ostrea corrugata Hutton.

Ostrea corrugata Hutt., Cat. Tert. Moll., 1873, p. 35.
O. discoidea E. A. Smith, Voy. "Erebus and Terror," Moll., 1874, p. 7., pl. ii., fig. 15 (not of Gould).

Stations 6, 9.

Family PINNIDÆ.

ATRINA Gray, 1840.

Atrina zelandica Gray.

Pinna zelandica Gray, Yate, N.Z., 1835, p. 310.
P. senticosa Gould, Proc. Bost., S.N.H., iii., 1850, p. 312.

Station 20.

Family CRASSATELLITIDÆ.

CYAMIOMACTRA Bernard, 1897.

Cyamiomactra problematica Bernard.

Cyamiomactra problematica Bernard, Bull. Mus. Hist. Nat., Paris, 1897, p. 311, fig. 2.

Station 4; Dredge Station A.

Cyamiomactra problematica, truncata var. nov.

Differs from the species in the short sub-trapezoidal form; the anterior end being short and rounded, the posterior end truncate, with a distinct angle towards the basal margin; between this and the beaks the valves show a distinct angle. It is an extreme form of the variable species, and well worthy of a varietal distinction, though intermediate forms are sometimes met with; they, however, are never so distinctly angled.

Length, 4mm.; height, 3.5 mm.; diameter 2mm.

Type in the Canterbury Museum, Christchurch.

Station 4.

PERRIERINA Bernard, 1897.

Perrierina taxodonta Bernard.

Perrierina taxodonta Bernard, Bull. Mus. Hist. Nat., Paris, No. 7, 1897, p. 312, fig. 3 in text.

Station 4.

CUNA Hedley, 1902.

Cuna carditelloides sp. nov.

Shell minute, trigonal, solid, slightly inequilateral, radially costate. *Beaks* contiguous, prodissoconchs minute, globose and smooth, surrounded by a narrow groove. *Anterior end* with the dorsal margin straight, descending, rounded towards the convex basal margin; *posterior end* similar to the anterior, but the dorsal margin feebly curved and angled towards the basal margin. *Lunule* distinct, long, lanceolate, with a few concentric ridges. *Sculpture* consisting of about 15 equi-distant narrow smooth rounded radiate riblets, the interstices deep and narrower than the costæ; concentric undulating growth-lines are distinct only near the base. *Colour* white. *Interior* white, porcellanous, shining. *Basal margins* crenate. *Hinge* broad; the right valve with a stout triangular cardinal tooth, sometimes bifid; left valve with two divergent cardinal teeth, the posterior usually bifid. *Resilifer* small. *Adductor scars* distinct, impressed. *Pallial line* simple.

Length, 2.5mm.; height, 3mm.; diameter, 1.5mm.

Type in the Canterbury Museum, Christchurch.

Dredge Station C.

Cuna delta Tate and May.

Carditella delta Tate and May, Trans. Roy. Soc. S. Aust., xxiv., 1900, p. 102; Proc. Linn. Soc. N.S. Wales, xxvi., 1901, p. 434, pl. xxvii., figs. 100, 101.

Cuna delta, Hedley, Mem. Aust. Mus., iv., 1902, p. 316.

Station 4; Dredge Station B.

Family CARDITIDÆ.

CARDITA (Bruguière) Lamarck, 1799.

Cardita calyculata Linné.

Chama calyculata L., Syst. Nat., ed. 10, 1758, p. 692.

Cardita aviculina Lam., Anim. s. Vert., vi., 1819, p. 26.

C. excavata Desh., P.Z.S., 1852 (1854), p. 100, pl. xvii., figs. 1-3.

Mytilicardia tasmanica T. Woods, Proc. Roy. Soc. Tasm., 1876, p. 161.

Stations 6, 22, 26 or 30; Dredge Station B.

VENERICARDIA Lamarck, 1801.

Venericardia (s. str.) difficilis Deshayes.

Cardita difficilis Desh., P.Z.S., 1852 (1854), p. 103, pl. xvii., figs. 16, 17.

Venericardia intermedia Hutt., Cat. Tert. Moll., 1873, p. 24.

Stations 2, 6, 12, 20, 22, 26 or 30.

VENERICARDIA (PLEUROMERIS) BOLLONSI Suter.

Venericardia (Pleuromeris) bollonsi Suter, Proc. Mal. Soc., vii., 1907, p. 211, pl. xviii., figs. 8-8b.

Dredge Station A.

VENERICARDIA (PLEUROMERIS) ZELANDICA Deshayes.

Cardita zelandica Desh., P.Z.S., 1852 (1854), p. 101 (not *Venericardia zelandica* Pot. and Mich., 1838, which is *Chione stutchburyi* Gray).

C. lutea Hutt., Man. N.Z. Moll., 1880, p. 159.

C. compressa Hutt., Proc. Linn. Soc. N.S. Wales, ix., 1885, p. 527 (not of Reeve).

Dredge Station C.

VENERICARDIA (MIODONTISCUS) CORBIS Philippi.

Cardita corbis Phil., Enum. Moll. Sicilæ, i., 1836, p. 55.

C. unidentata Basterot, reference not known to me.

Stations 2, 4, 5; Dredge Stations A, B.

Family CONDYLOCARDIIDÆ.

CONDYLOCARDIA Bernard, 1897.

CONDYLOCARDIA CRASSICOSTA Bernard.

Condylocardia crassicosta Bernard, Journ. de Conch., xliv., 1896 (1897), p. 175, pl. vi., fig. 1.

Station 4.

Family DIPLODONTIDÆ.

DIPLODONTA Bronn., 1831.

DIPLODONTA GLOBULARIS Lamarck.

Lucina globularis Lam., Anim. s. Vert., v., 1818, p. 544.

Stations 4, 26 or 30; Dredge Station A.

Family LEPTONIDÆ.

KELLIA Turton, 1822.

KELLIA SUBORBICULARIS Montagu.

Mya suborbicularis Mtg., Test. Brit., 1804, pp. 39, 564, pl. xxvi., fig. 6.

Kellia cycladiformis Desh., Traité Elém. de Conch., pl. xi., figs. 6-9.

Erycina rotunda Desh., P.Z.S., 1855, p. 181.

Station 6.

An elongately-oval variety.

NEOLEPTON Monterosato, 1875.

NEOLEPTON ANTIPODUM Filhol.

Kellia antipodum Filh., Comptes Rend., xci., 1880, p. 1095.
Neolepton antipodum Filh.: Hedley, Trans. N.Z. Inst., xxxviii., 1906, p. 74, pl. i., fig. 5.

Station 4.

Family TELLINIDÆ.

TELLINA (Linné) Lamarck, 1799.

TELLINA (s. str.) URINATORIA, sp. nov.

Shell small, thin, compressed, transversely oval, very inequilateral, white, convex at both ends. *Beaks* at about anterior third of length, acute, slightly raised, directed forwards. *Anterior end* short, convex, the dorsal margin oblique, slightly rounded. *Posterior end* produced, rounded, the dorsal margin straight, very slowly descending; *basal margin* broadly convex, slightly ascending anteriorly. *Sculpture* consisting of very fine and close concentric lines, crossed by microscopic radiate striæ. *Colour* white. *Interior* white, polished smooth. *Hinge*: 2 cardinal teeth in each valve, the anterior left and posterior right stouter, triangular, cleft at the top; 2 laterals in each valve, the anterior teeth nearer the cardinals. *Adductor scars* unequal. *Pallial sinus* large, reaching the anterior adductor scar.

Length, 7.5mm.; height, 5mm.; diameter, 2.3mm.

Type in the Canterbury Museum, Christchurch.

Dredge Station A.

Family SEMELIDÆ.

LEPTOMYA A. Adams, 1864.

LEPTOMYA LINTEA Hutton.

Tellina lintea Hutt., Cat. Mar. Moll., 1873, p. 67.
T. decussata Hutt., *t.c.*, p. 67 (not of Lamarck).
T. subovata Hutt., *t.c.*, p. 67 (not of Sowerby).
T. strangei Hutt., Journ. de Conch., xxvi., 1878, p. 47 (not of Deshayes).
T. retiaria Hutt., Trans. N.Z. Inst., xvii., 1885, p. 322.
Leptomya lintea Hutt.: Suter, Proc. Mal. Soc., vii., 1907, p. 213, pl. xviii., figs. 10-10c.

Dredge Station C.

Family MACTRIDÆ.

MACTRA Linné, 1767.

MACTRA (COELOMACTRA) SCALPELLUM Reeve.

Mactra scalpellum Reeve, Conch. Icon., viii., 1854, pl. xix., fig. 106.
Darina pusilla Hutt., Cat. Mar. Moll., 1873, p. 63.

Station 4.

MACTRA (MACTROTOMA) ELONGATA Quoy and Gaimard.

Mactra elongata Q. and G., Voy. "Astrolabe," Zool., iii., 1835, p. 518, pl. lxxxiii., figs. 1, 2.
Mulinia notata Hutt., Cat. Mar. Moll., 1873, p. 64.

Station 3.

ZENATIA Gray, 1852.

ZENATIA ACINACES Quoy and Gaimard.

Lutraria acinaces Q. and G., Voy. "Astrolabe," Zool., iii., 1835, p. 545, pl. lxxxiii., figs. 5, 6.
L. deshayesi Reeve, Conch. Icon., viii., 1854, pl. i., fig. 1.
Zenatia solenoides Desh. P.Z.S., 1854, (1855), p. 72 (not of Lamarck).
Z. cumingiana Desh., *t.c.*, p. 72.

Station 89.

Family VENERIDÆ.

MACROCALLISTA Meek, 1876.

MACROCALLISTA MULTISTRIATA Sowerby.

Cytherea (*Callista*) *multistriata* Sow., Thes. Conch., ii. 1851, p. 628, pl. cxxxvi., fig. 177.

Stations 2, 4.

CYTHEREA Bolten, 1798.

CYTHEREA OBLONGA Hanley.

Venus oblonga Hanley, in Wood's Index Test., Suppl., 1828.
Dosina zelandica Gray, Yate, N.Z., 1835, p. 309.

Stations 26 or 30, 29.

CYTHEREA SUBSULCATA Suter.

Venus sulcata Hutt., Proc. Linn. Soc. N.S. Wales, (2) i., 1887, p. 226 (Pliocene), not the species of 1875.
Chione subsulcata Suter, Proc. Mal. Soc., vi.. 1905, p. 205.

Station 20.

CHIONE Mergerle, 1811.

Chione (Chamelea) crassa Quoy and Gaimard.

Venus crassa Q. and G. Voy. "Astrolabe," Zool., iii., 1835, p. 525, pl. lxxxiv., figs. 7, 8.
Chione gibbosa Hutt., Cat. Mar. Moll., 1873, p. 71.

Stations 5, 6, 20.

Chione (Chamelea) mesodesma Quoy and Gaimard.

Venus mesodesma Q. and G., Voy. "Astrolabe," Zool., iii., 1835, p. 532, pl. lxxxiv., figs. 17, 18.
?*V. spurca* Sow., P.Z.S., 1835, p. 23.
Murcia scansilis Römer, Mal. Blätter, vii.., 1860, p. 161.

Stations 4, 12, 26 or 30, 29; Dredge Station C.

Family CARDIIDÆ.

PROTOCARDIA Beyrich, 1845.

Protocardia (Nemocardium) pulchella Gray.

Cardium striatulum Sow., P.Z.S., 1840, p. 105 (not of Brocchi).
C. pulchellum Gray, Dieff, N.Z., 1843, p. 252.

Stations 4, 12, 26 or 30.

Family PSAMMOBIIDÆ.

PSAMMOBIA (Lamarck) Bowdich, 1822.

Psammobia (Gobraeus) zelandica Deshayes.

Psammobia zelandica Desh., P.Z.S., 1854 (1855), p. 319.
P. zonalis Hutt., Cat. Mar. Moll., 1873, p. 66 (not of Lamarck).

Station 4.

Family SAXICAVIDÆ.

SAXICAVA Bellevue, 1802.

Saxicava arctica Linné.

Mya arctica Linné, Syst. Nat., ed. 12, 1767, p. 1113.
Hiatella minuta, Gray, in Dieff. N.Z., 1843, p. 252.
Saxicava australis Hutt., Man. N.Z. Moll., 1880, p. 134.

Station 6; Dredge Station A.

PANOPEA Ménard, 1807.

PANOPEA ZELANDICA Quoy and Gaimard.

Panopæa zelandica Q. and G., Voy. "Astrolabe," Zool., iii., 1835, p. 547, pl. lxxxiii., figs. 7-9.
P. solandri Gray, Dieff. N.Z., 1843, p. 255.

Stations 1, 14, 20.

Family TEREDINIDÆ.

TEREDO Linné, 1758.

TEREDO (XYLOTRYA) SAULII Wright.

Nausitora saulii Wright, Trans. Linn. Soc., xxv., 1865, p. 567, pl. lxv., figs. 9-15.

Station 74; in a piece of timber.

Family THRACIIDÆ.

THRACIA Blainville, 1824.

THRACIA VITREA Hutton.

Lyonsia vitrea Hutt., Cat. Mar. Moll. 1873, p. 61.
Thracia granulosa Hutt., Cat. Tert. Moll., 1873, p. 19.

Station 4.

Family MYOCHAMIDÆ.

MYODORA Gray, 1840.

MYODORA NOVAE-ZEALANDIAE E. A. Smith.

Myodora novæ-zealandiæ E. A. Smith, P.Z.S., 1880, p. 584, pl. liii., fig. 5.

Station 4.

MYODORA SUBROSTRATA E. A. Smith.

Myodora ovata Hutt., Cat. Mar. Moll., 1873, p. 62 (not of Reeve).
M. subrostrata E. A. Smith, P.Z.S., 1880, p. 584, pl. liii., fig. 6.

Station 4; Dredge Station A.

Family CHAMOSTREIDÆ.

CHAMOSTREA F. de Roissy, 1825.

CHAMOSTREA ALBIDA Lamarck.

Chama albida Lam., Anim. s. Vert., vi., 1819, p. 96.

Station 6.

BRACHIOPODA.

Family TEREBRATULIDÆ.

MAGELLANIA Bayle, 1880.

Magellania lenticularis Deshayes.

Terebratula lenticularis Desh., Revue Zool. Soc. Cuv., 1839, p. 359.
Waldheimia lenticularis Davidson, Trans. Linn. Soc., iv., 1886, p. 52, pl. ix., figs. 2-13.

Station 26 or 30.

TEREBRATELLA Orbigny, 1847.

Terebratella sanguinea Leach.

Terebratula sanguinea Leach, Zool. Misc., 1814, p. 76, pl. xxxiii.
T. cruenta Dillw., Cat. Rec. Shells, ii., 1817, p. 295.
Terebratella cruenta Davidson, Trans. Linn. Soc., iv., 1887, p. 87, pl. xiv., figs. 1-8.
Terebratula zelandica Desh., Revue Zool. Soc. Cuv., 1839, p. 359.
T. rubra Sow., Thes. Conch., i., 1846, p. 345, pl. lxviii., figs. 9-11
T. evansi Davidson, P.Z.S., 1852, p. 77, pl. xiv., figs, 7-9.

Stations 26 or 30, 44.

Terebratella rubicunda Sowerby.

Terebratella sanguinea Q. and G., Voy. "Astrolabe," Zool., iii., 1834, p. 556, pl. lxxxv., figs. 7, 8 (not of Leach).
T. rubicunda Sow., P.Z.S., 1852, p. 92. Davidson, Trans. Linn. Soc., iv., 1887, p. 84, pl. xv., figs. 15-29.
T. inconspicua Sow., P.Z.S., 1846, p. 93.
Waltonia valenciennesii Davidson, Ann Mag. Nat. Hist. (2). v. 1850, p. 475, pl. xv., fig. 1.

Stations 6, 9.

Family RHYNCHONELLIDÆ.

HEMITHYRIS Orbigny, 1847.

Hemithyris nigricans Sowerby.

Rhynchonella nigricans Sow., P.Z.S., 1846, p. 91. and Thes. Conch. i., 1846, p. 342, pl. lxxi., figs. 81, 82. Davidson, Trans. Linn. Soc., iv., 1887, p. 169, pl. xxiv., figs. 16-19.

Stations 6, 22.

CRUSTACEA.

By Charles Chilton, M.A., D.Sc., F.L.S.,
Professor of Biology, Canterbury College, New Zealand.

Plate LVIII.*

The collection of Crustacea is not a particularly large one, and the species collected belong mainly to the crabs, larger shrimps, etc., to which attention was naturally mainly directed. Very few of the smaller forms were obtained, the collection containing only a very few isopods and amphipods that were gathered incidentally along with the larger forms. The list contains 43 species divided among the groups of Crustacea as follows:—Decapoda 28, Stomatopoda 2, Amphipoda 4, Isopoda 5, Cirripedia 2, Parasitic Copepoda 2. All the specimens have been referred to species already described, but one species has only very recently been described, and another is new to the New Zealand fauna, while a new name is proposed for one preoccupied. The collection is nevertheless an interesting one in several respects, more particularly because it contains several forms gathered originally by the "Challenger" or by earlier collectors and not since recognised; these include one or two forms that had long been put down on the list of New Zealand Crustacea but whose right to remain on the list had been much doubted. It will be noticed that quite a large number of species belong to the *Paguridæ*, some of them being species that have not been collected since they were first described by Filhol or Henderson.

From the accounts given below it will be seen that there are one or two interesting examples of commensalism connected with some of the species. Thus *Paramithrax longipes* seems to be almost invariably accompanied by specimens of *Balanus decorus* growing on its carapace, the cirripedes being in some cases so large and numerous that they exceed in size the body of the crab itself. (See plate lvii.).

* For explanation of plate see p. 312.

Eupagurus stewarti seems rather peculiar in the "house" that it occupies. The abdomen of the hermit crab is straight, and in some cases it inhabits tubes formed of a *Millepora*; in other cases the hermit crab lives in a massive calcareous Polyzoon which is very much larger than the crab, so much so that it seems doubtful if the crab can drag its large solid dwelling-place about with it. (See fig. 1). In each case the crab inhabits a cylindrical cavity in the *Millepora* or Polyzoon, and it is not quite clear how this cavity has been formed. Professor Benham, to whom I am indebted for assistance in identifying the *Millepora* and Polyzoon, suggests that they may be pieces that have grown around a circular branch of seaweed and that the crab occupies the cavity formed by the subsequent decay of the seaweed. It is already known from Dr. Alcock's investigations in Indian seas that the houses in which hermit crabs live are made of a great variety of substances, and that in some cases, as in *Paguristes typica*, we have a case of intimate commensalism, a sea-anemone of the genus *Mamillifera* settling on the hinder part of the young hermit-crab's tail and the two animals growing up together in such a way that the spreading zoophytes form a blanket which the hermit crab can either draw completely forward over its head or throw half-back as it pleases.[1]

For assistance in supplying information or specimens for comparison I have to thank Mr. A. Hamilton of the Dominion Museum, Professor W. B. Benham of the Otago Museum, Mr. H. Suter, Mr. G. M. Thomson, Mr. T. Anderton, and the authorities of the Portobello Fish Hatchery. To Mr. Edgar R. Waite, Curator of the Canterbury Museum, I am indebted for the opportunity of examining the specimens, and thanks are due to him for making the collection under most unfavourable conditions during the cruise, when his main energies had to be devoted to the fishes and other groups more directly of economical importance.

I have not attempted to give the full synonymy of the species but have given only such references as seemed necessary in each case.

(1) Alcock.—*Journ. Asiatic Soc. Bengal*, 68, 1899, p. 111, and Cat. Indian Decapod Crustacea, Part 2, Anomura, 1905, p. 7.

LIST OF SPECIES.

BRACHYURA.

1. *Paramithrax peronii* Milne-Edwards.
2. *Paramithrax longipes* G. M. Thomson.
3. *Paramithrax latreillei* Miers.
4. *Acanthophrys filholi* A. Milne-Edwards.
5. *Prionorhynchus edwardsii* Jacquinot et Lucas.
6. *Cancer novæ-zealandiæ* (Jacquinot et Lucas).
7. *Nectocarcinus antarcticus* (Jacquinot et Lucas).
8. *Ovalipes bipustulatus* (Milne-Edwards).
9. *Ommatocarcinus macgillivrayi* White.
10. *Halicarcinus planatus* var. tridentatus (Jacquinot et Lucas).
11. *Halicarcinus huttoni* Filhol.
12. *Elamena producta* T. W. Kirk.
13. *Pinnotheres novæ-zealandiæ* Filhol.
14. *Ebalia lævis* (Bell).

ANOMURA.

15. *Petrocheles spinosus* Miers.
16. *Eupagurus rubricatus* Henderson.
17. *Eupagurus thomsoni* Filhol.
18. *Eupagurus stewarti* Filhol.
19. *Eupagurus noræ* nom. nov. (=*E. edwardsi* Filhol).
20. *Paguristes barbatus* (Heller).
21. *Aniculus aniculus* (Fabricius).
22. *Munida gregaria* (Fabricius).
23. *Galathea pusilla* Henderson.

MACRURA.

24. *Jasus edwardsii* (Hutton).
25. *Ibacus alticrenatus* Spence Bate.
26. *Leander affinis* (Milne-Edwards).
27. *Nauticaris marionis* Spence Bate.
28. *Pontophilus australis* (G. M. Thomson).

STOMATOPODA.

29. *Lysiosquilla spinosa* (Wood-Mason).
30. *Squilla armata* Milne-Edwards.

AMPHIPODA.

31. *Ampelisca chiltoni* Stebbing.
32. *Leptamphopus novæ-zealandiæ* (G. M. Thomson).
33. *Paradexamine pacifica* (G. M. Thomson).
34. *Phronima novæ-zealandiæ* Powell.

ISOPODA.

35. *Paridotea ungulata* (Pallas).
36. *Meinertia imbricata* (Fabricius).
37. *Livoneca raynaudii* Milne Edwards.
38. *Exosphæroma chilensis* (Dana).
39. *Cilicæa caniculata* (G. M. Thomson).

CIRRIPEDIA.

40. *Balanus decorus* Darwin.
41. *Scapellum spinosum* Annandale.

COPEPODA PARASITICA.

42. *Lernæa lotellæ* G. M. Thomson.
43. *Chondracanthus lotellæ* G. M. Thomson.

BRACHYURA.

Paramithrax peronii Milne-Edwards.

Paramithrax peronii M-Edw., Hist. Nat. Crust., i., 1834, p. 324.
Miers, Cat. N.Z. Crust., 1876, p. 5.
Lenz, Zool. Jahrb. xiv., heft 5, 1901, p. 454.
Chilton, Trans. N.Z. Inst. xxxviii, 1906, p. 265.
Fulton and Grant, Proc. Roy. Soc. Victoria, xix., part 1, 1906, p. 16.

One male specimen from Station 44, and one male and one female from Station 74. The female, though only 18mm. in length of carapace, bears eggs and agrees well with the characters of larger specimens, except that the spines on the carapace are sharper; in large specimens they become more like tubercles. The species is common around the New Zealand coasts at moderate depths, and the surface of the carapace is always more or less covered with sponges, seaweed, etc.

It extends to Australia, and Milne-Edwards gives the Indian Ocean as the locality from which his specimens came.

Paramithrax longipes G. M. Thomson.

Plate LVII.

Paramithrax longipes G. M. Thomson, Ann. and Mag. Nat. Hist., ser. 7, vol. x., 1902, p. 361.

Numerous specimens of this species were taken at Stations 4, 5, 7, 17, 23, and 26. They agree well with the description given by Mr. G. M. Thomson, except that in most cases the carapace is more spiny than is shown in his figure. Dimensions of largest male, length of carapace 80mm., breadth 60mm.: propod of cheliped, 60mm.

Nearly all the specimens have the carapace overgrown and sometimes almost completely covered with sponges, compound ascidians, *Serpulæ*, *Spirorbis*, and particularly with *Balanus decorus*. On one small female specimen there were nine or ten specimens of *Balanus decorus*, the whole of them together being larger than the body of the crab; another, a male, bore five specimens of this species on its back, and numerous other examples bore one or more large specimens of *Balanus decorus*. It thus appears that there must be some special association between the crab and this species of cirripede. (See Pl. lvii., figs. 1, 2, 3).

From Station 30 I have one mutilated male specimen measuring 30mm. from the tip of the rostral spines to the posterior end of the carapace, which already has the characteristic external maxillipeds, and undoubtedly belongs to this species; the spines on it are however very much more prominent and acute than those described and figured by Mr. Thomson—his figure appears to have been taken from an old specimen in which the spines have become reduced to tubercles. In the immature specimen the four spines in the branchial region are particularly sharp and prominent, the two posterior ones being the largest, the posterior margin of the carapace is produced in the median line into a prominent spine of about the same size and there is a well-marked row of four spines anterior to this in the median line; the rostral spines project almost horizontally while in the larger specimens they are somewhat depressed towards their extremities.

Paramithrax latreillei Miers.

Paramithrax latreillei Miers, Cat. N.Z. Crust., 1876, p. 6.
P. barbicornis Miers, *ib.* p. 6 (not of Latreille).
Hutton, Index Faunæ N.Z., 1904, p. 247.
P. cristatus Filhol, Mission de l'île Campbell. 1885, p. 358, pl. xli., fig. 11.
Lenz, Zool. Jahrb., xiv., heft 5, 1901, p. 454.

Numerous specimens of this species were taken in set nets at the Chatham Islands, whence specimens have previously been sent to me by Miss Shand; these agree well with the descriptions given by Miers and by Filhol. Miers at first referred the species to *P. barbicornis* (Latreille) an Australian species, but at the same time suggested the name *P. latreillei* should the species prove to be distinct from the Australian one. Filhol stated that it was quite different from *P. barbicornis* (Latreille) and gave a fresh description of it under the name *P. cristatus.* He also gave a description of the true *P. barbicornis* (Latreille), which he considered to be so different as to form a distinct genus, and he therefore suggested for it the name *Lobophrys barbicornis,* under which Milne-Edwards had inscribed it in the Catalogue of the Paris Museum.

Filhol gives the length of the carapace as 41mm. and the breadth 30mm. Some of the specimens obtained by the "Nora Niven" are considerably larger than this, one large male having the length of carapace 60mm. and breadth 42mm. The chelipeds become disproportionately large in these large males, this specimen having the propod 42mm. long and 18mm. broad.

Acanthophrys filholi A. Milne-Edwards.

Acanthophrys filholi A. M.-Edw., Bull. Soc. Phil., 1876, and Ann. Sci. Nat. (6) iv., 1876, art. 9, p. 4.

Filhol, Mission de l'Ile Campbell, 1885, p. 365, pl. xxxix., fig. 1, and pl. xl., fig. 8.

One female specimen from Station 17, one female from Station 26, and another from Station 44. The chelipeds in the female show the same crests on the carpus and are generally similar to those of the male, but are of much smaller size. All the specimens have the carapace thickly covered with sponges, compound ascidians, *Serpulæ,* etc.

I have a specimen in my collection from New Brighton, given to me by Mr. H. Suter. Filhol's specimens were from the oyster beds near Stewart Island.

Prionorhynchus edwardsii Jacquinot et Lucas.

Prionorhynchus edwardsii Jacq. et Luc., Voy. au Pôle Sud. Zool. iii., Crust., 1853, p. 8., pl. i., fig. 1.

Filhol, Mission de l'Ile Campbell, 1885, p. 367, pl. xlii., figs 1 to 4.

Rathbun, Proc. U.S. Nat. Mus. xv., 1892, p. 243.

Hodgson, "Southern Cross" Crustacea, 1902, p. 230.

Chilton, Subant. Is. N.Z., 1909, p. 608.

The specimens appear to agree pretty closely with the description given by Filhol. The dimensions of the largest individuals examined are:—

Male—Length of carapace, 175mm.
Breadth „ „ 150mm.
Propod of chelipeds, length 150mm.
breadth 45mm.

Female—Length of carapace, 115mm.
Breadth of carapace, 100mm.
Propod of chelipeds, length 65mm.
breadth 18mm.

Filhol (p. 370) gives the length of the female as 102mm. and the breadth 114mm., thus making the breadth greater than the length; it is probable, however, that his figures have been accidentally reversed.

The back of the carapace of many of the specimens was overgrown with a serpulid (probably *Pomatoceros strigiceps*) and with a mollusc (*Anomia* sp.), various polyzoa, etc.

Numerous specimens of this species were taken at Stations 5, 15, 17, 20, 47 and 48.

The species is common at the Auckland and Campbell Islands, and at moderate depths off the south of New Zealand. According to the settlers it has only been seen once at Stewart Island; about three years ago specimens were first taken there in shallow water, and soon after they are said to have come ashore in thousands, walking about on the beaches.

CANCER NOVAE-ZEALANDIAE, (Jacquinot et Lucas).

Platycarcinus novæ-zealandiæ Jacq. et Luc., Voy. au Pôle Sud., iii., Crust., 1853, p. 34, pl. iii, fig. 6.

Cancer novæ-zealandiæ Lenz., Zool. Jahrb. xiv., 1901, p. 459.
Chilton, Subant. Is. N.Z., 1909, p. 608.

One immature male specimen from Station 12, six miles north-west of the Nuggets. The species is very common on New Zealand coasts.

NECTOCARCINUS ANTARCTICUS (Jacquinot et Lucas).

Portunus antarcticus Jacq. et Luc., Voy. au Pôle Sud., iii., Crust., 1853, p. 51.

Nectocarcinus antarcticus A. M.-Edw., Archiv. Mus. Hist. Nat. x., 1861, p. 407.
Miers, Cat. N.Z. Crust., 1876, p. 30.
Hodgson, "Southern Cross" Crustacea, 1902, p. 229.
Chilton, Subant. Is. N.Z., 1909, p. 608.

This species was taken at Stations 2, 5, 12, 23, 26 and 30, and at the Chatham Islands. It is known also from the Auckland Islands, and is probably common at moderate depths around the southern parts of New Zealand and the islands south of New Zealand. The specimens agree well with the description given in Miers' Catalogue.

Ovalipes bipustulatus (Milne-Edwards).

Anisopus trimaculata De Haan, Fauna Japon. Crust., dec. i., 1833, p. 13.

Platyonychus bipustulatus M.-Edw., Hist. Nat. Crust., i., 1834 p. 437, pl. xvii., fig. 7-10.

Miers, Cat. N.Z. Crust., 1876, p. 32, and P.Z.S. 1881, p. 68.

Ovalipes bipustulatus Rathbun, Proc. U.S. Nat. Mus. xxi., No. 7, 1898, p. 597, and xxxviii., 1910, p. 577.

O. trimaculatus Stebbing, South African Crustacea, part ii., 1902, p. 13 (with discussion of synonymy).

Doflein, Wiss. Ergebn. Deutschen Tiefsee Exped. (1898-9), 1904, p. 92, pl. xxxii., fig. 6.

Numerous specimens of this species were taken during the expedition; one male from Station 5, and many others, male and female, from the Stations near the Chatham Islands, while, according to Mr. Waite, enormous bags were taken in Petre and Hanson Bays. (Introduction, p. 53). They agree well with the description given in Miers' Catalogue.

The dimensions of the largest specimen are:—Length of carapace 85mm., breadth of carapace 105mm.

The species is widely distributed, being found in Australia, and also on the coast of Chili, Cape of Good Hope, and generally throughout the Indo-Pacific region.

Ommatocarcinus macgillivrayi White.

Ommatocarcinus macgillivrayi White, Append. in Stanley, Voy. "Rattlesnake," ii., 1852, p. 393, pl. v., fig. 1.

M.-Edw, Ann. Sci. Nat., ser. 3, Zool. xviii., 1852, p. 163.

Miers, Chall. Rep., xvii., Brachyura, 1886, p. 247.

Stebbing, History Recent Crustacea, 1893, p. 92.

O. huttoni Filhol, Mission de l'Ile Campbell, 1885, p. 384, pl. xliii., figs. 1 and 2.

One small female specimen from Station 29; length of carapace 17mm., greatest breadth 35mm. This specimen agrees closely with the description given by Filhol.

In describing his specimen Filhol discusses the question as to whether it may be the female of *O. macgillivrayi* White, from Australia, but on account of various differences which he points out comes to the conclusion that this can hardly be the case. During the "Challenger" expedition one young male and two small egg-bearing females were taken in New Zealand seas, and these Miers referred to *O. macgillivrayi*. He pointed out.

however, that in all these specimens the chelipeds were of moderate length and not greatly elongated as in the large Australian males, the types of the species, in the British Museum; and he suggests that the differences may perhaps be found to be of specific importance. At the time he wrote he was evidently unacquainted with Filhol's description of *O. huttoni.*

Through the kindness of the authorities of the Portobello Fish Hatchery I have been able to examine two other female specimens and one male. In the latter the chelipeds are greatly elongated as in the Australian specimens referred to by Miers, and there can, therefore, I think, be little doubt that our New Zealand species is really the same as the one found in Australian seas.

In this male specimen the total width of the carapace to the tips of the lateral spines is 42mm., and the eye stalk reaches almost to the end of the spines, the chelipeds are greatly elongated, the merus being 35mm. long and the total length of the propod to the end of the fixed finger 47mm., the carpus is quite short, only 7mm. long; the merus has the under surface somewhat flattened, but otherwise is nearly cylindrical, and of approximately the same width throughout. It bears no spines, even the one on the middle of the posterior margin being quite absent, but along the lower inner angle there is a series of fairly well-marked granules, and other granules are present along the upper surface, while the other surfaces are smoother, being only minutely granulated. The propod is granulated in the same way, the granulations being most evident along the upper surface. It is rounded in section at the proximal end but widens considerably to the bases of the fingers where it is a good deal compressed. The dactyl is granular on its upper edge; its inner edge, like that of the fixed finger, bears a number of rounded teeth of various sizes.

Halicarcinus planatus var. tridentatus (Jacquinot et Lucas).

Hymenosoma tridentatum Jacq. et Luc., Voy. au Pôle Sud., iii., 1853, p. 60, pl. v., fig. 27.

H. tridentatus Filhol, Mission de l'Ile Campbell, 1885, p. 396.

H. planatus, var. *tridentatus* Chilton, Subant. Is. N.Z., 1909, p. 609.

An immature specimen from the Chatham Islands appears to belong to this common species. There is also a large male specimen from Station 6, off Stewart Island.

As explained under the reference last quoted, I look upon this form as a variety of the widely distributed sub-antarctic species *H. planatus* (Fabr.).

HALICARCINUS HUTTONI Filhol.

Halicarcinus huttoni Filhol, Mission de l'Ile Campbell, 1885, p. 398, pl. xlvii., fig. 1.

Lenz, Zool. Jahrb, xiv., 1901, p. 469.

Two males and four females from Station 75, all small; a female bearing eggs having the carapace 6mm. broad and its length a trifle less.

These specimens I refer with very little hesitation to Filhol's species. Lenz considers this only a young form of *H. planatus* var. *tridentatus* (Jacq. et Luc.) but some of my specimens are adult females with eggs, and they can be readily distinguished from even young forms of var. *tridentatus* Jacq. et Luc. They differ in shape of the carapace which is only slightly broader than long and narrows a little towards the front, and in having the three teeth of the front more nearly on a level with the surface of the carapace though the margin of the carapace is continued across the base of the front as a somewhat indistinct line; the teeth themselves are much longer and more slender than in var. *tridentatus;* they are hairy towards the end and some hairs are also present on the surface of the carapace, while the legs are much more abundantly furnished with hairs than in var. *tridentatus*. In the males that I have been able to examine the chelipeds are much smaller and have the hands less swollen than in var. *tridentatus* and the ischium bears at its distal end three fairly prominent teeth, one on the upper margin and one at each side.

In the size, greater hairiness, and in the very long and slender dactyls of the ambulatory legs my specimens seem to closely resemble those from Jervis Bay which are referred by Mr. Stebbing to *H. ovatus* Stimpson. This and other points in connection with the N.Z *Hymenosomidæ* must however stand over for solution at some future time.

ELAMENA PRODUCTA T. W. Kirk.

Elamena producta T. W. Kirk, Trans. N.Z. Inst., xi., 1878, p. 395.

Filhol, Mission de l'Ile Campbell, 1885, p. 404, pl. l., figs. 1 and 2.

Lenz, Zool. Jahrb. xiv., heft 5, 1901, p. 469.

E. kirki Filhol, *loc. cit.*, 1885, p. 405, pl. xlvii., figs. 5-9.

Two specimens, both females with eggs, from Stewart Island. *E. kirki* Filhol, as described and figured, differs a little in the shape of the carapace but is I think too near to be considered a separate species. *E. producta* appears to be a variable species, as Lenz has already pointed out.

PINNOTHERES NOVAE-ZEALANDIAE Filhol.

Pinnotheres novæ-zealandiæ Filhol, Mission de l'Ile Campbell, 1885, p. 395, pl. xlvi., figs. 1 to 6.

Lenz, Zool. Jahrb. xiv., 1901, p. 467, pl. xxxii., figs 11 to 14.

One female, Station 5, three females, Station 44, one female, Station 20; specimens of a *Pinnotheres* were also seen at Stations 31, 36, 37, 41. Mr. Waite writes (Introduction, p. 52) "Almost every adult *Pinna* taken had its crustacean commensal *Pinnotheres.*"

The specimens from Stations 5, 44 and 20, which I have been able to examine, seem undoubtedly to belong to this species. They agree generally with Filhol's description, but, as Lenz has pointed out, his figures are not exact in all points. The specimens also agree with the better description given by Lenz and with his figures. I have also similar specimens dredged by Captain Bollons in Manukau Harbour and another dredged by him off Cuvier Island in 32 fathoms which evidently belong to the same species. All these specimens are of somewhat large size, the largest having the carapace 13mm. long and 14mm. wide; they are thus rather larger than the specimens examined by Lenz and about the same size as the female specimens examined by Filhol.

Lenz's specimens were taken in the shells of *Mytilus* at French Pass; he describes two specimens taken from the same locality and also from *Mytilus* shells as a separate species *P. schauinslandi* which appears to differ from *P. novæ-zealandiæ* chiefly in the shape of the carapace and especially in having the front and the eyes visible in dorsal view. I am very doubtful if the characters given by Lenz are sufficient for the establishment of a separate species; the shape of the carapace varies somewhat in the different specimens that I have examined, being in some more rounded than in others; the front is not visible from above in the female specimens though Filhol shows it in his figure of the female as well as in the male. If we could assume that Lenz's specimens of *P. schauinslandi* were males I would have no hesitation in looking upon them as males of *P. novæ-zealandiæ,* but although Lenz does not state the sex of these specimens we cannot assume that if they were males he would have overlooked the possibility of their belonging to the same species as the females from the same locality that he was referring to *P. novæ-zealandiæ.* The other characters ascribed by Lenz to *P. schauinslandi* in connection with the shape of the chelæ and of the external maxillipeds do not appear to me to be of specific importance; the line of hairs on the upper inner margin of the carpus is present in all my specimens which, as I have said, owing to the shape of the carapace, etc., must belong to *P. novæ-zealandiæ*. However, the species in this genus are distinguished by such minute points that I do not feel prepared to unite *P. schauinslandi* definitely with *P. novæ-zealandiæ* without comparison of authentic specimens of both species.

Except for their larger size I can find little or nothing in the specimens described above to distinguish them from the smaller specimens found in mussel shells between tide marks at Dunedin, Lyttelton, etc., which on the authority of Heller and Miers I have hitherto referred to *P. pisum* Linn. These specimens appear to agree closely with the description of *P. pisum* given by Bell[2]; in them the eyes are pigmented while in the larger specimens dredged at varying depths the eyes (in the spirit specimens) seem to be always without pigment, but I can find no other difference of any importance and the general shape of the carapace, chelæ, external maxillipeds, etc., seems to be closely the same in all the specimens.

Ebalia laevis (Bell).

Phlyxia lævis Bell, Trans. Linn. Soc. xxi., 1855, p. 305, pl. xxxiv., fig. 3.

Miers, Cat. N.Z. Crust., 1876, p. 56.

Ebalia lævis Chilton, Trans. N.Z. Inst., xxxviii., 1906, p. 266.

One very small specimen from the Chatham Islands appears to belong to this species but it is too immature for certain determination. The species is common in New Zealand seas.

ANOMURA.

Petrocheles spinosus Miers.

Petrocheles spinosus Miers, Ann. Mag. Nat. Hist. (4), xvii., 1876, p. 222, and Cat. N.Z. Crust., 1876, p. 61, pl. i., fig. 5.

G. M. Thomson, Trans. N.Z. Inst., xxxi., 1898, p. 192.

Two specimens from Station 12 and two (females with eggs) from Station 44, all more or less imperfect.

This species, as Mr. G. M. Thomson points out, occurs in many parts of New Zealand, though it is not very often met with and no addition has been made to the description given in 1876 by Miers, which was drawn up from a single much injured specimen in the British Museum.

The following description may be therefore useful:—

(2) Bell, British Stalk-eyed Crustacea, 1853, p. 121.

Carapace triangular, broader behind, depressed or slightly convex, almost entirely covered with minute short hairs; lateral margins slightly arched and bearing a series of about ten small spines varying somewhat in size; front prominent, triangular, slightly concave above, lateral margins with three or four spines, extremity rounded, also bearing a few small spines. Chelipeds elongated, somewhat pubescent, granulous above, merus with four or five prominent sharp spines on the upper inner margin; propod with a series of sharp spines and a row of hairs on the outer margin extending to the tip of the fixed finger and two rows of granules on the upper surface, inner margin also granular; dactyl with a row of granules on the upper surface, under surface hairy; fingers not quite meeting at the base when closed. Ambulatory legs with the meral joints compressed, upper margin with sharp spines and hairs.

Length of carapace 8mm, greatest breadth 8mm.

Eupagurus rubricatus Henderson.

Eupagurus rubricatus Henderson, Chall. Rep. Anomura, 1888, p. 69, pl. vii., fig. 4.

G. M. Thomson, Trans. N.Z. Inst. xxxi., 1898, p. 180.

Alcock, Cat. Indian Decap. Crust. part ii., Anomura, 1905, p. 176.

E. intermedius Lenz, Zool. Jahrb. xiv., heft. 5, 1901, p. 446 pl. xxxii., figs. 8-10.

The collection contained numerous specimens of this species from Stations 2, 5, 20, 22, and 89. They agree well with Henderson's description which was drawn up from a single imperfect specimen taken by the Challenger Expedition, even the red markings he mentions on the legs are still evident in most of the specimens. The dactyls of the second and third legs are convex on the outer side while the inner surface forms a shallow groove extending along the whole length of the dactyl. The specimens are all much larger than Henderson's type specimen, thus one of them has the following dimensions:—Length of carapace 31mm., length of cheliped 68mm., length 3rd right leg 35mm., length of eye stalk 12mm., while another with the carapace 33mm. long has the chelipeds and 3rd right leg still longer and the chelipeds particularly broad.

E. intermedius Lenz from French Pass is, I think, undoubtedly the same as this species.

Eupagurus thomsoni Filhol.

Eupagurus thomsoni Filhol, Mission de l'Ile Campbell, p. 423, 1885, pl. li., fig. 6.

G. M. Thomson, Trans. N.Z. Inst., xxxi., 1898, p. 183.

Alcock, Cat. Indian Decap. Crust., part ii., 1905, p. 176.

One specimen from Station 5 and three from Station 17, in shells of a *Turritella.*

These agree well with Filhol's short description and with his figure, though the carpus of the right cheliped is hardly so spiny on its outer surface; the peculiar compressed shape of the propod of the left chela with the crests on it is very characteristic.

Eupagurus stewarti Filhol.

Eupagurus stewarti Filhol, Mission de l'Ile Campbell, 1885, p. 418, pl. li., fig. 3.

G. M. Thomson, Trans. N.Z. Inst. xxxi., 1898, p. 180.

Alcock, Cat. Indian Decap. Crust., part ii., 1905, p. 176.

I refer to this species a few small specimens from Stations 2, 5, and 12; one from Station 79 found in a small *Dentalium* shell seems to belong here, but is too immature for certain indentification. This species seems not to be particular as to its "house,"

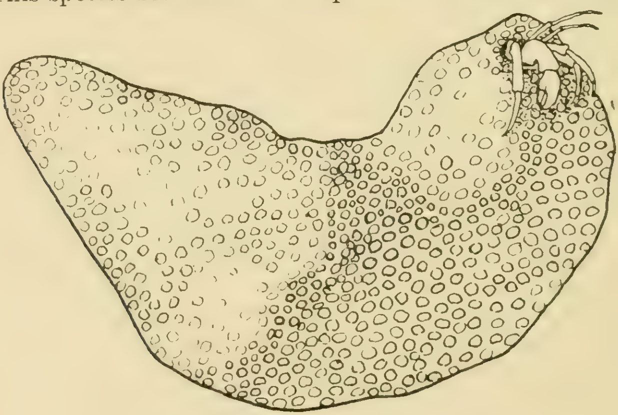

Fig 1. *Eupagurus stewarti* in calcareous polyzoon.

one or two are in small *Turritella* shells, several in small masses of a calcareous Polyzoon, and two in tubes formed by a *Millepora;* most of the specimens have the abdomen straight.

I have a small specimen from the Snares that I think also belongs to this species, but unfortunately both chelipeds are wanting.

I was at first inclined to look upon these specimens as young forms of *E. cookii*, in which the characteristic shape of the right chela with its denticulated marginal crest had not been fully developed; the specimen from Station 5 is however large enough to show this if it were going to be developed, and I have little doubt that it is correctly referred to *E. stewarti;* in it there is a slight crest along the outer edge of the propod and a little along the base, but the outer surface of the propod does not show the two ridges present in *E. cookii* and the outer margin is straight and not produced into a thin convex plate as in that species. Another specimen, though smaller, is a female bearing eggs, and the chelipeds show no further approach to the characters of *E. cookii* than do those of the other specimens.

Eupagurus norae *nom. nov.*

Eupagurus edwardsii Filhol, Mission de l'Ile Campbell, 1885, p. 412, pl. lii., figs. 1 and 2, (name preoccupied).

G. M. Thomson, Trans. N.Z. Inst., xxxi., 1898, p. 182, pl. xx, figs. 6 and 7.

Chilton, Trans. N.Z. Inst., xxxviii, 1906, p. 266.

E. "*edwardsii*" Alcock, Cat. Indian Decap. Crust., part ii., 1905, p. 176.

One from Station 17, with carapace 18mm. long. One from Station 23, a female with eggs, carapace 20mm. long. Others from Stations 5 and 29, smaller than the above.

These specimens agree well with the descriptions given by Filhol and Thomson.

Alcock has pointed out that the specific name is preoccupied in this genus by *E. edwardsii* Dana, and I have therefore named the species *norae* from the first name of the trawler "Nora Niven," by which the specimens now under consideration were obtained.

Paguristes barbatus (Heller).

Clibanarius barbatus Heller, Voy. Novara. Crust, 1865, p. 90, pl. vii., fig. 5.

Miers, Cat. N.Z. Crust., 1876, p. 67.

Filhol, Mission de l'Ile Campbell, 1885, p. 425.

G. M. Thomson, Trans. N.Z. Inst. xxxi., 1898, p. 172.

Henderson, Chall. Rep. Anomura, 1888, p. 78.

Alcock, Cat. Indian Decap. Crust. part ii., 1905, p. 160.

Paguristes subpilosus Henderson, Chall. Rep. Anomura, 1888, p. 77, pl. viii. fig. 2.

G. M. Thomson, *loc. cit.*, 1898, p. 187.

Alcock, *loc. cit.*, 1905, p. 156.

One specimen from Station 5 and one from Station 26, the latter in a *Voluta* shell. These specimens agree closely with Heller's description, and I have no doubt belong to the species described by him. They also agree equally closely with the description given by Henderson for *P. subpilosus,* and the two species must be combined. Henderson himself had pointed out the resemblance between the two, but had not combined them as Heller described the dactyls of the ambulatory legs as scarcely shorter than the corresponding propods; as a matter of fact in the specimens before me they are, as Henderson describes them, half as long again as the propods.

Aniculus aniculus (Fabricius).

Pagurus aniculus Fabr. Ent. Syst. ii., 1793, p. 468, and Suppl. 1798, p. 411.

Aniculus typicus Miers, Cat. N.Z. Crust., 1876, p. 64.

Hutton, N.Z. Journ. Sci., i., 1882, p. 264.

Filhol, Mission de l'Ile Campbell, 1885, p. 424.

G. M. Thomson, Trans. N.Z. Inst., xxxi., 1898, p. 184.

A. aniculus Alcock, Cat. Indian Decap. Crust., part ii, Anomura, 1905, p. 94, pl. vii., fig. 6.

A. R. McCulloch, Rec. Aust. Mus. vii., 1908, p. 59.

Full synonymy of this widely distributed species will be found in Alcock's report quoted above.

One fine specimen of this species, with carapace 55mm. long in the median line, was obtained at Station 5, *i.e.*, 50 miles east of Stewart Island. This species was put down by Heller as being found at Auckland during the "Novara" Expedition. No subsequent specimens however had been obtained, and in 1882 Hutton, in the work quoted above, placed it in a list of species which he thought should be struck out of the New Zealand fauna as they had been inserted only on Heller's authority, and were all large and conspicuous forms known mainly from warmer seas. It is interesting therefore to find this species turning up so far south as Stewart Island. The single specimen must I think undoubtedly be referred to this species, and on the whole it agrees well with Alcock's description. I have been able to compare it with a specimen in the Canterbury Museum from "Polynesia," and though it differs from this and from Alcock's description in the points mentioned below, I do not think these are sufficient for specific distinction.

The specimen is a large male with carapace 55mm. long, and therefore considerably larger than the form described by Alcock, the carapace of which was only 40mm. in length, and very much larger than the specimen in the Canterbury Muuseum. The branchial region of the carapace is quite soft and membranous and the rostrum is much less prominent, the front being merely produced a little in the middle so as to be slightly convex. The ophthalmic scales have two well marked spines at the tip and the left one has two other spines well marked and one smaller one on the outer margin, while the right one has only two on the outer margin, both less distinct than the two terminal ones. The second pair of legs is only slightly longer than the chelipeds and the third pair is somewhat longer than the second; in both the dactyl is considerably longer than the propod.

The specimen in the Canterbury Museum from "Polynesia" undoubtedly belongs to this species as described by Alcock, and differs from the Nora Niven specimen in having the rostrum much better marked and acute, the eye stalks rather more slender, the dactyls of the legs shorter and the curved lines of setae extending more continuously across the joints of the legs, while in the Nora Niven specimen they are more broken, the specimen also is somewhat more hairy on the chelipeds and legs and the anterior part of the carapace. It is however only about one-third the size of the Nora Niven specimen, and the differences are perhaps due to age.

MUNIDA GREGARIA (Fabricius).

Galathea gregaria Fabr., Ent. Syst. ii., 1793, p. 473.

G. subrugosa White, List. Crust. Brit. Mus., 1847, p. 66.

Munida subrugosa Miers, Zool. Erebus and Terror, Crust, 1874, p. 3, pl. iii., fig. 2.

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

Henderson, Chall. Rep. Anomura, 1888, p. 124.

G. M. Thomson, Trans. N.Z. Inst., xxxi., 1899, p. 194.

Hodgson, Southern Cross Crust., 1902, p. 232.

Chilton, Trans. N.Z. Inst,. xxxvii., 1905, p. 230, and Subant. Is. N.Z., 1909, p. 612.

A. M.-Edw., Mission du Cap Horn, vi., 1891, p. F. 36, pl. ii., fig. 2.

Grimothea gregaria, Henderson, *loc. cit.*, 1888, p. 124.

G. novæ-zealandiæ Filhol, Mission de l'Ile Campbell, 1885, p. 426.

Munida gregaria Miers, P.Z.S., 1881, p. 73.

A. M.-Edw., l.c., p. F. 32, pl. ii., fig. 1.

Numerous specimens of this species were taken at Stations 5, 7, 14, 21, and 26. From Station 7 there was a large number of specimens of varying sizes up to 54mm. in length. Though these were presumably brought up by the trawl in the usual way, I think from the character of them that they were not actually living on the sea bottom, for they were all perfectly clean and free from mud, and in all of them the external maxillipeds have the elongated foliaceous character that is associated with the pelagic form known as *Grimothea gregaria*. A considerable number of these specimens from Station 7 are mature, some of them being females bearing eggs. The following table gives the measurement of 8 of these specimens and also of 5 other specimens from Station 26, 3 being females bearing eggs. From the measurements given it will be seen that while there is considerable variety in the proportionate length of the external maxillipeds these appendages are considerably shorter in the specimens from Station 26 than in those from Station 7, although both lots contained mature females. The length of the body is measured from the tip of the rostrum to the extremity of the telson.

	Body.	Chelipeds.	External Maxilliped.
STATION 7.	mm.	mm.	mm.
1. Female, with eggs ...	35	35	18
2. ,, ,, ,, ...	38	36	18
3. ,, ,, ,, ...	39	35	18
4. ,, ,, ,, ...	40	40	20
5. Male	33	33	15
6. ,, ...	45	45	20
7. ,, ...	50	58	23
8. ,, ...	54	—	24
STATION 26.			
9. Female, with eggs ...	40	42	15
10. ,, ,, ,, ...	45	—	17
11. ,, ,, ,, ...	47	—	18
12. Male	50	—	18
13. ,, ...	51	60	19

From the details given above it is seen that there are two forms differing in the length and character of the external maxillipeds, but that each form may grow to approximately the same size and become sexually mature; it would be therefore most natural to conclude that we have to deal with two distinct species; however, as I have pointed out elsewhere, the general resemblance between the two forms is so great and the length of the external maxillipeds is subject to so much variation that I think we really have only one species of which the pelagic form (*Grimothea*) is primarily an immature stage but under certain conditions may remain in this stage and grow to be as large as the ordinary adult stage (*Munida*) and may even become sexually mature. It is at any rate the fact that where one of these forms is found the other is also to be met with not far away.

I have given above only a few measurements, but from them and from the examination of others not included in the table I think it is clear the external maxillipeds decrease in length in proportion to the body in the larger forms while the chelipeds tend to become somewhat longer in proportion to the length of the body.

Galathea pusilla Henderson.

Galathea pusilla Henderson, Chall. Rep. Anomura, xxvii., 1888, p. 121, pl. xii., fig. 1.

G. M. Thomson, Trans. N.Z. Inst., xxxi., 1899, p. 193, pl. xxi., fig. 7.

Grant and McCulloch, Proc. Linn. Soc. N.S.W., 1906, p. 49, pl., iv., figs. 5, 5a.

One imperfect specimen from Station 30.

The species appears to be common round the New Zealand coasts at moderate depths; it is also found off the coast of Australia, and Grant and McCulloch in the reference last quoted give a description of the adult male which had previously been undescribed.

MACRURA.

Jasus edwardsii (Hutton).

Palinurus edwardsii Hutton, Trans. N.Z. Inst. vii., 1875, p. 279. Miers, Cat. N.Z. Crust., 1876, p. 75.

P. lalandii Miers, *loc. cit.*, 1876, p. 74.

Jasus edwardsii T. J. Parker, Trans. N.Z. Inst. xvi., 1884, p. 297, and xix., 1887, p. 150.

J. lalandii (part), Ortmann, Zool. Jahrb. vi., 1891, p. 16.

This species was taken at many of the Stations, being extremely common at Stations 73, 74, 75. Mr. Waite informs me that the Crayfish was trawled in immense numbers at the Chatham Islands, both in Petre and Hansen Bays; the greater proportion were returned to the water, but eleven large sacks were filled and given to the Maori and Moriori inhabitants of the islands. It is remarkable that all the specimens taken proved to be males; I observed the same thing myself during a recent visit to Dusky Sound, in December, 1908, where many specimens were taken in shallow water and all proved to be males. On the other hand, fully half the specimens obtained in July and August from the shops for dissection in the Biological Laboratory are females.

This species is closely allied to *J. lalandii* Milne-Edwards from the Cape of Good Hope. Parker considered *J. edwardsii* a separate species distinguished mainly by a different pattern of the sculpturing on the abdominal segments; at the same time he pointed out that the differences were slight and that specimens from other localities might necessitate the merging of the two forms. Ortmann subsequently combined both *J. paulensis* (Heller) from St. Paul in the Indian Ocean, and *J. edwardsii* (Hutton) with *J. lalandii* (M-Edw.) (see Stebbing, South African Crustacea, part ii., p. 38). I have not been able to consult Ortmann's paper, and in the meantime leave the species under Hutton's name as a matter of convenience for New Zealand workers. As regards questions of distribution, it is immaterial whether we consider it a separate species or a variety of *J. lalandii.*

Ibacus alticrenatus Spence Bate.

Ibaccus alticrenatus Spence Bate, Chall. Rep. Macrura, xxiv., 1888, p. 23, pl. ix., fig. 2.

Several specimens from Stations 83 and 89, and one from the stomach of a *Zeus* at Station 30; another from Chatham Islands. It was also taken by the Challenger in New Zealand seas, and a variety has been taken off the coast of Australia.

These specimens agree minutely with the description given by Spence Bate. The late Mr. F. E. Grant[3] described a variety of this species under the varietal name *septemdentatus* from specimens dredged off Port Jackson in which the distal margin of the antennae bore seven teeth. The number of teeth on this margin is however subject to variation; in one of Mr. Grant's specimens there were six teeth on one side and seven on the other. In most of my specimens there are six teeth with a

(3) Grant, Proc. Linn., Soc. N.S.W., 1905, p. 322, pl. xi., fig. 1.

small secondary tooth on the inner side of the innermost one: one male specimen has six on the right side and seven on the left side, and another has eight on the right and seven on the left side. When there are only six teeth they are somewhat "distantly separated," as described by Spence Bate; when the teeth are more numerous they are naturally less separated at the base.

Spence Bate has pointed out that this species in general aspect agrees wth *Ibacus incisus* (Péron) (= *J. peronii* Leach), and might almost be considered a variety of that species; the differences, however, that he points out appear to be constant, and it is perhaps as well to consider it a separate species. *I. incisus* is found on the Australian coast, and I have specimens from Port Phillip which clearly show the differences pointed out by Spence Bate. This writer also notes that the species approximates in appearance somewhat to *Thenus orientalis*, and appears to be a form nearly allied to that genus.

In all cases in the report on the Challenger Macrura, Spence Bate spells the generic name *Ibaccus*, though, as Stebbing[4] has pointed out, he has given no reason for so doing.

Leander affinis (Milne-Edwards).

Palæmon affinis M-Edw., Hist. Nat. Crust. ii., 1837, p. 391.

G. M. Thomson, Trans. Linn. Soc. (2), viii., 1903, p. 450.

Filhol, Mission de l'Ile Campbell, 1885, p. 433.

Lenz, Zool. Jahrb. xiv., heft. 5, 1901, p. 435.

One damaged specimen from Station 89 seems to belong to this species.

Several specimens from the Chatham Islands. This is a very common species in New Zealand seas and is circumaustral in distribution.

Nauticaris marionis Spence Bate.

Nauticaris marionis Spence Bate, Chall. Rep. Macrura, 1888, p. 603, pl. cviii.

Chilton, Subant. Is. N.Z., 1909, p. 614.

Two females with eggs and one immature specimen from Station 30.

The species is widely distributed in southern seas.

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(4) Stebbing, History of Recent Crustacea, 1893, p. 194.

Pontophilus australis (G. M. Thomson).

Crangon australis G. M. Thomson, Trans. N.Z. Inst. xi., 1879, p. 231.

Pontophilus australis G. M. Thomson Trans. Linn. Soc. (2), viii., 1903, p. 434.

Several damaged specimens from Station 1 and one from Station 2.

STOMATOPODA.

Lysiosquilla spinosa (Wood-Mason).

Coronis spinosa Wood-Mason, Proc. Asiatic Soc. Bengal, 1875, p. 232.

Lysiosquilla spinosa Miers, Ann. Mag. Nat. Hist., (5) v., 1880, p. 12, pl. i., figs. 10-12, and p. 125.

Chilton, Trans. N.Z. Inst., xxviii., 1891, p. 62, pl. x. and xliii, 1911, p. 138, fig. 4.

One imperfect specimen from Station 5; the posterior end of the abdomen is wanting but the whole dorsal surface is quite smooth and the parts that can be examined agree well with this species which is widely distributed in New Zealand seas, and has also been recorded from the Andamans.

Squilla armata Milne-Edwards.

Squilla armata M.-Edw., Hist. Nat. Crust., ii., 1837, p. 521.

Gay, Hist. de Chile, Zool. iii., Crust., 1849, p. 223.

Miers, Ann. Mag. Nat. Hist. ser. 5, v., 1880, p. 25.

A. M-Edw., Mission du Cap Horn, 1891, p. F. 53.

Chilton, Trans. N.Z. Inst. xxiii., 1891, p. 60, and xliii, 1911, p. 135, figs. 1 and 2.

Stebbing, South African Crustacea, part ii., 1901, p. 45.

Bigelow, Proc. U.S. Nat. Mus. xvii., 1895, p. 515.

Several specimens from Station 85, found in the stomach of a *Dasybatus brevicaudatus.* These specimens are all of approximately the same size, the largest being about 84mm. in length. They agree on the whole well with the description of *S. armata* given by Miers, and evidently belong to the same species as two large specimens of *S. armata* in the Dominion Museum, with which I have been able to compare them through the kindness of Mr. A. Hamilton. They differ from these specimens only in having the median tubercles on the 4th, 5th and 6th abdominal segments obsolete and in the various carinæ being rather less prominent. In nearly all of them there are two or three small teeth on the posterior margin of the fifth abdominal segment between the sub-median and the lateral carinæ. The number of teeth on the posterior margin of the terminal segment between the sub-median and the lateral spines evidently varies with the age of the specimen; in most of the Nora Niven specimens there are eleven or twelve of these teeth though in some cases only ten, while in the larger specimens in the Dominion Museum the teeth are fewer, there being only eight; in the largest specimens the teeth are rather rounded and not pointed.

A. Milne-Edwards has given a fuller description of *Squilla armata* in the Mission du Cap Horn, and my specimens agree well with his description. He is inclined to unite with it *S. gracilipes* Miers[5] which is described as having ten teeth on the dactyls of the raptorial limbs. The number of these teeth is, as he points out, sometimes subject to very considerable variation in the same species as I have also noted in the case of *Lysiosquilla spinosa. Squilla gracilipes* however also differs according to Miers' description in having about 26 denticles between the sub-median marginal spines and about 18 on each side between these and the first lateral spines; the number of teeth between the sub-median and lateral spines doubtless varies, as I have already mentioned, according to age, but in all the adult specimens of *S. armata* that I have examined the margin between the sub-median spines is smooth except for the median fissure. It seems hardly likely therefore that *Squilla gracilipes* can belong to this species.

In general appearance and in the character of the posterior margin of the terminal segment *S. armata* shows considerable resemblance to *S. lata* Brooks from the Arafura Sea, and like that species it shows curved lines on the telson on each side of the median carina; it has, however, a well marked spine on the basal joint of the uropoda, and the teeth on the inner margin of the outer prolongation of the uropods are represented by faint serrations only instead of by sharp teeth increasing in length distally as in *S. lata*: that species has only seven teeth on the posterior margin between the sub-median and the lateral spines and the dactyl of the raptorial limb bears only six teeth.

I had written the paragraph above before I noticed that *Squilla armata* had been fully redescribed by Bigelow from specimens obtained off the coast of Patagonia, and that he had also pointed out the similarity of the posterior margin of the telson to that of *S. lata*.

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(5) Miers, Survey of H.M.S. "Alert," P.Z.S., 1881, p. 75, pl. vii., fig. 8.

AMPHIPODA.

Ampelisca chiltoni Stebbing.

Ampelisca chiltoni Stebbing, Chall. Rep. xxix., 1888, p. 1042. pl. ciii, and Das Tierreich Amphip., 1906, p. 102.

Chilton, Trans. N.Z. Inst. xxxviii., 1906, p. 267.

One specimen from Station 20. This species is found all round the New Zealand coasts at moderate depths.

Leptamphopus novae zealandiae (G. M. Thomson).

Pherusa novæ-zealandiæ G. M. Thomson, Trans. N.Z. Inst., xi., 1879, p. 239, pl. x.c., fig. 2.

Leptamphopus novæ-zealandiæ Stebbing, Das Tierreich Amphip., 1906, pp. 294, 727.

Chilton, Subant. Is. N.Z., 1909, p. 621.

Two specimens from Station 2.

The species is widely distributed in Antarctic and Subantarctic seas.

Paradexamine pacifica (G. M. Thomson).

Dexamine pacifica G. M. Thomson, Trans. N.Z. Inst., xi., 1879, p. 238, pl. x. b., fig. 4.

Paradexamine pacifica Stebbing, Das Tierreich Amphip., 1906, p. 518.

Chilton, Subant. Is. N.Z., 1909, p. 632.

One specimen from Station 2.

This species is common in New Zealand seas, and is closely allied to *P. fissicauda* Chevreux collected by the French Antarctic Expedition, 1903-5, at Booth Wandel Island and Port Charcot.

Phronima novae-zealandiae Powell.

Phronima novæ-zealandiæ Powell, Trans. N.Z. Inst., vii., 1875, p. 294.

Stebbing, Chall. Rep. xxix., 1888, p. 1356.

Hutton, Index Faunæ N.Z., 1904, p. 256.

Two specimens were obtained at Stewart Island during the Expedition, both in their "Phronima-houses," one being accompanied by a large number of young, about 2mm. in length.

Specimens of this species are frequently washed up on New Zealand beaches. The Challenger specimen which Stebbing refers to this species was taken in the Southern Ocean lat. 50 1′ S., long. 123 4′ E., and was reported to come from a depth of

1800 fathoms, though considering the general habits of the species it is very doubtful if it actually came from this depth.

P. novæ-zealandiæ is very similar in structure, habits, etc., to *P. sedentaria* (Forskäl) of the Northern Hemisphere, and may, as Stebbing suggests, prove to be identical with that species.

ISOPODA.

Paridotea ungulata (Pallas).

Oniscus ungulatus, Pallas, Spic. Zool. Fasc. ix., 1772, p. 62, pl. iv., fig. 11.

Idotea ungulata Miers, Journ. Linn. Soc., Zool., xvi., 1881, p. 52.

Paridotea ungulata Stebbing, South African Crust., part i., 1900, p. 53, and part ii., 1902, p. 56.

Chilton, Subant. Is. N.Z. 1906, p. 660.

Several specimens of both sexes from Stewart Island. The species is a common one in southern seas.

Meinertia imbricata (Fabricius).

Oniscus imbricatus Fabr., Mantissa Insectorum v., 1, 1787, p. 241.

Ceratothoa banksii Miers, Cat. N.Z. Crust., 1876, p. 105.

Meinertia imbricata Stebbing, South African Crustacea, part i., 1900, p. 58.

Hutton, Index Faunæ N.Z., 1904, p. 262.

Full synonymy is given by Stebbing in the reference quoted above.

One adult specimen and several young of various stages were obtained during the Expedition on *Trachurus picturatus.* The species is known from the Indian Ocean, Java, Cape Colony, and New Zealand.

Livoneca raynaudii Milne-Edwards.

Livoneca raynaudii M.-Edw., Hist. Nat. Crust. iii., 1840, p. 262. Schiödte and Meinert, Naturhist. Tidsskr. (3), xiv., 1884, p. 367, pl. xv., figs 9-13.

Whitelegge, Mem. Aust. Mus. iv., 1901, part iii., p, 236.

Thielemann, Abhand. K. Bayer. Akad. d. Wissensckh. ii. Suppl. Bd., 3 Abhand., 1910, p. 42.

L. novæ-zealandiæ Miers, Ann. and Mag. Nat. Hist. (4) xvii., p. 227, and Cat. N.X. Crust., 1876, p. 106, pl. iii., fig. 2.

Chilton, Subant. Is. N.Z., 1909, p. 651.

Several specimens taken on fish at Station 6,[6] off Stewart Island. The species is a common parasite on several species of fish in New Zealand seas, and is widely distributed in southern seas. Thielemann records it from Yokohama also.

Though I had previously hesitated, I now think that our New Zealand species should be referred to *L. raynaudii* Milne-Edwards from the Cape of Good Hope, as has already been done by Mr. Whitelegge. Schiödte and Meinert give L. *novæ-zealandiæ* as a doubtful synonym of *L. raynaudii;* they examined Milne-Edwards' type specimen and included with it specimens from New Zealand and Australia. Dr. W. T. Calman of the British Museum, who has kindly looked into the question for me, informs me that the only South African specimen of the genus in the Museum is one from "Simons Bays," identified (apparently by Miers) as L. *novæ-zealandiæ;* further, Dr. Calman has compared Miers' type specimens of *L. novæ-zealandiæ* with Schiödte and Meinert's figures without detecting any obvious differences.

Exosphaeroma chilensis (Dana).

Sphæroma chilensis Dana, U.S. Explor. Exped. Crust, 1853, p. 777, pl. lii., fig. 3a-c.

Sphæroma chilense Hansen, Q. Jour. Micro. Sci. xlix., 1905, p. 116.

There are three specimens from the Chatham Islands which I think undoubtedly belong to this species. Dana described the species as follows:—

"Body smooth. Abdomen with two obsolete prominences above, caudal segment short, very broadly rounded behind. Caudal stylets reaching just to line of extremity of abdomen; inner lamella arcuate on outer side, sub-acute at apex; outer, straight lanceolate, round at apex."[7]

The specimens agree well with the brief description given by Dana, except that I should be inclined to describe the posterior end of the pleon as truncate with rounded angles rather than "very broadly rounded." This, however, is a character that appears to vary according to the size, the posterior extremity being distinctly truncate in larger specimens while in smaller ones it could quite well be described as very broadly rounded.

Though this species has not been previously recorded from New Zealand it is widely distributed on the New Zealand coasts, and I have for some time had in my collection specimens from

(6) The only fishes taken at Station 6 were:—*Physiculus bachus, Thyrsites atun, Clupea neopilchardus, and Pelotretis flavilatus.* Ed.

(7) I am indebted to Mr. Robert Hall, Curator of the Tasmanian Museum, for a copy of this description; the text of Dana's report is not available in Christchurch.

Auckland, Lyttelton, and Chatham Islands. Some of those gathered at Auckland (for which I am indebted to Mr. H. Suter) had already been labelled *Sphæroma chilensis* by him.

The first three joints of the palp of the maxillipeds are produced into lobes on the inner side just as in *Exosphæroma gigas*, and the species must therefore be transferred to that genus. I postpone a more detailed description of the species.

On some of the specimens were found individuals of the species *Iais pubescens* (Dana) which is so common as a semi-parasite on *E. gigas*.

Cilicaea caniculata (G. M. Thomson).

Næsa caniculata G. M. Thomson, Trans. N.Z. Inst., xi., p. 234 pl. x. A, fig. 7-7a.

G. M. Thomson and Chilton, Trans. N.Z. Inst., xviii., 1879, p. 153.

Cilicæa canaliculata Hansen, Q. Jour. Micro. Sci. xlix., 1905, p. 123.

One male and eight females (or immature males) from Molyneaux Bay. 20-46 fathoms.

CIRRIPEDIA.

Balanus decorus Darwin.

Plate LVII.

Balanus decorus Darwin. Monog. Cirripedia, Balanidæ. 1854, p. 212, pl. ii., figs. 6a, 6b.

Hutton, Trans. N.Z. Inst., xi., 1879, p. 328.

Chilton, "Subant. Is. N.Z.," 1909, p. 670.

Numerous specimens of various sizes were found on the carapaces of nearly all the specimens of *Paramithrax longipes* Thomson, with which it seems to be specially associated (see *ante* p. 289). Other specimens were found on a *Voluta* shell inhabited by the hermit crab *Eupagurus rubricatus* Henderson. The species is common in New Zealand seas, and is also found in Australia.

Scalpellum spinosum Annandale.

Scalpellum (*Smilium*) *spinosum* Annandale, Trans. N.Z. Inst. xliii., 1911, p. 164, with figs. 1-4.

Several specimens from Station 5 forming a fine series growing together in tufts.

I had described this species as new, but I find that it is the same as one recently described by Mr. Annandale in a paper read before the Otago Institute, on the 5th July, 1910, the MS.

of which I have had an opportunity of consulting. My specimens agree very closely with his description, and indeed the specific diagnosis I had drawn up contains almost precisely the same points as those mentioned in his. Mr. Annandale had only one specimen from Nelson for examination, from the examination of the series at my disposal I had noted that the minute blunted calcareous spines on the peduncle vary considerably, in some specimens being distinct only towards the base, but in others equally well marked towards the distal end.

Mr. Annandale says that the species closely resembles *S. kampeni* Annandale, which occurs off the east coast of Sumatra at Singapore and in the Gulf of Siam.

COPEPODA PARASITICA.

Lernaea lotellae G. M. Thomson.

Lernæa lotellæ G. M. Thomson. Trans. N.Z. Inst., xxii., 1890 p. 369.

Hutton, Index Faunæ N.Z., 1904, p. 274.

Two specimens from *Physiculus bachus* Station 75.

Chondracanthus lotellae G. M. Thomson.

Chondracanthus lotellæ G. M. Thomson, Trans. N.Z. Inst., xxii, 1890, p. 372.

Hutton, Index Faunæ N.Z., 1904, p. 274.

A few specimens labelled "Gill cavity, Red Cod (*Physiculus bachus*)." They are referred to by Mr. Waite in the "Introduction" (p. 52), as having been taken in Blueskin Bay, Otago.

EXPLANATION OF PLATE LVIII.

Fig. 1. Dorsal view of female specimen of *Paramithrax longipes* showing carapace covered with *Balanus decorus*.

Fig. 2. Dorsal view of male specimen of *Paramithrax longipes* with carapace bearing *Balanus decorus*, *Serpulae*, &c.

Fig. 3. Side view of specimen shown in fig. 1, on larger scale.

NOTE.—The references to T.N.Z.I., vol. xliii., have been obtained from paged proofs, the volume not being issued at the date of publication of this work.—ED.

[*Frank Chilton, photo.*

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CONTENTS

ADDITIONS AND CORRECTIONS

TO THE

BASIC LIST

OF THE

FISHES OF NEW ZEALAND.[1]

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

It is more than five years since the Basic List was published, and the following are such additions and corrections as I have met with during the course of my work. As, however, certain groups only have been studied, no completeness is aimed at, but as the present volume is being closed, it seems advisable to publish such information as has already been gleaned.

The numbers prefixed to the species are those of the Basic List, and indicate that some change is made. When the specific name is changed, the original reference to the substituted name is given so as to preserve the basic character of the list (as 9—*Cephaloscyllium isabella* Bonnaterre). When the genus only is changed, the original reference is not given, as it will be found, on consulting the list (as 22—*Typhlonarke aysoni* Hamilton). In a few cases the change is of orthography only (as 98—*Macruronus novæ-zelandiæ* Hector). Species additional to the list are denoted by a letter following the number (as 17a—*Centrophorus plunketi* Waite). The genera not being numbered, the position of a new entry is indicated by the page, its exact situation being immediately in advance of the first species bearing the name of the genus (as p. 8—*Centrophorus* Müller and Henle).

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[1] Waite, pp. 3-35 *antea*, 1907.

In the Basic List I used the names bestowed by Forster in preference to those of Bloch and Schneider, and, in doing so, generally followed authors who wrote on the subject, but, according to modern views, the latter names have priority, as they occur earlier on the page.

The following extracts from Gill's "A Comparison of Antipodal Faunas,"[2] give the history of a number of the names of New Zealand Fishes, and are worthy of reproduction.

"The first glimpse of the piscine fauna of New Zealand is due to Dr. John Reinhold Forster, who accompanied the celebrated Capt. Cook(e) on his second voyage, and visited New Zealand in 1773 and again in 1774. Forster made full descriptions, and his son George drew sketches of many fishes observed by him and gave them scientific names, but his own work embodying these observations remained unpublished for nearly three-quarters of a century. Meanwhile, however, Forster's manuscripts fell into the hands of Schneider, the editor and completer of Bloch's 'Systema Ichthyologiæ,' and the new species of fishes were incorporated in the 'Systema' generally with Forster's own names, but in some cases, with new ones.

"Forster's new work (Descriptiones Animalium in Itinere ad Maris Australis Terras) was not published till 1844.

"It is to be remarked that some of the species described by Forster have each received two names, Schneider, with the propensity common in his time to change a name because it did not seem to be as good a one as could be given, substituting for Forster's one of his own which suited him better. Nevertheless Foster's, in every case but one, was also given. Forster's names were therefore actually *published* at the same time as Schneider's and in connection with his (Forster's) own descriptions. Whose names then shall be adopted, Forster's or Schneider's?

"Cuvier and Valenciennes sometimes adopted Forster's, and sometimes gave new ones. Richardson also generally adopted Forster's names, deviating from this course only in four instances. Günther generally accepted Forster's names, but in one instance adopted Schneider's, and for other species took later names.

[2] Gill, Mem. Nat. Acad. Sci. VI.,, 1893, p. 93.

"The Güntherian nomenclature was adopted by Prof. Hutton and Prof. Hector in the Catalogue of the Fishes of New Zealand. Later, Prof. Hutton revived several of Forster's names previously generally neglected."

As Dr. Gill tells us, he abided by the Rules of the American Ornithologists' Union; since that time the law of absolute priority has been in vogue, but in deference to the wishes of many workers, it is now sought to secure some stability of nomenclature by fixing for all time certain names which, though admittedly not tenable under the strict priority law, have been so very generally used that no good purpose is secured by supplanting them. If censorship is ever passed on the Forster-Schneiderian names, I would use those of Forster, because, as Gill says, he was the original investigator, and, moreover, his names are in general use. In the meantime, the priority rule obtains, and certain defections in the Basic List are corrected below.

It might be held that all names occurring in this connection should be credited to Schneider, but I think it may be conceded that where he adopted Forster's names, the personal name of Forster should stand as the author of the species. It is true that the two writers placed the species in different genera (as 123—*Cichla macroptera* Bloch and Schneider; *Sciaena macroptera*, Forster), but as none of the genera is to-day admitted in connection with the species there assigned to it by either author, the question is unimportant.

"Opinion No. 5," expressed by the Commission of the Seventh International Zoological Congress, Boston, 1907, reads:—"A pre-Linnean name, inelegible because of its publication prior to 1758, does not become elegible simply by being cited or reprinted with its original diagnosis after 1757."

I had noted this as affecting Walbaum's names used in the Basic List, and these names were actually later considered by the Commission, and embodied in "Opinion No. 21" of the Eighth Congress, Graz, 1910; the statement being that Klein's genera do not gain availability by reason of being quoted by Walbaum.

The names of genera applied to Numbers 14, 20, and 24, are altered accordingly.

9. Cephaloscyllium isabella Bonnaterre.

Squalus isabella Bonnaterre, Encycl. Meth. Ichth., 1788, p. 6.

Family CARCHARINIDÆ.

Page 7—CARCHARINUS Blainville, 1816.

10. Carcharinus lamia Rafinesque.
11. Carcharinus brachyurus Günther.

Page 7—SPHYRNA Rafinesque, 1810.

14. Sphyrna zygæna Linnæus.
16. Oxynotus centrina Linnæus.

Squalus centrina Linnæus, Syst. Nat. ed. x., 1758, p. 233.

17. Squalus fernandinus Molina.

Squalus fernandinus Molina, Hist. Chili, 1788, p. 393.

Page 8—CENTROPHORUS Müller and Henle, 1837.

17a. Centrophorus plunketi Waite.

Centrophorus plunketi Waite, T.N.Z.I., xlii., 1910, p. 384.

19. Euprotomicrus bispinatus Quoy and Gaimard.

Scymnus bispinatus Quoy and Gaimard, Voy., Uranie, Zool., 1824, p. 197.

Division I.—Narcobatoidei (Electric Rays).

Family NARCOBATIDÆ.

Page 8—NARCOBATUS Blainville, 1816.

20. Narcobatus fairchildi Hutton.
21. A synonym of 20.

Page 8—TYPHLONARKE Waite, 1909.

22. Typhlonarke aysoni Hamilton.

Page 9—ARHYNCHOBATIS Waite, 1909.

23a. Arhynchobatis asperrimus Waite.

Arhynchobatis asperrimus Waite, Rec. Cant. Mus. I., 1909, p. 150.

Family DASYATIDÆ.

Page 9—DASYATIS Rafinesque, 1810.

24. DASYATIS BREVICAUDATUS Hutton.

Family AETOBATIDÆ.

Page 9—AETOBATIS Blainville, 1816.

25. AETOBATIS TENUICAUDATUS Hector.

26. CALLORHYNCHUS MILII Bory.

Callorynchus milii Bory, Dict. Class. d'Hist. Nat. III., 1823, p. 62.

27. CHIMÆRA NOVÆ-ZELANDIÆ Fowler.

Chimæra novæ-zelandiæ Fowler, Proc. Acad. Nat. Sci. Phil. lxii., 1911, p. 603.

28. ENGRAULIS ANTIPODUM Günther.

Engraulis encrasicholus var. *antipodum* Günther, Cat. Fish. Brit. Mus. vii., 1868, p. 386.

29. CLUPEA NEOPILCHARDUS Steindachner.

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

Page 10—AMBLYGASTER Bleeker, 1849.

30. AMBLYGASTER ANTIPODUS Hector.

32. A synonym of 33.

Page 10—CYCLOTHONE Goode and Bean, 1895.

35. CYCLOTHONE MICRODON Günther.

Page 10—TRIARCUS Waite, 1910.

37. TRIARCUS AUSTRALIS Hector.

47. GALAXIAS ALEPIDOTUS Forster.

Esox alepidotus Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 395.

Page 13—BATHYSAUROPSIS Regan, 1911.

57. BATHYSAUROPSIS GRACILIS Günther.

57a. CHLOROPHTHALMUS NIGRIPINNIS Günther.

Chlorophthalmus nigripinnis Günther, Ann. Mag. Nat. Hist. (5) ii., 1878, p. 182.

59. MYCTOPHUM HUMBOLDTI Risso.

Gasteropelecus humboldti Risso, Ichth. Nice, 1810, p. 358.

65a. CENTRISCOPS OBLIQUUS Waite.

Centriscops humerosus var. *obliquus* Waite, Rec., Cant. Mus. I., 1911, p. 170.

Page 14—MACRORHAMPHOSUS Lacépède, 1803.

65b. MACRORHAMPHOSUS SCOLOPAX Linnæus.

Balistes scolopax Linnæus, Syst. Nat. ed. x., 1758, p. 329.

66. Specimens identified from New Zealand are probably referable to 66a.

66a. SYNGNATHUS NORÆ Waite.

Syngnathus noræ Waite, Rec. Cant. Mus. I., 1911, p. 173.

71. SOLEGNATHUS SPINOSISSIMUS Günther.

Fowler (Proc. Nat. Acad. Sci. Phil. 1907, p. 426) proposes to make this species the type of a new genus—*Castelnauina*. Seeing that the component species of the genus *Solegnathus* are so closely allied, I cannot admit generic rank for this species.

78. ATHERINA PINGUIS Lacépède.

Atherina pinguis Lacépède, Hist, Nat. Poiss., V. 1803, p. 371.

Page 16—ERUMETOPOS Morton, 1888.

82a. EURUMETOPOS JOHNSTONII Morton.

Eurumetopos johnstonii Morton, Proc. Roy. Soc. Tasm., 1887, p. 77.

84. SERIOLELLA PUNCTATA Forster.

Gasterosteus punctatus Forster, in Bloch and Schneider, Syst. Ichth, 1801, p. 37.

87. CENTROLOPHUS HUTTONI Waite.

Centrolophus huttoni Waite, T.N.Z.I., xlii., 1910, p. 387.

90a. CŒLORHYNCHUS ASPERCEPHALUS Waite.

Cœlorhynchus aspercephalus Waite, Rec., Cant. Mus. I., 1911, p. 178.

98. MACRURONUS NOVÆ-ZELANDIÆ Hector.

103. PHYSICULUS RHACINUS Forster.

Gadum rhacinum Forster, in Bloch and Schneider, Syst. Ichth. 1801, p. 56.

Page 18—AUSTROBERYX McCulloch, 1911.

106. AUSTROBERYX AFFINIS Günther.

Page 19—HOPLOSTETHUS Cuvier and Valenciennes, 1829.

107. Hoplostethus elongatus Günther.

108. Hoplostethus intermedius Hector.

110. Polyprion oxygeneios Bloch and Schneider.

Epinephelus oxygeneios Bloch and Schneider, Syst. Ichth., 1801, p. 301.

Page 20—MACCULLOCHIA Waite, 1910.

116. Maccullochia labiosa Günther.

Page 20—ZANCLISTIUS Jordan, 1907.

116a. Zanclistius elevatus Ramsay and Ogilby.

Histiopterus elevatus Ramsay and Ogilby, Proc. Linn. Soc. N.S. Wales (2), III., 1888, p. 1311.

Family CEPOLIDÆ.

Page 20—CEPOLA Linnæus, 1766.

116b. Cepola aotea Waite.

Cepola aotea Waite, Proc. N.Z.I., 1910, p. 26.

119. Latris ciliaris Forster.

Sciæna ciliaris Forster, in Bloch and Schneider, Syst. Ichth, 1801, p. 310.

Page 20—DACTYLOSPARUS Gill, 1862.

123. Dactylosparus macropterus Forster.

129a. Girella cyanea Macleay.

Girella cyanea Macleay, P.L.S., N.S.W., v., 1881, p. 409.

Page 21—KYPHOSUS Lacépède, 1802.

129b. Kyphosus sydneyanus Günther.

Pimelepterus sydneyanus Günther, A.M.N.H. (5), xviii., 1886, p. 368.

Page 21—UPENEICHTHYS Bleeker, 1859.

135. A synonym of 137.

136. A synonym of 138.

137. Pseudolabrus miles Bloch and Schneider.

Labrus miles Bloch and Schneider, Syst. Ichth,. 1801, p. 264.

140a. PSEUDOLABRUS PITTENSIS Waite.

Pseudolabrus pittensis Waite, Proc. N.Z.I., 1910, p. 26.

146. CARANX PLATESSA Cuvier and Valenciennes.

Caranx platessa Cuvier and Valenciennes, Hist. Nat. Poiss., ix., 1833, p. 84.

Page 23—DECAPTERUS Bleeker, 1851.

147. DECAPTERUS KOHERU Hector.

Page 23—TRACHURUS Rafinesque, 1810.

148. TRACHURUS PICTURATUS Bowditch.

Seriola picturata Bowditch, Excursion to Madeira, 1825, p. 123.

152. SCOMBER PNEUMATOPHORUS De la Roche.

Scomber pneumatophorus De la Roche, Ann. Mus. Hist. Nat., xiii., 1809, p. 315.

Page 24—REXEA Waite, 1911.

159a. REXEA FURCIFERA Waite.

Rexea furcifera Waite, Proc., N.Z.I., 1911, p. 49.

Page 24—BENTHODESMUS Goode and Bean, 1881.

161. BENTHODESMUS ELONGATUS Clarke.
171. DIRETMUS ARGENTEUS Johnson.

Diretmus argenteus Johnson, Proc. Zool. Soc., 1863, p. 403.

Page 26—OREOSOMA Cuvier and Valenciennes, 1829.

172a. OREOSOMA ATLANTICUM Cuvier and Valenciennes.

Oreosoma atlanticum Cuvier and Valenciennes, Hist. Nat. Poiss. iv., 1829, p. 515.

176. BRACHYPLEURA NOVÆ-ZELANDIÆ Günther.
177. AMMOTRETIS NUDIPINNIS Waite.

Ammotretis nudipinnis Waite, Proc. N.Z.I., 1911, p. 50.

Page 26—PELOTRETIS Waite, 1911.

178a. PELOTRETIS FLAVILATUS Waite.

Pelotretis flavilatus Waite, Proc. N.Z.I., 1911, p. 50.

180. Rhombosolea millari Waite.

Rhombosolea millari Waite, Rec. Cant. Mus. I., 1911, p. 205.

184. Peltorhamphus novæ-zeelandiæ Günther.

Page 28—ECHENEIS Linnæus, 1758.

189. Echeneis brachyptera Lowe.

Page 28—HELICOLENUS Goode and Bean, 1895.

190. Helicolenus percoides Richardson.

191. A synonym of 190.

194. Doubtfully New Zealand.

195. Probably a synonym of 196.

Page 29.—PTERYGOTRIGLA Waite, 1899.

198a. Pterygotrigla picta Günther.

Trigla picta Günther, Chall. Rep. Shore Fishes, 1880, p. 24.

206. Notothenia macrocephala Günther.

Notothenia macrocephala Günther, Cat. Fish. Brit. Mus. II., 1860, p. 263.

207. A synonym of 206 (*emend*).

208. Notothenia coriiceps Richardson.

Notothenia coriiceps Richardson, Voy. Ereb. and Terr., 1844, p. 5.

209. A synonym of 206 (*emend*).

211. A synonym of 210.

214. Kathetostoma giganteum Haast.

Kathetostoma giganteum Haast, T.N.Z.I., v., 1873, p. 274.

216. Geniagnus monopterygius Bloch and Schneider.

Uranoscopus monopterygius Bloch and Schneider, Syst. Ichth., 1801, p. 49.

Page 30—GNATHAGNUS Gill, 1861.

216a. GNATHAGNUS INNOTABILIS Waite.

Gnathagnus innotabilis Waite, Rec. Aust. Mus. v., 1904, p. 238.

217. HEMEROCŒTES MONOPTERYGIUS Bloch and Schneider

Callionymus monopterygius Bloch and Schneider, Syst. Ichth. 1801, p. 41.

217a. HEMEROCŒTES MICROPS Waite.

Hemerocœtes microps Waite, Rec. Cant. Mus. I., 1911, p. 247.

223. ACANTHOCLINUS QUADRIDACTYLUS Bloch and Schneider.

Blennius quadridactylus Bloch and Schneider, Syst. Ichth. 1801, p. 177.

To be placed as 113a.

Page 33—SACCARIUS Günther, 1861.

245a. SACCARIUS LINEATUS Günther.

Saccarius lineatus Günther, Cat. Fish. Brit. Mus. iii., 1861, p. 183.

Page 34—PSEUDOMONACANTHUS Bleeker, 1866.

246. PSEUDOMONACANTHUS SCABER Forster.

246a. PSEUDOMONACANTHUS CONVEXIROSTRIS Günther.

Monacanthus convexirostris Günther, Cat. Fish, Brit. Mus. viii., 1870, p. 248.

247. OSTRACION FORNASINI Bianconi.

Ostracion fornasini Bianconi, Nuov. Ann. Sci. Nat. v., 1846, pp. 113-115.

248. SPHEROIDES RICHEI Freminville.

Tetrodon richei Freminville, Nouv. Bull. Philom. iii., 1813, p. 250.

NOTES ON THREE NOTABLE NEW ZEALAND WHALES.

By EDGAR R. WAITE, F.L.S., Curator.*

Plates LIX.–LXIII.

THE OKARITO WHALE

(*Balænoptera sibbaldii*).

Plates LIX.–LXI.

On February 17th, 1908, news was received in Christchurch that a huge whale 99 feet in length had been found lying dead on the ocean beach near Okarito, on the West Coast of the South Island. It was described as being so high that a man on horse-back could not see over it. Allowance being made for the usual exaggerated reports, it would still seem likely that the whale was a large one so accompanied by our taxidermist, I at once started for the scene. We arrived at Hokitika by the usual course, train and coach, but our subsequent experiences with horses, crossing rivers, swollen with heavy and continuous rain, need not be detailed. Having negotiated the 83 miles from Hokitika, we arrived at Okarito on February 22nd, five days after the news was received. The whale was lying six and a-half miles to the northward of the town, near a promontory known as Commissioners' Point, and by the time we arrived the body had flattened down considerably, so that it presented the appearance shown in the photograph (plate LX.). In order to ascertain the length of the carcase a stake was placed in the sand at the end of the snout and another in the notch of the tail, and the distance between them showed the animal to be 87 feet in length, the precise figure obtained by Mr. J. W. Thomson, the harbour master, who had made a careful independent measurement. The dimension of 99 feet originally taken was measured over the curves of the back. It proved to be a cow whale and was lying on its back, parallel to the coast line and almost straight, so that in taking dimensions, no allowances had to be made. The tail which was lying flat on the sand measured 21 feet across the flukes (plate LXI.). There was no difficulty in identifying the whale, the absence of teeth, the many grooves on throat and belly (plate LXI.) and the relatively small paddles coupled with the large size and elongate shape, at once fixed the species as the Blue Whale. The following additional notes are culled from an article written for the *Weekly Press* on my return :—

* Reprinted from "Guide to the Whales and Dolphins of New Zealand."

"Having breasted Commissioner's Point we looked down to the beach and there saw what resembled a large vessel bottom upwards. This was the whale. No words of mine can convey the slightest idea of the enormous mass spread before us. You may step out 87 feet but you cannot realise the bulk of the creature. The men who claimed the carcase had cut away some of the blubber, and the escaping oil saturated the sand all around. The effect of this was very noticeable on the would-be breakers ; far from the vicinity of the whale they were smoothed down and an attempt to wash the hands in the sea seemed only to add a little more oil to them. The whale had been lying dead on the beach for two weeks when we first saw it—so there was another noticeable and memorable feature in connection with it. I cannot say at what distance the odour of dead whale was apparent, but it was confidently predicted that both my taxidermist and myself would lose our breakfasts as others had done, but we proved to be superior to such a trifle.

"The next and subsequent days were spent alongside the whale, and much labour was expended in trying to reduce the bulk of the creature. Attention was especially directed to cutting away the flesh on the lower jaw and the beach was strewn with masses each as large as an ox, and then but half, or less, had been removed. Having worked down to the palate we found that the whalebone was missing. My opinion is that the whale had been dead some time before it was cast on to the beach and that as the flesh rotted away, the baleen was washed out. This was a sad loss to the men, for they had an offer of £100 for the whalebone alone. Large scars on the body showed where barnacles had been but the animals had all dropped off when the host died. The question was raised as to how the huge creature met its death, and the only answer seems to be—old age. It is, of course possible that the baleen had dropped out much as old people lose their teeth, and that the whale died of starvation. I should imagine, however, that the whalebone was lost after death.

"I had hoped to secure the skeleton of the whale for the Museum, but, under the circumstances, this proved to be, at the time, impossible. Whale's flesh is exceedingly tough and absolutely no tools were to be obtained, excepting an old hay knife, which, however, did remarkably good service. It could be used but by one man at a time, and several would be required for earnest work. Then there was the labour question. Very few men were available and as they were earning good wages at the flax and timber mills, there was evident disinclination to leave such work to cut up whale notwithstanding an offer of advance in wages."

That the skeleton was ultimately secured for the Museum is a matter of history. As a result of many representations made to my friend, Mr. Edgar F. Stead, he formed a small syndicate, and in

July, 1908, five months after I first saw the carcase, rescued the bones and successfully delivered them at the Museum. The work proved to be a very arduous and disagreeable task, and altogether occupied four weeks.

£400 was paid for the skeleton landed at the Museum, of this sum one-half was raised by public subscription.

The skeleton was mounted by the Museum staff and now presents the appearance shown on plate LIX., which is reproduced from a sequent series of photographs.

The following are some of the principal dimensions taken either from the carcase or the skeleton.

Total length 87 ft.
Length of head 21 ft.
Greatest width of skull 10ft. 8in.
Direct length of lower jaw 20ft. 8in.
Greatest width across mandibles 10ft. 10in.
Length of paddle, 11ft 9in.
Width of tail flukes 21 ft.
Length of sternum 1ft. 10in.
Breadth of sternum 2ft.
Breadth of scapular 5ft. 6in.
Width of 15th dorsal vertebra 5ft. 2in.
Number of vertebræ—
Cervical 7 (all free).
Dorsal 15.
Lumbar 14.
Caudal 28. Total, 64.
Number of ribs 15 pairs.

The first 20 caudal vertebræ possess chevron bones.

Zoologists differ as to the number of ribs possessed by the Blue Whale, some giving 15 and others 16 pairs. While the Okarito whale has the lower number, it is significant that the sixteenth dorsal vertebra has an articular surface, so that did we not know that all the ribs were secured and preserved, we should, by examination of the vertebræ pronounce the number to be 16 pairs.

Attention may be drawn to the small bones suspended beneath the lumbar region ; they are in no way attached to the axial skeleton but during life were imbedded in the flesh, and represent all that remains of the hind limbs, with which the ancestors of whales were no doubt furnished. They are thus vestigial bones, the larger of which probably represent the ischia—one of the bones of the pelvis—while the smaller bones, no larger than a walnut, are probably referable to the rudiments of a hind limb.

It is noteworthy that whereas some of the bones of the whale as for example those of the lower jaw, are composed of very hard and dense bone, the texture of these vestigial bones is spongy and they can easily be pierced with a pin.

It is not possible to give the weight of the entire skeleton, but it has been estimated at 9 tons. Some of the bones were weighed for freight purposes, the cranium, exclusive of the maxillæ, nasal bones, etc., weighed 1 ton 9 cwt., and the lower jaws together, 1 ton 5 cwt.

The baleen cannot be described, for, as before-mentioned, it had been lost out of the mouth, but it would be very similar to that shown on plate LX., which represents two pieces from another blue whale, stranded at Motanau, which I afterwards examined, the piece on the right of the picture shows the baleen as seen from the outside ; the inner side of the plates is hidden by the hair-like fringes seen in the piece on the left. The longest plates measure less than three feet and the whale was 56 feet in length.

THE ALLANDALE WHALE.

(*Mesoplodon layardi*).

Plate LXII.

On March 22nd, 1912, Mr. James Davenport, of Lyttelton, informed me that a "Bottle-nosed Whale," 20 feet in length, had been stranded at Allandale in front of his house and was then alive.

On arriving at Allandale, somewhat later, I found the animal to be a Strap-toothed Whale. Mr. Davenport told me that the whale was first seen by him at 7 o'clock in the morning and it was then in difficulties, the rapidly falling tide cutting off its retreat to deeper water and leaving it stranded on the mudflat. By this time Mr. Davenport was abreast of the whale and as soon as it saw him and realised its predicament it emitted a series of roars, the noise being similar to that of a sea lion. Ziphiioid whales are known to possess a voice, one species roaring like a bull another lowing like a cow while a third is described as sobbing. In its fury to free itself, the whale lashed the water into foam, and scoured out a deep hole in the mud, in which it lay when I first saw it. At this time the water was about 12 inches in depth, but it rapidly receded leaving the unfortunate animal in a pool of water in which it lived for a considerable time. As the tide again rose we were in readiness with a motor boat and tackle and were pleased to find that the carcase floated, for my experience with some of the dolphins is that they sink when shot. The towage to Lyttelton was safely accomplished, the proceedings greatly interesting numbers of dog fishes which were kept at a reasonable distance to prevent mutilation of the carcase.

The colouration is striking, being black and yellowish grey, the two being sharply defined. Generally speaking the front portion is grey, and the hinder portion black, but the disposition of the colours requires to be more fully described. The grey area extends from the snout to a point in advance of the dorsal fin, occupying more than half the depth of the body, but it rises to include an area around the pectoral fin, which is black. The continuity of the colour on the fore part of the body is interrupted by a black cap which extends from the thicker part of the upper beak, so as to include the portion against which the tooth rests to the blow hole, whence it passes widely round the eye, thence forward below, reaching the chin groove as a narrow band. The anal region lies in a grey area, and the tip of the tail flukes is yellowish.

The whale was a male and the following are some of the measurements taken :—

Total length, 18 feet 3 inches.
Girth 11 feet.
Vertical depth of body 3 feet 10 inches.
Width of tail flukes 4 feet 10 inches.
Snout to blowhole 2 feet 5 inches.
Width of blowhole $5\frac{1}{4}$ inches.
Blowhole to dorsal fin 8 feet 8 inches.
Length of dorsal 1 foot 6 inches.
Height of dorsal 1 foot 1 inch.
Dorsal fin to tail 7 feet 8 inches.
Snout to pectoral fin $51\frac{1}{2}$ inches.
Length of pectoral 2 feet $1\frac{1}{2}$ inches.
Length of eye $1\frac{3}{4}$ inches ; depth of eye 1 inch.
Snout to throat grooves 1 foot 3 inches ; length of each groove $11\frac{1}{2}$ inches.

The blowhole is crescentic with the concavity forward. The throat has one pair of grooves which are close together in front, but very divergent behind.

The specimen was cast at the Museum and the coloured cast is hung on the south wall of the New Zealand gallery, this illustrates the appearance of a whale as in life, and shows well the position of the peculiar teeth in relation to the head (plate LXII.). The complete skeleton in the lower gallery and a skull in a bay in the same room show the bony characters. From the latter it will be seen that the teeth arise from near the middle of the lower jaw, grow backwards, and meet over the upper beak so as to very materially interfere with its action ; it thus becomes a question as to how an animal which can scarcely open its mouth is able to feed.

At the summit of each tooth will be noticed the small enamel tip, the use of which can scarcely be conjectured.

This species is well represented in the Museum ; in addition to the cast, a complete skeleton (Waipara Beach, 16th March, 1874), a skull, showing the two teeth meeting over the upper jaw (Great Barrier Island) and ear bones being exhibited.

PELORUS JACK

(*Grampus griseus*).

Plate LXIII.

One commonly hears the remark that "Pelorus Jack is the only 'fish' protected by Act of Parliament," (Order-in-Council), and while the better informed are aware that it is not a fish, but a dolphin of some kind, considerable discussion has taken place as to the identification of the animal. In the "Animals of New Zealand, 1904," it is identified with the Beluga or White Whale, and this latter species has been regarded as a New Zealand animal on the identification of an imperfect skull.

The White Whale is an arctic form and is distinguished by the absence of a fin on the back. All photographs of Pelorus Jack (Kaikai-a-waro of the Maories) show that it possesses a very high dorsal fin (plate LXIII.), and from a consideration of several photographs which I have seen, I am quite in agreement with the opinion expressed by the Rev. D. C. Bates of Wellington, that "Jack" is none other than a Grampus, but of course nothing short of an actual examination of the animal can definitely settle the question. Pelorus Jack is protected for the term of its natural life, and it would be a fortuitious circumstance if its body was afterwards recovered. Passengers on the vessels negotiating French Pass are much disappointed if "Jack" does not appear, he usually swims to the vessel, and plays around the bows for some time, finally leaving it to repeat the manœuvre when the next vessel comes along. The general colour of the animal is grey, curiously marked with scratch-like lines, which are probably caused by the cuttle fishes which form the staple food of the Grampus.

The Curator acknowledges, with many thanks, the kindness of the following firms in permitting use of the below mentioned copyright pictures in illustration of the book :—

Skeleton of the Okarito Whale,
Christchurch Press Co.

Cast of the Allandale Whale,
Lyttelton Times Co.

Photograph of Pelorus Jack,
Sharland & Co., Ltd.

DESCRIPTION OF THE MAORI TOMB

By the CURATOR and

A. HAMILTON, Director Dominion Museum, Wellington.*

Plates LXIV.–LXIX.

So assiduously have dealers and collectors exploited the art treasures of the Maori that it is worthy of note when any old object is to-day met with outside our Museums.

The introduction of European tools has produced a similar effect on the Maori as among other people : work is more rapidly, and possibly therefore, less carefully executed ; and the old traditions of their carvings has been so far departed from, that we are led to ask if the why and wherefore have not also been forgotten. I once asked a Maori carver why he represented his figures as having four fingers and a thumb on each hand, whereas the old carvers chiselled three fingers only. He replied, in effect, that when using a steel chisel there was little extra trouble in carving two additional digits, whereas with a greenstone tool the cutting of two more fingers took too much time. Either he did not know the tradition relating to the three-fingered hand, or, what is more likely, did not fear more nearly approaching the representation of the human form than his ancestors had dared to.

Of the relics which remain in different parts of the country probably a considerable proportion owe their preservation to the circumstance that they are *tapu* or sacred, and consequently are retained long after everything else has gone.

One such object has quite recently been added to the Maori collection in this Museum and as a prelude to the description of this Pou-Pou, or tomb the following is culled from a newspaper account, which gave me the first intimation that a collector had secured the carvings and offered the same for sale. The word Pou means a carved slab but the combination Pou-Pou is here to be read as applying to the whole structure :—

" For many years past, in the Maori village at Maketu, the visitor has been enabled to admire one of the best samples of Maori architecture in existence, in the shape of a Pou-Pou, or carved burial tomb. The tomb was in the form of a house, and having given sanctuary for generations to the remains of the principal chiefs of that locality, was held strictly tabooed by all, and no one, with the

* Reprinted from "Guide to the Maori Tomb."

exception of the heads of the tribe, was allowed to come near this veritable house of the dead unless under the most extenuating circumstances. The curio collector looked on the tomb with longing eye, and offered the guardians all sorts of fancy prices for it, but the belief that the dead and gone ancestors would rise in their wrath and cause both destruction and bloodshed in the tribe were their resting-place disturbed, compelled the superstitious natives to warn the enterprising pakehas away. Thus year after year the famous Pou-Pou remained untouched. At the beginning of 1908, a local collector in the person of Mr. S. Dannefaerd endeavoured to secure the tomb, despite the reluctance of the owners to turn their valuable possession into some form of ready capital. After some trouble the head chief, one Kihiharoa, accepted a price submitted, and the negotiations were then closed. But, whether as penance for his action or otherwise is not clear, Kihiharoa joined his ancestors some days afterwards, and was duly interred in the Pou-Pou.

"Four years later the tomb was taken to pieces and carted to Okere, whence it was brought by launch into Rotorua.

"The carving is in an excellent state of preservation, and despite the fact that the tomb must have stood for something like a century has not suffered from its exposure to wind and rain. Mr. Dannefaerd informed our representative that the Pou-Pou was the best of three known to be standing in the Dominion."

We are told that the tomb must have stood for something like a century and while the carvings have suffered little from exposure to wind and rain, the slabs have undoubtedly fallen as a result of the rotting of the portion in the earth, possibly more than once, with the result that the lower part of the carvings themselves have suffered, while in any case it would be merely a question of measurable time when the whole structure was destroyed. There should, therefore, be some satisfaction in knowing that the life of the Pou-Pou has been preserved for a very long period indeed. With the money obtained by the sale of the carvings the Maories intend to erect a larger, if more modern edifice and will thus be able to include the whole of their graves within one enclosure, an arrangement which I am given to understand, meets with the approval of the whole tribe.

The tomb as erected formed a rectangular house-like structure but Mr. Hamilton suggests that the carvings may originally have been used in a large house, and this view is certainly true of some of the slabs, for their uncarved side is notched for the reception of the foot of the rafter. As other slabs do not possess this notch they may have been specially carved to complete the tomb which would account for the fact noted by Mr. Hamilton that all are not of the same style, and were no doubt executed by different workmen at different periods. If some of the slabs were originally used for a large house they must be of even older date than the tomb, and the circumstance of there having being protected within a house (the carvings being inside the houses, in the nature of panels) would account for their good state of preservation, the lower portion excepted.

The carvings were placed on three sides of the tomb only, namely one end forming a gable and two sides. Mr. Hamilton speaks of the carved gable end as the back of the house, but in the present popular account it will be more convenient to write of it as the front, as indeed all laymen would.

There may have been no roof originally or the structure may have been thatched with toetoe (*Arunda conspicua*). If so, however, sawn planks had been substituted at a later date, as shown on plate LXIV., from which it will be seen that the whole was surrounded with a modern fence and outlying posts.

The slabs as originally hewn would be from 18 inches to 2 feet longer than at present for they have completely rotted off at ground level; some of the lower scroll work has also suffered. The central slab of the gable end has rotted less, a considerable portion of the lower part still remaining. It is evident that, in the course of time, the slabs must have fallen and been erected with portion of the carving sunk below the level of the ground, hence the loss of this part by decay. It would also appear that some structural alteration was made at that time, for rebates have been cut in the edges of some of the slabs, to receive battens of wood which concealed the juncture as may be seen in two of the pictures (plates LXVI. and LXVIII.). It is, however, unlikely that anything of the kind formed part of the original design as the rebatting process has destroyed part of the carving itself.

The Pou-Pou as re-erected in the Museum occupies a space about 8½ feet by 5 feet while the height to the eaves is 5 feet 5 inches the pitch of the roof being 2 feet 3 inches higher.

The gable end (plate LXV.) is formed of three slabs, the central one being carved to represent the figure as seen from the front, and the ones on each side as in profile looking outwards. The two sides of the structure are each formed of four slabs, all of which are illustrated (plates LXVI.–LXIX.).

We do not know if the bones of the Ancestor were buried within the Pou-Pou or if they were hidden elsewhere as described by Mr. Hamilton in case of the chief Te Heu Heu.

The following description of the carvings has been very kindly supplied by Mr. Hamilton, who is a recognised authority on Maori Art, but as his descriptions were compiled from photographs, I have supplied (within brackets) minor details such as size and condition which could only be ascertained from an examination of the carved slabs themselves. With the exceptions noted, all the slabs are approximately 5ft. 4in. in height.

Description of the Carvings.

These carved totara slabs have for years stood at Maketu indicating the resting place of one of their leading men.

This kind of burial tomb is of comparatively modern origin; as in the olden days when war parties were on the warpath more care was taken to conceal the last resting place of the bundle of scraped and prepared bones which was the end of all brave men or those of high rank. If the bones were not hidden it would be possible for the enemy to deeply insult their opponents by making fish-hooks or other things from a bone of their ancestor. The so-called civilisation of this country has rendered it possible to bury the body in the earth in some prominent position, and either to build a small house over it, to erect a number of carved slabs round it, or in more recent times to build a regular monument of brick, stone or marble above it.

A reference to the old memorial cenotaphs in Angas will show that a row of wooden slabs, carved or painted, was erected and decorated in the same way as a war canoe with white feathers and a fence placed round it. Sometimes these were very elaborate and in the Dominion Museum there are the carvings belonging to the tomb memorial of Te Heu Heu. The memorial was erected with others at Poukawa, but the bones were carefully concealed at Tongariro. There were other tombs standing until recently at Ruato with several of the large carved slabs round the fence.

As a rule these enclosures were not roofed in. The slabs do not show any sign of holes for the flaxlashing, tying them on to any frame work, but judging by the original photograph the edges were covered by a broad batten which should have been tied over the joins, and the ties ornamented with white albatross feathers as at page 102 "Maori Art."

The slabs forming the present specimens are apparently of Arawa workmanship and may very well have been intended for a large house or houses.

No. 1—The central board of the back of the building is in perfect preservation and presents a figure with a MERE and a HEI TIKI suspended sideways. Beneath the figure is an interlaced group of Manaias. Strangely enough the cenotaph of carved slabs could only be known as a Tiki, there is no other term that would apply to it. The Maori would also apply the word Tiki to a solitary carved post set up to mark the temporary resting-place of a corpse and I know of no other word that could be correctly applied. (The central slab is 9ft. high overall, and the width of 1, 2 and 3 combined is 5ft.)

Nos. 2 and 3 are evidently a pair carved to suit the gable shaped form of the intended building. They both represent the human figure in a sideways position, and No. 3 has never been finished, like so much of the Maori carving. The base of this slab is filled up with numerous wriggling manaias. (The outer edge of No. 2 has eight rough holes pierced in it, and we find eight similar holes in the left edge of No. 9 also. These two slabs could not be in juxtaposition but may have formed part of the same original structure, the slabs of which were probably lashed together with flax.)

No. 4 is rather a different type and is decayed to the level of the hands. The tiwhana mark on one side is not carved and the carving above seems to be done with some irregularity, probably purposely. (The tiwhana mark is the tattooed lines over the eyebrows. Width of slab 30in.)

No. 5 is much decayed at the base but has been well carved. The figure is apparently carrying something in the right hand, which may be an unfinished flute. (25in. wide and 5in. thick).

No. 6 has a short head well carved and two fine Manaias on the thighs, the lower probably representing a waist mat or belt. (Width 22in.)

No. 7 is a fine well-carved slab somewhat decayed at the bottom. The body is covered with a pattern of diamond shaped panels frequently found in carvings from Rotorua and the neighbourhood. (Width 23in.)

No. 8—A fine slab, but the lower part much decayed. As in No. 4 small marks are inserted to fill in the spaces above the shoulders and two manaias above the head. (Width 30in.).

No. 9 differs from the others, and was probably carved at the same time as Nos. 2 and 3. The body pattern is quite different from those used generally. The hands are decorated with manaias as in many of the more finely carved pare or door ornaments. (Width 26in.. This slab has holes bored on its left edge, see Note under No. 2).

No. 10 is a slab on which the figure of the Ancestor is well defined and carefully carried out, and is almost perfect. The figure is treated as a WHEKU and in common with the others the shoulders, thighs and knees are ornamented with variously designed spirals of more or less intersected patterns. (Width 21in.).

No. 11 is decayed at the base, but is otherwise in good condition. It is cut out of a piece of honey-combed totara for which the Maoris had a fancy, at any rate they did not reject it. The figure carries a mere. (Width 21in.).

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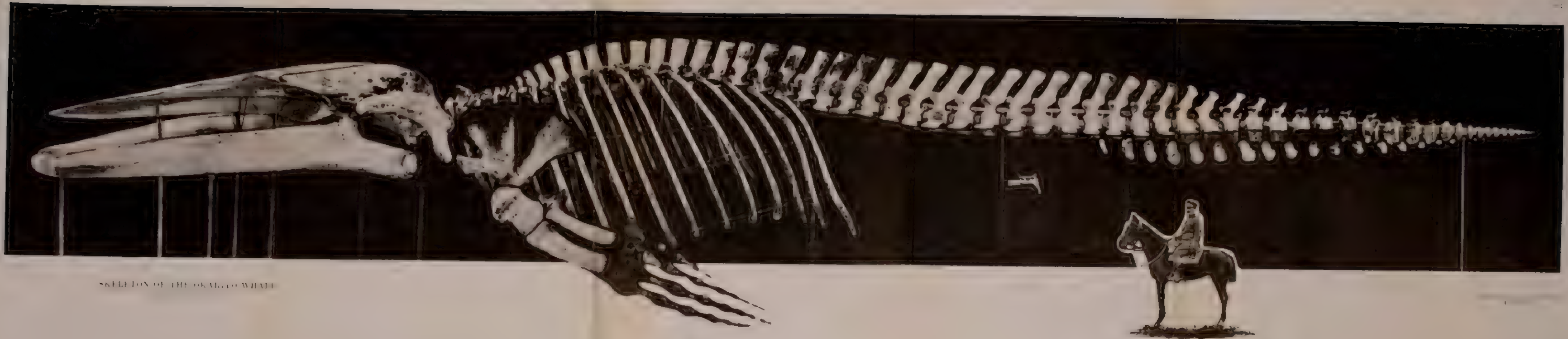
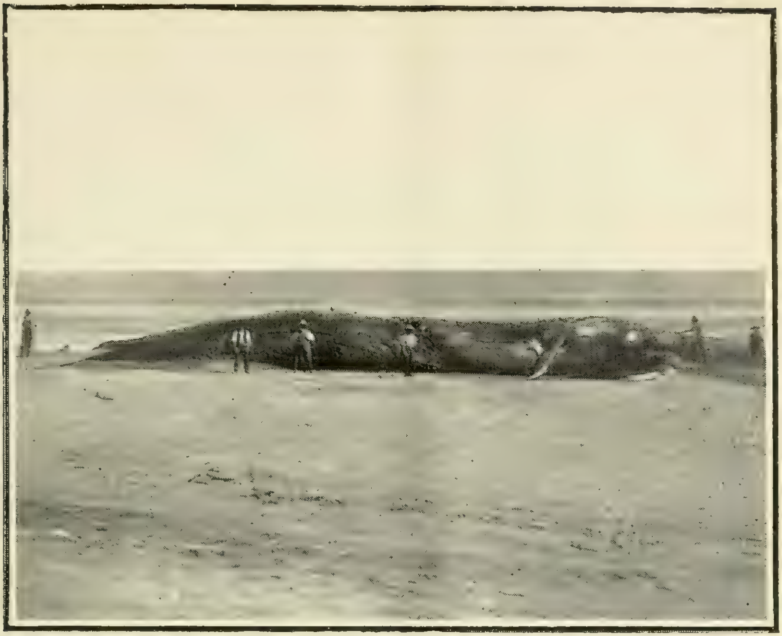


SKELETON OF THE OKARITO WHALE



THE OKARITO WHALE ON THE BEACH.

Edgar R. Waite, photo.

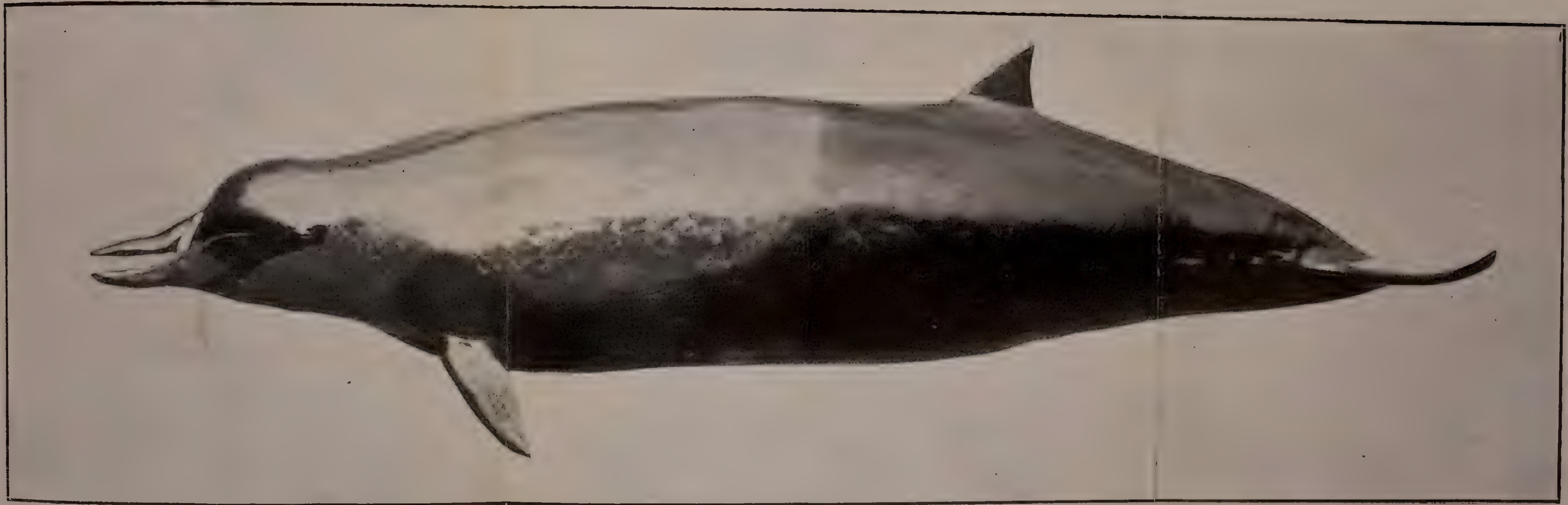
BALEEN OF THE MOTONAU WHALE.

TAIL OF THE OKARITO WHALE.

Edgar R. Waite, photo

BELLY OF THE OKARITO WHALE.

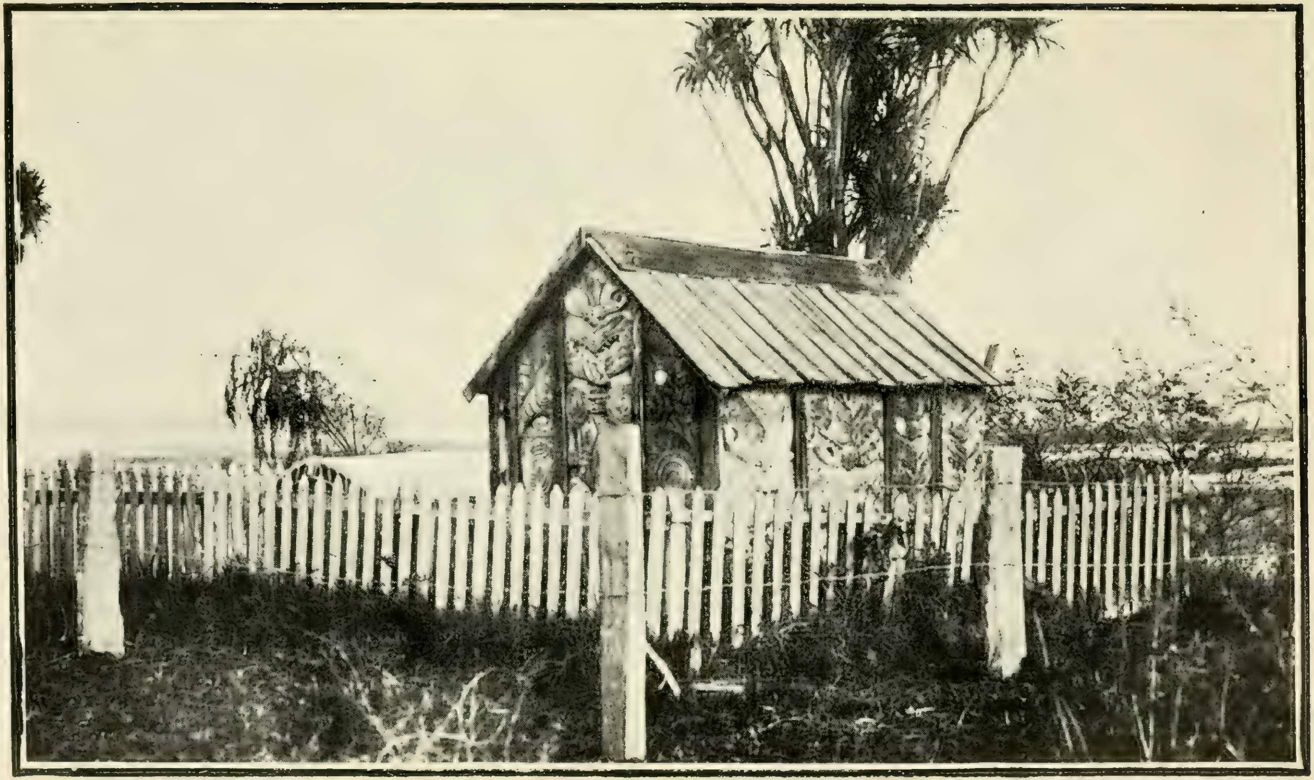
"Lyttelton Times," (Leslie Hinge), photo.



"Lyttelton Times," (Leslie Hinge), photo.

CAST OF THE ALLANDALE WHALE.

"PELORUS JACK."



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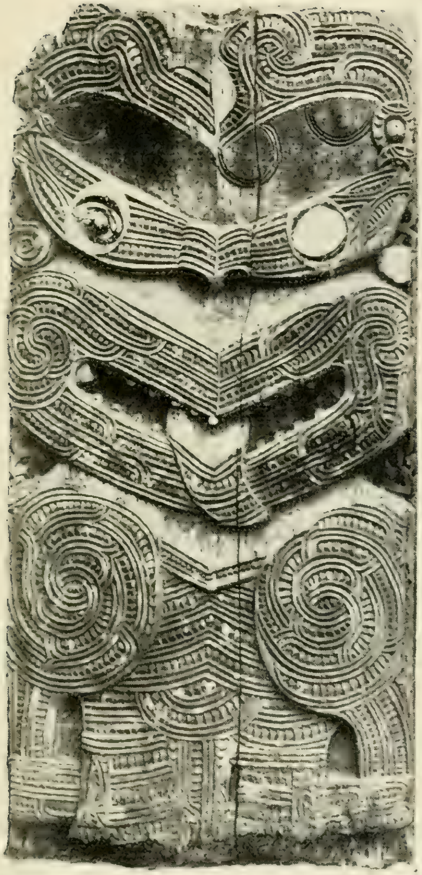

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Edgar R. Waite, photo.

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Edgar R. Waite, photo.