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STUDIES IN AUSTRALIAN FISHES.

No. 6. *

With a description of a new *Girellops* from the Kermadec Islands.

BY

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(Plates x-xiv.)

Family DASYATIDÆ.

Genus TAENIURA, Müller & Henle.

TAENIURA LYMMA, Forsskal.

(Plate x.)

Taeniura lymma, Garman, Mem. Mus. Comp. Zool., xxxvi., 1913, p. 399
—*vide* references and synonymy. *Id.*, Ogilby, Proc. Linn. Soc. N.S.
Wales, x., 1885, p. 465, and Mem. Qld. Mus., i., 1912, p. 31, and v.,
1916, p. 87.

Pectoral disc subcircular, longer than broad, its width 1.2 in its length; the snout and lateral margins are broadly rounded, but the posterior pectoral angles are pointed. Preocular length equal to the width between the angular projections on the upper margins of the spiracles. Eyes large, their bulge subequal in size to the spiracles, and to half the interspiracle width. Skin smooth; a series of flattened spines on the median line of the back extending backward almost to the level of the posterior insertion of the pectorals; these form an irregular double row before the shoulders, and there are one or two spines on each side of the median series on the shoulders themselves. Width of the mouth 1.4 in its distance from the end of the snout. Jaws undulous; teeth small and tessellate, with flattened points directed backwards; a series of larger pointed ones on each side of the upper jaw. A fringed velum behind the upper jaw, and two papillæ behind the lower. Nostrils elongate, each with a broad outer fold and a postero-interior valve; nasoral valve emarginate and fringed posteriorly. Posterior gill-opening well before the middle of the pectoral disc.

Ventrals elongate, their outer angles produced and their posterior margins rounded. Tail 0.6 longer than the body, with two spines inserted behind the middle of its length; upper surface grooved before the spines but keeled behind their tips; lower surface with a broad fin extending from before the base of the spines to the tip, which is about as broad as the tail above it.

Colour.—Tan brown above, with large blue spots irregularly scattered over the disc and ventral fins, which are mostly darker than the ground-colour in the preserved specimen though lighter in life. A broad blue stripe extends along each side of the tail from the back to behind the caudal spines. Lower surfaces uniformly light coloured.

* For No. 5, see "Records," xii., pt. 8, 1919, p. 171.

Described and figured from a female example 229 mm. wide, from Murray Island.

Variation.—A larger specimen from St. Crispin Reef, only differs in having the blue spots lighter instead of darker than the ground-colour, and in having microscopic spinules imbedded in the skin on some parts of the back which can be felt with the finger. A smaller male from Port Darwin has the spots on the disc larger and blackish with indefinite lighter margins.

Locs.—Port Darwin, North Australia; coll. Christie & Godfrey. Murray Island, Torres Strait; coll. Hedley & McCulloch, October, 1907. St. Crispin Reef, off Port Douglas, Queensland; coll. McCulloch, June, 1919.

Family CLUPEIDÆ.

Subfamily DUSSUMIERIINÆ.

Genus *STOLEPHORUS*, *Lacépède*.

STOLEPHORUS ROBUSTUS, *Ogilby*.

Blue Sprat.

(Plate xi, fig 1.)

Spratelloides robustus, Ogilby, Proc. Linn. Soc. N.S.Wales, xxii, 1897, p. 64.

Stolephorus robustus, Waite, Mem. N.S.Wales Nat. Club, No. 2, 1904, p. 12, and Rec. Austr. Mus., vi., 1906, p. 195. *Id.*, Ogilby, Ann. Qld. Mus., No. 9, 1908, p. 5.

? *Spratelloides delicatulus*, Zeitz, Trans. Roy. Soc. S.Austr., xxxii., 1908, p. 295 (Not of Bennett).

D. 12; A. 11; P. 13; V. 8; C. 17. 45 scales between the upper angle of the operculum and the base of the tail; 8-9 between the origins of the dorsal and ventral fins, excluding the median series above and below; 14 scales on the middle line of the back before the dorsal fin.

Depth before the dorsal fin 5.1 in the length to the hypural joint; head 3.7 in the same. Eye equal to the length of the snout, 3.5 in the head. Interorbital space 1.1 in the eye. Depth of the caudal peduncle 3.1 in the head. Third dorsal ray 1.5, third anal ray 3.7, pectoral 1.6, ventral 2.1, and caudal 1.3 in the head.

Body moderately robust though laterally compressed, the ventral surface rounded like the back and without serrated scales; ventral profile more convex than that of the back. Snout obtusely pointed, the mandible scarcely projecting when the mouth is closed. Maxilla broad, reaching to below the anterior border of the eye; jaws and palate apparently toothless, tongue spatulate, free anteriorly. Nostrils close together, midway between the eye and the end of the snout. Eye large, with a well developed anterior and posterior adipose lid. Interorbital space flat. Upper surface of head, sides of snout, cheeks and operculum closely covered with large ramose canals, which also extend over the scapular region.

Scales large and regular, their borders minutely but distinctly lobulate. An elongate axillary scale above each pectoral and ventral fin, and enlarged scales cover the basal portions of the pectorals. Modified scales form an imperfect sheath at the base of the dorsal fin, and a more distinct one on the base of the anal. Base of caudal scaly, with the usual enlarged pinnate scales on each lobe.

Dorsal fin situated in a groove on the back, and commencing nearer the snout than the hypural joint; the first ray is about half as long as, and simple like the second; the third is longest and branched. First ventral ray inserted a little behind the middle of the dorsal base; it is simple and scarcely shorter than the second, and reaches almost half way to the vent when adpressed. Pectorals very low on the sides, and reaching half their distance from the ventrals. Anal with two simple rays anteriorly, the third longest. Caudal deeply forked.

Colour.—Dark bluish black on the back and upper portion of the sides, which colour forms a well defined line at its junction with the silver of the rest of the body, except on the caudal peduncle where it is more or less diffused. A dark oblique streak on the side of the snout in front of the eye, and a dark horse-shoe shaped mark on the base of the tail.

Described and figured from one of Ogilby's types which is 63 mm. long from the snout to the end of the middle caudal rays.

Synonymy.—I have compared specimens from Queensland, New South Wales, Victoria, and Tasmania, and can find no specific differences between them. It seems probable, therefore, that the examples from South Australia which were doubtfully identified by Zietz as *S. delicatulus* are properly referable to *S. robustus*.

Locs.—Numerous specimens of this species up to 83 mm. long are in the Australian Museum from near Sydney and Port Hacking, New South Wales. Two others are from Bulwer, Moreton Bay, Queensland; several from Queenscliff, Victoria; and a number of badly preserved specimens from Tasmania.

Family ENGRAULIDÆ.

Genus ENGRAULIS, *Cuvier*.

ENGRAULIS AUSTRALIS, *Shaw*.

Australian Anchovy.

(Plate xii, fig. 1.)

Atherina australis, Shaw, in White's Voy. N.S.Wales, 1790, p. 296 and plate opposite, fig. 1.

Engraulis australis, McCoy, Official Record, Intercolonial Exhib., Melbourne, 1866-7, p. 319

- Engraulis enerasicholus* var. *antipodum*, Günther, Brit. Mus. Cat. Fish., vii., 1868, p. 386. *Id.*, Hutton, Cat. Fish. N. Zeal., 1872, p. 62, and Trans. N. Zeal. Inst., v., 1873, p. 270. *Id.*, Johnston, Proc. Roy. Soc. Tasm., 1882 (1883), pp. 92 & 132, and 1890 (1891), p. 37. *Id.*, Kent, Nat. in Austr., 1897, p. 155.
- Engraulis commersonianus*, Günther (*nec.* Lacépède), Brit. Mus. Cat. Fish., vii., 1868, p. 388—part, suggested Australian identification (*Atherina australis*) only.
- Engraulis antarcticus*, Castelnau, Proc. Zool. Soc. Vict., i., 1872, p. 186. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, iv., 1879, p. 365, and vi., 1882, p. 257. *Id.*, Lucas, Proc. Roy. Soc. Vict. (2), ii., 1890, p. 37.
- ? *Engraulis heterolobus*, Klunzinger (*nec.* Rüppell), Arch. Naturg., xxxviii. i., 1872, p. 42, and Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 415—part, Victorian specimens. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 57—part, Victorian specimens. *Id.*, Lucas, Proc. Roy. Soc. Vict. (2), ii., 1890, p. 37.
- Engraulis australis*, Steindachner, Denkschr. Akad. Wiss. Wien, xli. i., 1879, p. 14.
- Engraulis antipodum*, Waite, Mem. N.S.Wales Nat. Club, No. 2, 1904, p. 13. *Id.*, Stead, Ed. Fish. N.S.Wales, 1908, p. 28. *Id.*, Waite, Rec. Cantb. Mus., i., 1907, p. 9. *Id.*, Zietz, Trans. Roy. Soc. S.Austr., xxxii., 1908, p. 294. *Id.*, McCulloch, Rec. W.Austr. Mus., i. 3, 1914, p. 213.

D. 15; A. 17; P. 16; V. 7; C. 19; Br. 12. Depth before the ventrals 6.2 in the length to the hypural joint; head 3.6 in the same. Eye 3.9, snout 6.6 in the head. Longest dorsal rays 2.1, longest anal rays 3.3, upper pectoral ray 2.2, and first ventral ray 3.5 in the head. Base of the dorsal fin 2.5, and base of the anal fin 1.8 in the head.

Body elongate fusiform, robust, the width 1.4 in the depth; ventral surface scarcely carinate and without any projecting scutes. The scales are large, with entire edges; they commence on the nape above the gill-opening, and form sheaths at the bases of the dorsal and anal fins. (Most of the scales are missing in this specimen, so that the number cannot be counted, but other examples from the same locality retain traces of about forty in a longitudinal row). An elongate axillary scale at the base of each pectoral and ventral fin, and another between the latter fins; some enlarged scales cover the base of each pectoral, and three or four enlarged feather-like paired scales are superimposed above the bases of the inner caudal rays, the outer pair of which is largest.

Head naked, the greater part covered with a system of canals and pores opening on the surface, and which leave only the snout and mandible bare. Nostrils close together, and situated midway between the end of the snout and the anterior border of the eye. Mouth a little oblique; the maxilla is a little expanded posteriorly and reaches backward almost to the mandibular articulation, but not nearly to the preopercular margin. Mandible closing within the upper jaw and reaching forward to the vertical of the posterior nostril. Premaxillary with a row of fine cardiform teeth along its whole length, and each mandibular edge has a similar row

of smaller teeth; a row of microscopic teeth is present on each palatine bone, and a few are present on a raised ridge on each side of the vomer. Gill-membranes united across the isthmus anteriorly by a fine membrane. Gill-rakers slender, those at the angle of the first arch two-thirds as long as the eye; about thirty on the lower limb of the first arch.

First dorsal ray placed a trifle nearer the hypural joint than the end of the snout; the two anterior rays are simple, and the third is branched and longest, being longer than the base of the fin. Anal commencing behind the tip of the adpressed dorsal; its two anterior rays are simple, the third branched and longest though little more than half the length of the base of the fin. Ventral inserted before the dorsal, the origin of which is above the middle of its length when it is adpressed; its first ray is simple and longest, the others branched. Pectoral reaching more than half its distance from the ventral, its upper ray simple, the second branched and longest. Caudal forked.

Colour, after preservation in alcohol.—Brown on the back and upper portion of the side, with a broad silver lateral band from the shoulder to the tail; lower portions of the sides and head silvery.

Described and figured from a specimen 107 mm. long, from the end of the snout to the tip of the middle caudal rays, which was collected at Port Hacking, New South Wales.

Variation.—One other specimen of about the same size from Port Hacking, and four from the Melbourne Markets exhibit the following characters.

Locality.	Dorsal.	Anal.	Vertebrae.
Port Hacking ...	1+14	17	43
Victoria ...	15	18	45
„ ...	15	19	45
„ ...	16	19	44
„ ...	1+15	19	43

Status.—*E. australis* is very similar to *E. encrasicolus*, Linné, but appears to have less numerous scales, there being only about 40 in a longitudinal row instead of 48-50.

Synonymy.—The common Anchovy of southern Australia and New Zealand appears to have been referred to under several different names by different authors.

The figure of *Atherina australis*, Shaw, which was accompanied by only a few characters of a general nature, is very crude, and cannot be associated with our species with certainty. The fact that it has but one dorsal fin excludes it from the Family Atherinidæ in which it was placed

by its author, while its general appearance suggests that it is an Engraulid; this has been already noted by Cuvier and Valenciennes¹ who considered it possibly synonymous with *E. browni*, and by Günther² who included it with doubt in the synonymy of *E. commersonianus*. From White's journal, it is almost certain that all the species described by Shaw in the addendum to his work were taken between Botany Bay and Broken Bay, New South Wales; and as only one species of the family Engraulidæ is known from this area, it is reasonable to assume that Shaw's figure represents that common species.

Günther's name *antipodum* was established to distinguish Tasmanian and New Zealand specimens which were regarded as mere varieties of *E. encrasicolus*, Linné, having a few more anal rays than European representatives of the species. My Victorian specimens referred to above exhibit this characteristic, and leave no doubt that they belong to the same form as was discussed by Günther. This supposed difference is not constant, however, the number being subject to variation, and I find no specific differences between the Victorian specimens and the local examples I have identified as *E. australis*.

Engraulis antarcticus was a name given by Castelnau to a species which was said to be very common in the Melbourne markets during the whole year about 1872. I have examined many Victorian specimens which differ from his description principally in having 18-19 instead of 12 anal rays and 7 instead of 6 ventral rays, but as they were purchased in the Melbourne markets in 1880 and 1886, they indicate that Castelnau's counting of the fin-rays was incorrect. Castelnau relied upon the presence of mandibular teeth and a silvery lateral band to distinguish his *antarcticus* from *encrasicolus*, in which these characters were said to be wanting by Günther, but I find both the teeth and the band are present in specimens of the European species, and quite similar to those of Australian examples.

E. heterolobus, Rüppell, is a tropical species, so that Klunzinger's records of it from Hobson's Bay are almost certainly incorrect. His Victorian specimens were perhaps identical with the form described above, which is apparently the only Engraulid occurring in the waters of that State, and references to his papers are accordingly included in the above synonymy.

Steindachner's brief description of his *E. australis* from Hobson's Bay was based upon small examples in bad condition. Such characters as were given agree with those of the specimens here described and figured, and I therefore regard Steindachner's species as synonymous with Shaw's variety of the same name.

Occurrence.—Though the Australian Anchovy is commonly said to be abundant in our waters, the records of its occurrence in large numbers are not very numerous. McCoy (1867) first observed the species in great

¹ Cuvier & Valenciennes, *Hist. Nat. Poiss.*, 4to. ed., x., 1835, p. 313, and xxi., 1848, pp. 32 & 35.

² Günther, *Brit. Mus. Cat. Fish.*, vii., 1868, p. 388.

abundance in Hobson's Bay, Victoria, and Castelnau later noted that it was common in the Melbourne markets during the whole year about 1872. According to Johnston, the Anchovy occurs in Tasmanian waters in vast shoals where it is preyed upon by Barracouta and Mackerel. He found it abundant between the years 1882 and 1890, and noted that it frequently entered the estuaries of the Derwent, Tamar, and Huon Rivers during the summer months. Stead (1908) noted that the species congregates in enormous shoals of surpassing magnitude on the coast of New South Wales, and he recorded such an occurrence in March, 1908. He added that Anchovies are always present on the coast of New South Wales where they frequent the deeper waters of our harbours, lakes, and estuaries. Ogilby (1908) observed that the species visits southern Queensland in large shoals during the winter months.

Localities.—Specimens having the same characters as the example described above are in the Australian Museum from various localities in south-western Australia, Tasmania, Victoria, and New South Wales. The species has further been recorded from South Australia, southern Queensland, and New Zealand.

Family RETROPINNIDÆ.

Genus RETROPINNA, Gill.

Retropinna, Gill, Proc. Acad. Nat. Sci. Philad., 1862, p. 14 (Orthotype *Argentina retropinna*, Richardson). *Id.*, Günther, Brit. Mus. Cat. Fish., vi., 1866, p. 171.

Richardsonia, Steindachner, Sitzb. Akad. Wiss. Wien, liii., 1866, p. 469 (Orthotype *Argentina retropinna*, Richardson).

Jenynsellia, Ogilby, Ann. Qld. Mus., No. 9, 1908, pp. 6, 7, 15 (Orthotype *J. weatherilli*, Ogilby).

General form elongate, the body covered with cycloid scales of moderate size; no true lateral line. Head naked with symmetrically placed open pores. Eyes rather large, mouth large, oblique; strong teeth are present on both jaws, on the vomer, palatines, and tongue, and on the mesopterygoid and basihyal. Gill-openings extending far forward, the membranes united with the isthmus; 5-6 branchiostegals. Dorsal fin placed far back, partly opposite the anal; a small adipose dorsal present above the end of the anal. Anal longer than the dorsal. Pectorals low down on the sides. Ventrals submedian, with six rays. A membrane commences on the ventral surface between the pectorals, and extends backward and increases in depth to the vent. Caudal forked. Vertebrae about 50.

Distribution.—Fresh waters and estuaries of New Zealand and Tasmania. Murray River drainage system in Victoria, South Australia, New South Wales, and south-eastern Queensland; also the Burnett River and coastal streams of southern Queensland and New South Wales.

The New Zealand and Tasmanian species descend to the estuaries to breed, and their young are captured, together with those of some species of *Galaxias*, and sold as Whitebait. This habit has not been noticed in the Australian species, though it is recorded that those inhabiting the coastal streams may be found in both fresh and salt water³. But it is evident that specimens living in the western rivers of New South Wales cannot get so far down as the sea to breed, and that their eggs must be deposited, and the young developed in the fresh water streams.

a. Scales larger, in 50-60 rows.

b. Vomerine and palatine teeth uniserial; New Zealand.....*retropinna*.

bb. Vomerine and palatine teeth partly biserial; Australia.....*semoni*.

aa. Scales smaller, in about 70 rows; Tasmania.....*tasmanica*.

RETROPINNA RETROPINNA, *Richardson*.

New Zealand Smelt.

(Figs. 1-2.)

Argentina retropinna, Richardson, Ichth. "Erebus & Terror," 1848, p. 121, pl. lii., figs. 1-3. *Id.*, Powell, Trans. N.Zeal. Inst., ii., 1870, p. 84, pl. xvi., fig. 1.

Retropinna richardsonii, Gill, Proc. Acad. Nat. Sci. Philad., 1862, p. 14. *Id.*, Günther, Brit. Mus. Cat. Fish., vi., 1866, p. 171. *Id.*, Hector, Trans. N.Zeal. Inst., iii., 1871, p. 133, pl. xviii., fig. 3, and xxxv., 1903, p. 315. *Id.*, Hector, Fish. N.Zeal., 1872, p. 126. *Id.*, Hutton, Fish. N.Zeal., 1872, p. 58, pl. x., fig. 91, and Trans. N.Zeal. Inst., v., 1873, p. 270, and xxviii., 1896, p. 318. *Id.*, Gill, Mem. Nat. Acad. Sci., vi., 1893, p. 112. *Id.*, Hutton, Index Faun. N.Zeal., 1904, p. 51.

Richardsonia retropinna, Kner, Zool. "Novara," iii., Fische iii., 1867, p. 318.

Retropinna richardsonii, var. *elongata*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 413.

Retropinna osmeroides, Hector, Trans. N.Zeal. Inst., iii., 1871, p. 134, pl. xix., fig. 1, and xxxv., 1903, p. 315. *Id.*, Fish. N.Zeal., 1872, p. 126.

Retropinna retropinna, Waite, Rec. Cantb. Mus., i., 1907, p. 10.

Characters of a specimen 52 mm. long to the hypural joint, without the tail, which was received from the British Museum and was labelled by Mr. C. Tate Regan as a "Cotype of *R. richardsonii*" (fig. 1).

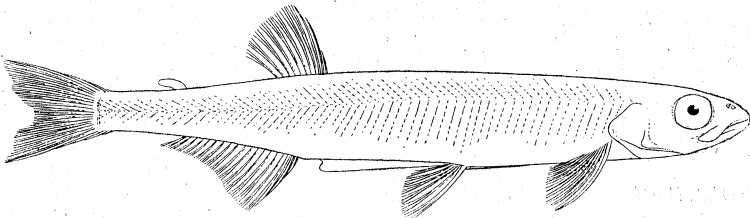


Fig. 1. *Retropinna retropinna*. Cotype.

³ Stead, Fish. Austr., 1906, p. 33.

Br. 5. D. 3/8; A. 3/17; P. 11; V. 6; C. 18. About 60 myomeres, of which the seventeenth descends to the ventral fin, and the thirty-sixth falls below the origin of the dorsal. About sixty scale-pits in a longitudinal row.

Depth before the ventrals 6·8 in the length to the hypural joint; head 4·6 in the same. Eye 3·2 in the head; snout 1·2 in the eye, and 4 in the head. Interocular space slightly greater than the length of the snout. First branched dorsal ray 1·8, first branched anal ray 2, pectoral 1·4, and ventral 1·8 in the head. Anal fin commencing below the middle of the dorsal base. Jaws subequal. Premaxillary teeth in a single row; a few teeth on the edge of the maxilla. Mandibular teeth in two rows anteriorly, uniserial laterally. Vomerine and palatine teeth in single rows; a row of large hooked teeth on each side of the tongue with some median ones posteriorly.

This specimen differs from Richardson's description in having the jaws equal, the mandibular teeth biserial anteriorly, and five instead of six branchiostegals.

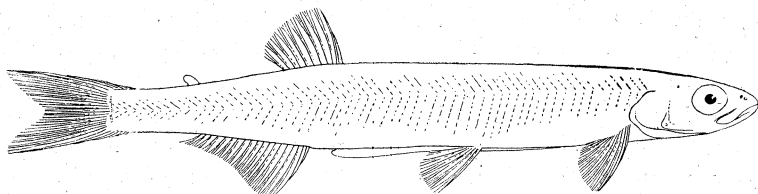


Fig. 2. *Retropinna retropinna*.

Variation.—A second New Zealand specimen (fig. 2) differs from the Cotype only in being rather more elongate. In other specimens the mandible projects well beyond the upper jaw as described and figured by Richardson. The dorsal rays vary from 11-13 in number, the anal from 18-20, and the pectoral from 9-12.

Localities.—Seventeen specimens, 50-78 mm. long, are in the Australian Museum from New Zealand, all of which are more or less imperfectly preserved. Three are from Lake Rotoiti, and one from Napier, North Island; coll. W. J. Phillipps.

RETROPINNA SEMONI, *Weber*.

Australian Smelt.

(Plate xi., figs. 2, 3.)

Richardsonia retropinna, Steindachner, Sitzb. Akad. Wiss. Wien, liii., 1866, p. 469 (Not *Argentina retropinna*, Richardson).

Retropinna richardsonii, Macleay, Proc. Linn. Soc. N.S.Wales, vi., 1882, p. 228. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 55, and Proc. Linn. Soc. N.S.Wales, xxi., 1897, p. 727 (Not of Gill).

Retropinna retropinna, Waite, Mem. N.S. Wales Nat. Club, No. 2, 1904, p. 13. *Id.*, Zietz, Trans. Roy. Soc. S. Austr., xxxii., 1908, p. 295 (Not of Richardson).

Prototroctes semoni, Weber, Zool. Forsch. Austr., v., 1895, p. 274.

Jenynsella weatherilli, Ogilby, Ann. Qld. Mus., No. 9, 1908, p. 15.

Jenynsella semoni, Ogilby, Mem. Qld. Mus., i., 1912, p. 32.

Retropinna semoni, Ogilby, Mem. Qld. Mus., vi., 1918, p. 97.

Characters of a specimen of the typical form, 41 mm. long to the end of the middle caudal rays, from Ithaca Creek, near Brisbane, Queensland (Pl. xi., fig. 2).

D. 2/8; A. 3/12; P. 10; V. 6; C. 18. About 54 scales in a longitudinal row; about 48 myomeres, the fifteenth descending to the ventrals, and the twenty-ninth falling below the origin of the dorsal. Depth before the ventral fins 5.4 in the length to the hypural joint; head 4.02 in the same. Eye 3.2 in the head; snout 1.5 in the eye, and 4.5 in the head. Interocular space slightly greater than the length of the snout. First branched dorsal ray 2, first branched anal ray 1.9, pectoral 1.5, and ventral 2.1 in the head. Mandible just closing within the upper jaw. Similar in all structural details to the specimen described below.

Description of a specimen 55 mm. long from the snout to the end of the middle caudal rays, from Sackville, Hawkesbury River, New South Wales, in which the anal rays are more numerous than in the typical form (Pl. xi., fig. 3).

D. 3/8; A. 4/15; P. 11; V. 6; C. 18. About 52 myomeres, and about the same number of scale-rows between the shoulder and the hypural joint. Vertebrae 50. Depth before the ventrals 6 in the length to the hypural joint; head 4.7 in the same. Eye 3.2 in the head; snout 1.4 in the eye, and 4.6 in the head. Interocular space slightly greater than the length of the snout. First branched dorsal and anal rays 1.9, pectoral 1.5, and ventral 1.6 in the head.

General form moderately elongate, compressed, the dorsal and ventral profiles almost evenly rounded; the adipose membrane on the ventral surface makes its appearance between the tips of the pectorals, and extends backward between the ventrals, reaching its greatest depth before the vent, where it terminates abruptly. Greater portion of the body covered with concentrically striated, cycloid scales of moderate size, but these are wanting on the breast and anterior portion of the abdomen beneath the pectorals; they are rather irregular in their arrangement; they extend onto the base of the caudal fin, but the remaining fins and the ventral membrane are naked. No true lateral line, but the junction of the angles of the myomeres is marked by a pigmented line extending from the shoulder to the hypural joint beneath the scales.

Head rather small, naked, with large open pores arranged regularly on the nape, preoperculum, preorbital and mandible. Snout rounded, the mandible projecting slightly when the mouth is closed. Maxilla broad, its obtuse point reaching backward to below the end of the first

third of the eye. Nostrils large, close together, and situated about midway between the eye and the end of the snout; the anterior with a low raised margin, and a thick lobe separating it from the posterior. Preopercular angle rounded, with a large pore on its border. Operculum and suboperculum with rounded margins and a broad free membranous border. Gill-openings extending forward to below the anterior portion of the eye, the membranes united with, but overlapping across the isthmus. Five broad branchiostegals. Teeth (of a specimen of similar size, and collected with the specimen described and figured) cardiform and curved; those in the premaxillaries are smallest and uniserial; no teeth on the maxillary edge. Mandibular teeth a little larger, in two rows anteriorly, but becoming smaller and uniserial on the sides; a curved band of teeth across the vomer, the outer teeth being largest and in two rows, while the median ones are smaller and uniserial; palatine teeth largest anteriorly and in two rows, becoming smaller and uniserial posteriorly; a patch of teeth on each mesopterygoid; lingual teeth largest of all, hooked and arranged in a single row on each side of the tongue, the rows meeting anteriorly and posteriorly, and there are a few mesial teeth at the back of the tongue; a broad elongate patch of teeth on the basihyal.

Dorsal fin higher than long, its origin a little in advance of the vertical of the vent; the first three rays are simple, the others branched. Adipose dorsal small, originating a trifle behind the vertical of the base of the last anal ray. Anal commencing in advance of the middle of the dorsal base, the tip of its last ray reaching beyond the base of the adipose dorsal; the four first rays are simple, the remainder branched; the first branched ray is longest and equal to that of the dorsal in length. Pectoral placed very low on the body, rounded, its inner and outer rays simple, the others branched; it extends much more than half its distance from the ventral. Ventrals large and rounded, the first ray inserted a little nearer the snout than the last anal ray; the outer ray is thickened but branched, only the inner one being simple. Caudal forked.

Colour.—Almost uniformly light coloured in alcohol, the operculum silvery; cranium dark, and some blackish dots on the snout, lips, and back; a dark patch at the base of the tail, and a pigmented line along the sides to the shoulders. In life, this species is translucent green, with the eye, opercles, and the whole abdominal region silver; a median silvery iridescent band extends along the side of the tail; scales of the back margined with black dots; top of head black, and a black spot at the base of the tail.

Status.—*R. semoni* differs from the New Zealand *R. retropinna* in having some of the vomerine and palatine teeth arranged in two rows instead of a single series; it has also only about fifty instead of sixty scales in a longitudinal row. In all other details, however, the two are very similar.

Variation.—An examination of a large number of specimens from numerous localities shows that this species varies considerably in several of its characters. This variation is correlated to a certain extent with

the distribution of the species, examples from Queensland, for example, generally having fewer anal rays than others from New South Wales. Were this correlation well maintained the species might be subdivided into geographical races; but it is not consistent, and I have examples from near Sydney which appear to be similar in all details with others from the Burnett River. The following table illustrates the variation of several characters in thirty-seven specimens from seven different localities.

Locality.	No.	Dorsal.	Anal.	Ven- tral.	Pec- toral.	Caudal.	Anal origin below.
Eidsvold ...	1	9	14 (15)	6	8	18	Middle of dorsal.
"	1	9	14 (15)	6	9	—	Ant. half of dorsal.
Ithaca Creek ...	1	10	15	6	10	18	Ant. part of dorsal.
Noosa River ...	1	9	15	6	9	18	Ant. half of dorsal.
Rylstone ...	1	10	15	6	9	—	—
Eidsvold ...	1	10	16	6	9	—	Ant. part of dorsal.
Rylstone ...	2	9	16	6	10	—	—
"	1	10	16	6	9	—	—
Duck Creek ...	1	10	16	6	10	18	Ant. part of dorsal.
Hawkesbury R.	1	10	16	6	9	—	—
Darling R. ...	1	10 (11)	15 (16)	6	12	18	Middle of dorsal.
"	1	11	16 (17)	6	10	18	Middle of dorsal.
Eidsvold ...	1	9	17	6	9	18	Ant. part of dorsal.
Darling R. ...	1	10	17	6	11	18	Middle of dorsal.
"	1	9	17 (18)	6	11	18	Middle of dorsal.
"	1	10 (11)	17 (18)	6	11	18	Middle of dorsal.
Rylstone ...	2	10	17	6	10	—	—
Hawkesbury R.	1	10	17	6	10	—	—
"	2	11	17	6	10	—	—
"	2	10	17	6	9	—	—
Darling R. ...	1	10	18	6	10	20	Middle of dorsal.
Hawkesbury R.	1	11	18	6	8	—	—
"	5	11	18	6	10	—	—
"	1	10	18	6	9	—	—
"	1	10	18	6	10	—	—
"	1	11	19	6	10	—	—
"	2	11	20	6	10	—	—
"	1	11	20	6	11	—	—

Localities.—Series of specimens in greater or lesser numbers are in the Australian Museum from the following localities:—Eidsvold, Burnett River, Queensland; coll. Dr. T. L. Bancroft. Head waters of Noosa River, and Ithaca Creek, near Brisbane; coll. J. Douglas Ogilby. Rylstone, Cudgegong River, New South Wales; coll. D. G. Stead. Horton River, near Bingara, New South Wales; coll. A. R. McCulloch. Darling River, between Wilcannia and Bourke, New South Wales; coll. R. Helms. Murrumbidgee River, near Narrandera, New South Wales; coll. D. G. Stead. Hastings River, near Beechwood, New South Wales; coll. A. R. McCulloch. Glenbrook Creek, junction of the Grose and Nepean Rivers, and Sackville, Hawkesbury River; coll. A. R. McCulloch. Duck Creek, at Clyde, New South Wales; coll. A. R. McCulloch.

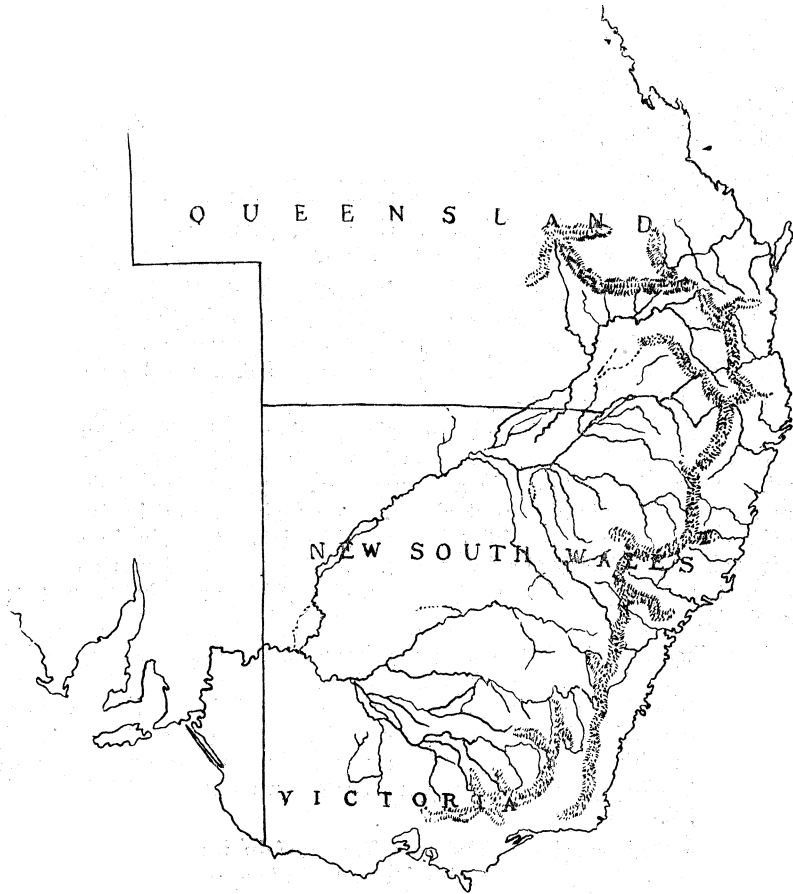


Fig. 3. Distribution of *Retropinna semoni*.

Distribution.—*R. semoni* was originally described from the Burnett River, Queensland, and I have examined several specimens from various localities in south-eastern Queensland. It also extends over the whole area drained by the Murray River system; numerous specimens are in the Australian Museum from various widely separated localities in western New South Wales, while it has also been recorded from Pyramid Hill, Victoria, by Ogilby, and from Lake Alexandrina, South Australia, by Zietz. The species further occurs in the coastal rivers of New South Wales at least as far south as Sydney, and I have collected many specimens both in the Hastings River and in various tributaries of the Hawkesbury near Sydney.

RETROPINNA TASMANICA, *sp. nov.*

Tasmanian Smelt.

(Plate xi., fig. 4.)

Retropinna richardsonii, Johnston, Proc. Roy. Soc. Tasm., 1882 (1883), pp. 62, 128, and 1890 (1891), p. 36 (Not *R. richardsonii*, Gill).

D. 3/8; A. 3/16; V. 6; P. 10; C. 18. Scales mostly missing from the holotype, though there are indications of about 74 rows between the operculum and the hypural joint. (Other Tasmanian specimens in which the scales are attached, have about 70 rows).

Depth before the ventral fins 6.3 in the length to the hypural joint; head 5 in the same. Eye 3.2 in the head; snout 1.3 in the eye, and 4.3 in the head. Interocular width slightly greater than the length of the snout. First branched dorsal and anal rays 1.8, ventral fin 1.6, and pectoral fin 1.4 in the head.

Anal commencing below the anterior portion of the dorsal fin. Basal portion of the ventral membrane covered with small scales. Jaws subequal. Premaxillary teeth in a single row. Mandibular teeth in two rows anteriorly, uniserial posteriorly. Vomerine teeth in two rows, palatines apparently uniserial (they are biserial anteriorly in a larger specimen received with the holotype). A single row of teeth on each side of the tongue, with some scattered median ones between them posteriorly.

Described and figured from a specimen 67 mm. long to the end of the middle caudal rays, from the Huon River.

Variation.—The palatine and vomerine teeth of Tasmanian specimens may be arranged in either one or two rows. The scales are apparently variable in number, but seem to be always in seventy or more rows. In eleven specimens the fin-rays vary as follow:—D. 11-12; A. 17-21; P. 9-11; V. 6.

Status.—This species differs from *R. semoni* in its squamation, there being about seventy rows of scales instead of about fifty; they are also more developed on the nape and thoracic regions, and are distinct on the basal portion of the ventral membrane. The increased number of scales also distinguishes *R. tasmanica* from *R. retropinna*.

Localities.—Thirteen specimens are in the Australian Museum from the Huon River, and the neighbourhood of Hobart, Tasmania.

Family KUHLIIDÆ.

Genus KUHLIA, Gill.

Dules (part), Cuvier and Valenciennes, Hist. Nat. Poiss., iii., 1829, p. 111.

Id., Günther, Brit. Mus. Cat. Fish., i., 1859, p. 266.

Kuhlia, Gill, Proc. Acad. Nat. Sci. Philad., 1861, p. 48 (*Perca ciliata*, Cuv. and Val.). *Id.*, Boulenger, Brit. Mus. Cat. Fish. (2nd ed.), i., 1895, p. 35. *Id.*, Regan, Proc. Zool. Soc., 1913, p. 374.

- Moronopsis*, Gill, Proc. Acad. Nat. Sci. Philad., 1863, p. 82 (*Dules marginatus*, Cuv. and Val.).
- Paradules*, Bleeker, Nederl. Tijd. Dierk., i., 1863, p. 257.
- Herops*, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 392 (*H. munda*, De Vis).
- Boulengerina*, Fowler, Proc. Acad. Nat. Sci. Philad., 1906, p. 512 (*Dules mato*, Lesson)—not of Dollo, 1886.
- Safole*, Jordan, Proc. U.S. Nat. Mus., xlii., 1912, p. 655 (*Dules tæniurus*, Cuv. and Val.).

An examination of a cotype of *Herops munda*, De Vis, proves it to be a species of *Kuhlia*, so that the synonymy of this genus must be rendered as above.

KUHLIA MUNDA, *De Vis*.

- Herops munda*, De Vis, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 392.
- Dules humilis*, De Vis. *Ibid.*, p. 396.
- Kuhlia humilis*, Ogilby, Ann. Qld. Mus., No. 10, 1911, p. 46, pl. vi., fig. 1.
Id., Regan, Proc. Zool. Soc., 1913, p. 380, fig. 69a.
- Dules nitens*, Ramsay and Ogilby, Proc. Linn. Soc. N.S.Wales (2), ii., 1887, p. 4. *Id.*, Regan, Proc. Zool. Soc., 1914, p. 340.
- Kuhlia malo* (part), Boulenger, Brit. Mus. Cat. Fish. (2nd ed.), i., 1895, p. 40—not of Cuvier and Valenciennes.
- Kuhlia proxima*, Kendall and Goldsborough, Mem. Mus. Comp. Zool., xxvi., 1911, p. 282, pl. iii., fig. 2.

Synonymy.—An example 126 mm. long from the snout to the end of the middle caudal rays, is in the Australian Museum, labelled as "*Dules munda*; Cardwell." It was received from Mr. De Vis by Mr. Ogilby in 1886, and as it agrees in all details with the description of *Herops munda*, De Vis, it is evidently a cotype of that species. This specimen only differs from Ogilby's description and figure of *Kuhlia humilis*, De Vis, in having the eye somewhat larger, it being 2.36 in the length of the head, less the mandible, instead of 2.75; the two species are therefore apparently synonymous. I have further compared it with the holotype of *Kuhlia nitens*, Ramsay and Ogilby, which is 236 mm. long, and have found it similar in all structural details; some slight differences in the proportions of the eyes, head, and depth are evidently due to the different sizes of the two specimens.

I am indebted to Mr. Ogilby for the suggestion as to the identity of De Vis' puzzling genus.

Loc.—Cardwell, Queensland; cotype of *Herops munda*. Port Moresby, New Guinea; holotype of *Dules nitens*.

Family KYPHOSIDÆ.

Genus KYPHOSUS, *Lacépède*.

Key to the Australian species:—

- a. Anterior dorsal rays distinctly higher than the longest spines.
 b. About 52 scales in a row between the supraclavicle and the hypural joint.....*cinerascens*.
 aa. Median dorsal spines longer than the rays.
 c. D. xi/12, A. iii/11.
 d. L. lat. about 55.....*sydneyanus*.
 dd. L. lat. about 66 (Klunzinger).....*indicus*, Klunz.
 cc. D. xi/13, A. iii/12; l. lat. 54.....*gibsoni*.

KYPHOSUS INDICUS (*Cuv. and Val. ?*), *Klunzinger*.

Pimelepterus indicus, Klunzinger, Sitzb. Akad. Wiss. Wien., lxxx. i., 1879, p. 357, pl. vii. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 15 (Perhaps not *P. indicus*, Cuv. and Val.).

Pimelepterus fallax (part), Klunzinger, Fisch. Roth. Meeres, i., 1884, p. 64—Australian specimens.

The identity of the specimen from King George's Sound, characterised and figured by Klunzinger, remains uncertain. He counted about 66 scales on the lateral line, but his figure shows only 53 pierced scales; it also shows about 54 rows between the supraclavicle margin and the hypural joint. The illustration was prepared by Eduard Konopicky, however, whose work is notable for its accuracy, which suggests that Klunzinger may have counted the scales incorrectly. The specimen is possibly a rather slender example of *K. sydneyanus*, Günther, which species has been recorded from Western Australian waters.

KYPHOSUS SYDNEYANUS, *Günther*.

Silver Drummer.

(Pl. xii., fig. 2).

Pachymetopon grande, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1882, p. 406. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 17 (Not of Günther).

Pimelepterus sydneyanus, Günther, Ann. Mag. Nat. Hist. (5), xviii., 1886, p. 368. *Id.*, Ogilby, Ed. Fish. N.S.Wales, 1893, p. 40, pl. xvi.

Pimelepterus meridionalis, Ogilby, Proc. Zool. Soc. Lond., 1886, p. 539.

Kyphosus sydneyanus, Waite, Mem. N.S.Wales Nat. Club, No. 2, 1904, p. 26. *Id.*, Stead, Ed. Fish. N.S.Wales, 1908, p. 53. *Id.*, Zietz, Tr. Roy. Soc. S.Austr., xxxiii., 1909, p. 267. *Id.*, Waite, Rec. Cantb. Mus., i.4, 1912, p. 319, and Tr. N.Zeal. Inst., xlv., 1913, p. 219. *Id.*, McCulloch, Rec. W.Austr. Mus., i. 3, 1914, p. 219.

Pimelepterus drewii, Hector, Tr. N.Zeal. Inst., xix., 1887, p. 590.—
Nomen nudum.

D. xi/12; A. iii/11; P. 18; V. i/5; C. 17. 55 pierced scales on the lateral line, of which five are beyond the hypural joint. About 63 rows of scales above the lateral line between its origin and the hypural joint, of which the anterior ones are very irregular; 52 rows between the posterior margin of the supraclavicle and the hypural joint. 10 scales between the origin of the dorsal fin and the lateral line, and 20 more to the ventral surface.

Depth before the ventrals 2.1 in the length to the hypural joint; head 3.6 in the same. Breadth at the pectoral bases 2.5 in the depth. Eye shorter than the snout, 1.7 in the interorbital space, and 3.9 in the head. Interorbital width 2.1, and snout 3 in the head. Depth of the caudal peduncle 1.4 in its length, and 2.1 in the head. Sixth dorsal spine 2.9, second dorsal ray 2.4, and pectoral 1.5 in the head.

Body broadly elliptical, compressed, the upper and lower profiles almost equally arched. Head obtuse, almost as deep as long; the snout is very convex before the eyes, but thence the profile rises evenly to the origin of the dorsal. Eye almost entirely in the anterior half of the head, and well below the upper profile; interorbital space convex. Preorbital, snout, and lips naked, the rest of the head covered with strongly ctenoid scales. Preorbital and preoperculum serrated; two weak opercular spines. Nostrils approximate, near the eye, with low skinny margins. Maxillary scaly, just reaching the vertical of the anterior orbital margin; jaws equal. Teeth in a single row in each jaw; the horizontal and vertical portions of the median premaxillary teeth subequal in length. An angular patch of minute teeth on the vomer, and a very small patch on the anterior part of each palatine; a very broad patch on each pterygoid, and a broad curved patch on the anterior part of the tongue.

Body entirely covered with strongly ctenoid scales, which also extend over the greater portion of all the rayed fins, and form sheaths at the bases of the dorsal and anal spines. Lateral line following the curve of the back. Post-temporal bone serrated.

Dorsal commencing a little behind the vertical of the ventral spine; the margin of the spinous portion is evenly arched, and the sixth spine is longest and much longer than the anterior rays. Soft dorsal much shorter than the spinous portion; its margin is almost straight, and the rays decrease in length backward. Anal a little farther back than the soft dorsal; the second and third spines are subequal, and the anterior rays are distinctly higher than those of the dorsal. Pectoral short and broad, the fifth ray longest, the margin rounded. Ventrals reaching about two-thirds of their distance from the vent. Caudal deeply emarginate, the lobes pointed.

Colour.—Dark silver, with longitudinal stripes extending along the sides between each row of scales. Head silver and bronze; a bronze stripe across the eye and another across the cheek, between which is a brilliant silver area. Opercular margin blackish. First dorsal olive-black, the other vertical fins lighter though dark towards their margins. A blackish spot beneath the pectoral at the lower angle of its base.

Described and figured from a specimen 245 mm. long, captured near Sydney by Mr. F. McNeill.

Variation.—This young example differs considerably in its general form from larger examples 770 mm. in length; in these the depth is only one-third of the length to the hypural joint, but specimens of intermediate size indicate that this is merely growth variation. Owing to the fact that the scales of the anterior portion of the body are very irregularly arranged, it is not possible to satisfactorily count the number of rows, but some specimens have more numerous scales than others, there being between 48 and 52 in a row between the posterior margin of the supraclavicle and the hypural joint.

Synonymy.—The name *Pimelepterus sydneyanus* was based upon a large stuffed example from Port Jackson, thirty inches long, which, according to Günther's description, had 67 scales on the lateral line and only 11 dorsal rays. In both these characters it differs from similarly large specimens in the Australian Museum from the same locality, which have 54-55 pierced scales on the lateral line and 12 dorsal rays. Mr. C. Tate Regan has re-examined Günther's type for me, however, and counts 55 pierced scales on the lateral line, 54 in a row between the supraclavicle and the hypural joint, and 12 dorsal rays, which disposes of the discrepancy.

Pimelepterus meridionalis also was described by Ogilby from large examples taken in Port Jackson, but its author later relegated it to the synonymy of *P. sydneyanus*; as no specimens now in the Australian Museum are labelled as *P. meridionalis*, and as the typical examples cannot be identified, this synonymy cannot be proved, but since there appears to be only one large species of the genus occurring in Port Jackson, it is almost certain that the names *P. sydneyanus* and *P. meridionalis* apply to the same fish.

The name *P. drevii*, Hector, was based on a New Zealand specimen now preserved in the Dominion Museum, Wellington. Gill⁴ included this name in the synonymy of *Incisidens simplex*, but some details of the characters of the type, forwarded to me by Mr. W. J. Phillipps, indicate its identity with *K. sydneyanus*.

Habits.—According to Mr. McNeill, large examples of this fish appear close inshore on the coast near Sydney about the middle of September, when they are captured by rod-fishermen; they disappear again at the end of the summer, but small specimens may be captured throughout the winter. Their arrival is coincident with the appearance of a brown coloured seaweed⁵ which covers the rocks near the low-water level, and upon which they feed. If handfuls of the weed be thrown into the water, the fish may often be observed to rise at it as it drifts from the rocks with such avidity that they partly expose themselves above the surface, and so leave no doubt as to their identity. The same weed is used to bait hooks for the capture of the larger specimens, though

⁴ Gill—Mem. Nat. Acad. Sc. Wash., vi., 1893, p. 116.

⁵ Identified by Mr. A. H. S. Lucas as *Wildemania laciniata*, which is cooked and eaten by people living on the Scotch Coast.

a prawn will serve to attract smaller examples when it is not available during the winter months. Unless specially treated, the larger specimens are almost worthless as food, being very tough and of unpleasant flavour, but smaller examples are quite as tasty as the Blackfishes of the related family Girellidæ. Mr. McNeill has observed the species commonly off the coast near Sydney, and of all sizes between four inches and two feet in length.

Locs.—Four specimens are preserved in the Australian Museum from near Sydney, and one has been recently received from Mr. Edgar R. Waite which was taken in South Australian waters. The species has been recorded from Western Australia, South Australia, New South Wales, and New Zealand.

KYPHOSUS CINERASCENS, *Forskål.*

- Pimelepterus cinerascens* (Forskål), Day, Fish. India, 1875, p. 143, pl. xxxv., fig. 3. *Id.*, Bleeker, Atlas Ichth., ix., 1876, p. 15, pl. cccxlv., fig. 4. *Id.*, Günther, Ann. Mag. Nat. Hist. (5), xviii., 1886, p. 368.
- Pachymetopon squamosum*, Alleyne & Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 275, pl. ix., fig. 1. *Id.*, Macleay, *Loc. cit.*, v., 1881, p. 407, and vii., 1887, p. 246, and ix., p. 16.
- Scorpius vinosa*, Alleyne & Macleay, Proc. Linn. Soc. N.S.Wales, i., 1877, p. 277, pl. ix., fig. 2. *Id.*, Macleay, *Loc. cit.*, v., 1881, 398. *Id.*, Vaillant, Bull. Mus. Hist. Nat., iii., 1897, pp. 85-87.
- Kyphosus cinerascens*, Cockerell, Mem. Qld. Mus., ii., 1913, p. 57. *Id.*, Ogilby, Mem. Qld. Mus., ii., 1913, p. 90. *Id.*, McCulloch, Rec. Austr. Mus., xi, 7, 1917, p. 181.

A fine specimen of this species 365 mm. long, was secured on St. Crispin Reef on the outer edge of the great Barrier Reef, off Port Douglas, in June, 1918. It was feeding with several others on the reef at low tide, in water about 12 inches deep, and was speared by a native fisherman, who called it a Bream. It was a light silvery blue in colour, with two vertical bands posteriorly, the first between the anterior portions of the dorsal and anal, and the second between the posterior insertions of those fins.

A second specimen in the Australian Museum, 267 mm. long, from Port Moresby, was identified by Macleay as *Pachymetopon squamosum*, which species has already been recognised as synonymous with *K. cinerascens*. It agrees with the larger specimen in all details, and both agree with Bleeker's description and figure of the species.

KYPHOSUS GIBSONI, *Ogilby.*

(Plate xii., fig. 3).

Kyphosus gibsoni, Ogilby, Mem. Qld. Mus., i., 1912, p. 50.

D. xi/13; A. iii/12; P. 19; V. i/5; C. 15. 59 pierced scales on the lateral line, of which 6 are behind the hypural joint. About 75 rows of

scales above the lateral line between its origin and the hypural joint; 62 rows between the posterior margin of the supraclavicle and the hypural joint. 12 scales between the origin of the dorsal fin and the lateral line, and 21 more to the ventral surface.

Depth before the ventrals 2.6 in the length to the hypural joint; head 4.08 in the same. Breadth at the bases of the pectorals 2.1 in the depth. Eye 1.1 in the snout, 1.8 in the interorbital space, and 4.3 in the head. Interorbital width 2.3, snout 3.7 in the head. Depth of the caudal peduncle 1.7 in its length, and 2.4 in the head. Sixth dorsal spine 2.3, first dorsal ray 2.7, and pectoral fin 1.6 in the head.

Total length, from the snout to the end of the middle caudal rays, 387 mm.

The above characters and the accompanying figure are taken from the holotype of the species, which has been kindly lent to me for the purpose by the Director of the Queensland Museum.

Loc.—Moreton Bay, Queensland.

Family GIRELLIDÆ.

Key to the Australian, New Zealand, and Kermadec Island Genera.

- a. An inner series of flattened teeth in each jaw arranged in a broad band.
 - b. Operculum largely naked.
 - c. Scales larger, 49-58 in a longitudinal row; outer teeth in 1-4 rows, with trenchant or tricuspid edges.....*Girella*.
 - cc. Scales small, about 90 in a longitudinal row; outer teeth in a single row, tricuspid.....*Tephraeops*.
 - bb. Operculum scaly.
 - d. Scales small, about 80 in a longitudinal row; outer teeth in a single row, tricuspid.....*Melambaphes*.
- aa. Inner series of jaw-teeth absent or scarcely developed; cylindrical and pointed if present.
 - e. Scales small, about 70 in a longitudinal row, with trenchant or tricuspid edges.....*Girellops*.

GIRELLA, *Gray*.

Key to the Australian species.—

- a. Outer teeth of the jaws imbricate, in 2-4 rows, simple or tricuspid; 14-16 dorsal spines; 49-52 rows of scales between the scapula and the hypural joint.
 - b. Body uniformly coloured or with about 11 dark vertical bands; nostril but little fimbriate.....*tricuspidata*.
 - bb. A pale vertical band from the back to the belly.....*zonata*.
- aa. Outer teeth of the jaws in a single row, tricuspid; 50-58 scales between the scapula and the hypural.
 - c. 14-16 dorsal spines; nostrils scarcely fimbriate; tail more or less emarginate.....*cyanea*.
 - cc. 13 dorsal spines; nostrils markedly fimbriate; tail subtruncate.....*elevata*.

GIRELLA TRICUSPIDATA, *Quoy & Gaimard*.

Blackfish.

(Plate xiv, fig. 1).

Box tricuspidatus, Quoy & Gaimard, Voy. Uranie, 1824, p. 296.

Oblata tricuspidata, Cuvier & Valenciennes, Hist. Nat. Poiss., vi., 1830, p. 372.

- Crenidens triglyphus*, Richardson, Ichth. Erebus & Terror, 1845, p. 36, pl. xxv., fig. 2.
- Crenidens simplex*, Richardson, *Ibid.*, 1848, p. 120.
- Girella tricuspidata*, Günther, Brit. Mus. Cat. Fish., i., 1859, p. 428, and Ann. Mag. Nat. Hist. (3), xx., 1867, p. 59. *Id.*, Steindachner, Sitzb. Akad. Wiss. Wien, lvi. i., 1867, p. 324. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 355. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 407. *Id.*, Johnston, Proc. Roy. Soc. Tasm., 1881 (1882), p. 111, and 1890 (1891), p. 30. *Id.*, Woods, Fish. & Fisher. N.S.Wales, 1882, p. 39, pl. vii. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 18. *Id.*, Lucas, Proc. Roy. Soc. Vict. (2), ii., 1890, p. 20. *Id.*, Ogilby, Ed. Fish. N.S.Wales, 1893, p. 42, pl. xii. *Id.*, Waite, Mem. N.S.Wales Nat. Club, No. 2, 1904, p. 26. *Id.*, Stead, Ed. Fish. N.S.Wales, 1908, p. 49, pl. xix. *Id.*, Roughley, Fish. Austr., 1916, p. 52, pl. xii.
- Girella simplex*, Günther, Brit. Mus. Cat. Fish., i., 1859, p. 429. *Id.*, Kner, Reise Novara, Zool., i., 1865, p. 75. *Id.*, Steindachner, Sitzb. Akad. Wiss. Wien, lvi. i., 1867, p. 323, pl. i., fig. 3 (teeth). *Id.*, Klunzinger, Arch. Naturg., xxxviii. i., 1872, p. 22, and Sitzb. Akad. Wiss. Wien, lxxx. i., 1879, p. 355. *Id.*, Hector, Trans. N.Zeal. Inst., ix., 1877, p. 468, pl. viii., fig. 6c. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 407. *Id.*, Johnston, Proc. Roy. Soc. Tasm., 1882 (1883), p. 111, and 1890 (1891), p. 30. *Id.*, McCoy, Prodr. Zool. Vict., dec. viii., 1883, pl. lxxiii. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 18. *Id.*, Lucas, Proc. Roy. Soc. Vict. (2), ii., 1890, p. 20. *Id.*, Sherrin, Handb. N. Zeal. Fish., 1886, p. 71. *Id.*, Kent, Gt. Barrier Reef, 1893, pp. 285, 369. *Id.*, Ogilby, Ed. Fish. N.S.Wales, 1893, p. 44. *Id.*, Waite, Mem. N.S.Wales Nat. Club, No. 2, 1904, p. 26, and Rec. Cantb. Mus., i., 1907, p. 21.
- Melanichthys tricuspidata*, Castelnau, Proc. Zool. Soc. Vict., i., 1872, p. 67, and Proc. Linn. Soc. N.S.Wales, iii., 1879, pp. 350, 363.
- Melanichthys simplex*, Castelnau, Proc. Zool. Soc. Vict., i., 1872, p. 68, and ii., 1873, p. 41, and Proc. Linn. Soc. N.S.Wales, iii., 1879, pp. 350, 363.
- Incisidens simplex*, Gill, Mem. Nat. Acad. Sci. Wash., vi., 1893, p. 116.
- Melanichthys blackii*, Castelnau, Proc. Zool. Soc. Vict., ii., 1873, p. 41.
- Otenolabrus? knoxi*, Hutton, Trans. N.Z. Inst., v., 1873, p. 265, pl. x. *Id.*, Knox, *Ibid.*, p. 308. *Id.*, Hector, *Ibid.*, vii., 1875, p. 249.
- Girella percoides*, Hector, Trans. N.Z. Inst., vii., 1875, p. 243, pl. x., fig. 6d.
- Girella blackii*, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 408.
- Girella ramsayi*, Macleay, *Ibid.*, p. 409. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 18. *Id.*, Lucas, Proc. Roy. Soc. Vict. (2), ii., 1890, p. 20.
- ? *Girella carbonaria*, De Vis, Proc. Linn. Soc. N.S.Wales, viii., 1883, p. 283.
- Girella mentalis*, De Vis, Proc. Linn. Soc. N.S.Wales, viii., 1883, p. 284.
- Girella multilineata*, Clarke, Trans. N.Zeal. Inst., xxxi., 1899, p. 98, pl. vii. *Id.*, Waite, Rec. Cantb. Mus., i. 1, 1907, p. 21.

D. xv/12; A. iii/12; P. 17; V. i/5; C. 17. L. lat. 46; 49 rows of scales between the scapula and the hypural joint and about 46 directly above the lateral line; 8 scales between the lateral line and the back below the middle of the dorsal fin excluding those of the scaly sheath.

Depth before the ventral fins 2.6 in the length from the snout to the hypural joint; head 3.6 in the same. Eye 5 in the head and 1.6 in the interorbital space; length of the snout and the width of the interorbital space equal, 3.09 in the head. Eighth dorsal spine 2.3, third dorsal ray 2.09, and third anal ray 1.6 in the head. Pectoral 1.2, and ventral 1.3 in the head.

Head largely naked, though the temporal region and upper half of the operculum are scaly, and small scales cover the cheek and postocular region. Profile slightly convex, the snout obtusely conical; interorbital space convex. Eye much narrower than the interorbital space, and but little broader than the preorbital bone. Nostrils close together, with raised skinny margins which may be subdivided into a few fimbriæ. Maxillary hidden by the preorbital; jaws subequal. Preoperculum with a broad naked border, its edge entire. Operculum with a flat spine. A band of teeth arranged in oblique series of about three or four in front of each jaw, compressed, with simple trenchant edges (female); behind these there is a broad band of minute, more or less tricuspid teeth in each jaw.

Body covered with finely ctenoid scales of moderate size which extend forward to and end abruptly above the anterior portion of the eye. They form sheaths at the bases of the dorsal and anal fins, and extend up between the rays of the vertical fins. They are largest on the sides of the body and tail, and smallest on the nuchal region, breast and abdomen. Caudal peduncle as deep as long.

First dorsal commencing directly behind the vertical of the opercular lobe, its spinous portion almost twice as long as the soft. Margin of the spinous dorsal rounded, the spines increasing in length to about the eighth and then decreasing again backwards; third dorsal ray highest, longer than the longest spine, the others decreasing backwards. Anal opposite and longer than the soft dorsal; third spine longest and more than half as long as the third ray which is much longer than that of the dorsal. Pectoral obtusely pointed above, its margin rounded. Ventrals a little shorter than the pectorals, and inserted a little before the middle of their length; they reach five-sixths of their distance from the vent. Caudal emarginate, the lobes pointed.

Colour.—Almost uniform brown after preservation, the pectoral and ventral fins lighter; broad darker bars extend horizontally between each row of scales. In life, the colour is silver grey tinged with bronze, with the back smoky and the belly lighter. Eleven or twelve dark grey bands descend from the dark part of the back onto the silver of the sides, one being before the dorsal fin and one behind it; these are narrow, covering one or two rows of scales, and they descend almost to the ventral surface above the anal fin but not so low elsewhere. Fins smoky grey.

Described from a female example 290 mm. long from Port Macquarie, New South Wales. The accompanying figure is prepared from the same specimen, but the colour-marking is copied from another in which the dark bands chance to have been preserved.

Variation.—The dark bands referred to rarely show in preserved examples, and are variable in both number and intensity in fresh specimens. They are most apparent in light coloured examples, and appear to be intensified under stress of excitement as when the fish is hooked; if the fish be swimming quietly in a pool they are scarcely visible, and the whole body is darker than when it is first taken from the water. Incipient albinos have been forwarded to the Australian Museum which are almost uniformly canary yellow in colour, while a true albino which was captured near Sydney is white with the back and sides closely speckled with silver-grey dots. In eleven specimens from various localities, the dorsal spines and rays vary in number from xiv-xvi and 11-13 respectively; one abnormal specimen had five anal spines, of which the third and fourth arose from the same base though they were not united.

Notes on the occurrence and habits of this species have been published by Stead⁶.

Synonymy.—Klunzinger (1872), Castelnau (1872), and McCoy (1883), each suggested the specific identity of *Girella tricuspidata* and *G. simplex*. Stead (1908) recorded that the form commonly recognised as *G. simplex*, in which the outer teeth have truncate cutting-edges, is merely the female form of *G. tricuspidata* which has distinctly trilobate teeth; but he offered no proof of his statement. I am indebted to Mr. F. McNeill for an interesting series of jaws, milts, and rows, taken from fifty-five specimens which were secured by himself at or near Coogee, near Sydney, at various dates in April and May, 1919. The teeth of the outer series in both jaws are distinctly trilobate in all (fifteen) the males; two specimens, however, have a few truncate teeth near the symphyses of the jaws, some of which are functional while the others are small and partly embedded in the gum. In thirty-nine of the females, these teeth are almost all truncate; one or more of the lateral teeth are sometimes distinctly trilobed, and one example has a well developed trilobed tooth among the truncate ones at the symphysis. One pair of jaws associated with large ovaries has almost all the teeth trilobate, but a few median and lateral teeth are truncate. The teeth of the females have truncate edges in their earliest stages, as is proved by an examination of some extracted from the gum at the base of and anterior to the functional series; on the other hand, the teeth of the males are distinctly trilobed in their early stages. The minute teeth of the inner band in each jaw are more or less trilobed in both sexes, though more markedly so in males than in females.

Two specimens caught on a line in succession at Maroubra, 29th June, 1919, which offered no differences other than in dentition, proved to be

⁶ Stead—Fish. Austr., 1906, p. 91, and Ed. Fish. N.S. Wales, 1908, p. 49.

male and female upon dissection; in the male the teeth were all tricuspid, while they were trenchant in the female, thus bearing out the observations recorded above.

Girella blackii, Castelnau, was included in the synonymy of *G. tricuspidata* by Ogilby in 1893, while the identity of *G. percoides*, Hector, and *G. simplex* was recognised by Hector in 1877. *Otenolabrus knoovi*, Hutton, was recognised as a synonym of *G. simplex* by Gill in 1893.

A specimen in the old collection of the Australian Museum is labelled as *Girella ramsayi*, though it unfortunately has no other data. It is apparently the holotype of Macleay's species, no other example so labelled being in either the Macleay Museum or the Australian Museum collections. It agrees with the brief description of *G. ramsayi* in its length and major details, though some proportions of the eye, snout and interorbital space are a little different. It agrees with the description in having only two perfect anal spines, but the malformed base of a third is quite distinct. It does not differ in any details from specimens of *G. tricuspidata* of the same size.

Mr. Ogilby has compared the holotype of *Girella mentalis*, De Vis, in the Queensland Museum with an example of *G. tricuspidata*, and finds no difference between them except that the holotype has only thirteen dorsal spines. He notes that though he has examined scores of specimens of *Girella* from Moreton Bay, he has not found another specimen to agree with De Vis' example in this detail, and therefore regards the latter merely as an unusual variation of *G. tricuspidata*.

The type of *G. carbonaria*, De Vis, is apparently lost. This imperfectly described species is here regarded as probably synonymous with the female form of *G. tricuspidata*.

Two male examples about 350 mm. long, recently secured at Kawan Island, New Zealand, by Mr. C. Hedley, agree well with Clarke's description and figure of *Girella multilineata*. A careful comparison of them with specimens of *G. tricuspidata* from Sydney, however, reveals no distinguishing characters to substantiate the New Zealand species.

Distribution.—*Girella tricuspidata* was originally described from Shark Bay, Western Australia. The species has since been recorded from Victoria, Tasmania, New South Wales, Moreton Bay, and New Zealand.

GIRELLA ELEVATA, Macleay.

Black Drummer; Rock Blackfish.

(Plate xiii., fig. 1.)

Girella elevata, Macleay, Proc. Linn. Soc. N.S.Wales, v., 1881, p. 408.
Id., Ogilby, Cat. Fish. N.S.Wales, 1886, p. 18. *Id.*, Waite, Mem. N.S.Wales Nat. Club, No. 2, 1904, p. 26. *Id.*, Stead, Ed. Fish N.S.Wales, 1908, p. 51, pl. xx.

D. xiii/14; A. iii/11; P. 18; V. i/5; C. 15. 51 rows of scales below the lateral line between the scapula and the hypural joint and about the

same number directly above it; about 8 scales between the lateral line and the back below the middle of the dorsal fin, not including those of the scaly sheath.

Depth before the ventrals 2.4 in the length from the snout to the hypural joint; head 3.7 in the same. Eye 4 in the head, and 1.3 in the interorbital space; length of the snout and width of the interorbital space equal, 3 in the head. Last dorsal spine 2, third dorsal ray 1.5, and second anal ray 1.2 in the head. Pectoral 1.09, and ventral 1.2 in the head.

Head largely naked; there is a small patch of scales above the operculum and on the temporal region, and a narrow series extends downward behind the eye and expands over the cheek. The profile is convex and the snout tumid; interorbital space convex. Eye much narrower than the interorbital space, and but little broader than the preorbital bone. Nostrils large, close together, with fimbriate edges, the anterior with a dermal lobe. Maxilla extending back almost to below the anterior orbital border, and completely hidden by the preorbital when the mouth is closed; jaws subequal. Cheek-scales minute and irregular; preopercular edge smooth, with a broad naked border. Operculum with two flat spines, the lower somewhat pointed, the upper rounded. Outer teeth of each jaw arranged in a single row, with strongly tricuspid edges; there are about fourteen larger teeth in each jaw, and the upper row is continued backward on the sides to the end of the premaxilla by some minute teeth: the inner teeth of each jaw are minute, flattened, tricuspid, and arranged in a broad band.

Body covered with ctenoid scales of moderate size, which extend forward to, and end abruptly on the neck. They form sheaths at the bases of the dorsal and anal fins, and extend up between the bases of the spines and rays of all the fins except the ventrals. They are largest on the sides and caudal peduncle, and smallest on the nuchal region, breast and abdomen. Caudal peduncle as deep as long.

First dorsal commencing directly behind the vertical of the opercular lobe, its spinous portion about once and one-third as long as the soft. The margin of the spinous portion is rounded, and the spines increase rapidly in length to the fifth, after which they increase very slightly to the last; anterior dorsal rays distinctly higher than the spines, the third longest; margin of the soft dorsal rounded. Anal opposite, and as long as the soft dorsal; the third spine is longest and about half as long as the anterior rays which are higher than those of the dorsal; the margin is rounded, its posterior portion subvertical. Pectorals rounded, the fifth upper ray longest; ventrals shorter than the pectorals, inserted well behind them, and reaching about three-fourths of their distance from the vent. Caudal subtruncate.

Colour.—Uniform dark bluish-brown in life, each scale with the middle of a lighter bluish colour and a well defined bronze border; the ventral surface is a little lighter in colour, with bronze reflections. The fins are uniformly slaty-brown. In alcohol the fish becomes of an almost uniform brown colour.

Described and figured from a young example 216 mm. long, secured at Maroubra near Sydney, by Mr. F. McNeill.

Variation.—In its younger stages this fish is more or less mottled with dark bifurcating bands descending from the back to the sides.

Habits.—According to Mr. McNeill, this fish frequents the foaming wash of the waves in the vicinity of weed-covered rocks on the coast near Sydney, where it procures the weed known as Sea-cabbage upon which it feeds. In calmer weather, it will allow itself to be carried over the rocks by the waves, and after taking a mouthful of the weed, hurries back with the receding water, though it is occasionally left stranded until another wave enables it to regain the water. When hooked, this fish endeavours to dart into a retreat among the rocks where it secures a hold among the shelves and ledges with its outstretched fins, and from which position it can only be dislodged with difficulty. It is commonly known as the Black Drummer. Further notes on the habits are given by Stead.

Locs.—*G. elevata* is known only from the vicinity of Sydney. Several specimens are in the Australian Museum from Maroubra, near Sydney, and one from Terrigal, a little farther to the north.

GENUS GIRELLOPS, *Regan*.

Girellops, Regan, Proc. Zool. Soc., 1913, p. 369 (*Girella nebulosa*, Kendall and Radcliffe).

This genus has been separated from *Girella* and *Tephraeops* on account of the absence of an inner series of teeth in each jaw. In the following species a few minute and almost rudimentary inner teeth are present, which, however, are very different to those of *Girella* and *Tephraeops* in which they are numerous, flattened, and arranged in a broad band.

GIRELLOPS FIMBRIATUS, *sp. nov.*

(Plate xiii., fig. 2.)

D. xvi/12; A. iii/10; V. i/5; P. 16; C. 17. 71 rows of scales below the lateral line between its origin and the hypural joint, and about 86 rows above it; 12-13 scales in a row between the lateral line and the back below the eighth dorsal spine excluding those on the base of the fin.

Depth before the ventrals 2.4 in the length from the snout to the hypural joint; head 3.6 in the same. Eye 4 in the head, 1.3 in the interorbital space, which is slightly less than the length of the snout; snout 2.7 in the head. Last dorsal spine 1.8, second dorsal ray 1.7, second anal ray 1.1 in the head. Pectoral subequal to the ventral, 1.05 in the head.

Head largely naked; there are small patches of scales above the operculum and on the temporal region, and a narrow series extends down behind the eye and expands over the cheeks. The profile is somewhat convex over the eye, but the interorbital space is nearly flat; the eye is much narrower than the interorbital space, which is a trifle shorter than the snout. Preorbital smooth, the space between the eye and the maxilla is more than one-half the width of the eye. Nostrils large and close together; the margins of both are closely fimbriate and the anterior has a posterior fimbriate lobe. Maxilla extending backward to below the anterior orbital border, expanded posteriorly; mandible shorter than the

upper jaw. Cheek-scales minute and irregular; preopercular edge entire, the angle rounded; a broad naked preopercular border. Operculum with two flat spines. The outer teeth of each jaw are arranged in a single row, and they have truncate edges, though one or two lateral ones are bi- or tricuspid: there are about twelve in each jaw, and they terminate abruptly at the sides, there being no minute lateral teeth as in *Girella*. The teeth of the inner series of each jaw are minute, spaced, and pointed, and are mostly arranged in a single row, though several scattered ones occur behind the others.

Body covered with small scales which extend forward to, and end abruptly on the neck; they cover the bases of the vertical fins, and extend up between the rays of all but the ventrals. The scales are strongly ctenoid on the body, but cycloid on the fins; they are smallest on the nuchal region, breast and abdomen, and largest on the sides and caudal peduncle. Caudal peduncle a little longer than deep.

First dorsal commencing a little behind the vertical of the opercular lobe, its spinous portion more than twice as long as the soft. The margin of the spinous dorsal is rounded, and the spines increase rapidly in length to the fifth, after which they increase slightly to the last, which is a little shorter than the anterior rays. Soft dorsal highest anteriorly, the margin rounded. Anal commencing beneath the posterior dorsal spines and terminating before the soft dorsal; the length of its base is subequal to that of the soft dorsal; the second and third spines are subequal in length, and about one-half as long as the anterior rays; second ray longest, the posterior margin of the fin subvertical. Pectorals and ventrals subequal in length, the latter reaching to the first anal spine. Caudal a little emarginate.

Colour.—Uniform dark brownish-grey after preservation in formaline, the pectoral and dorsal fins somewhat lighter than the others.

Described from a single specimen 159 mm. long, which was collected at the Kermadec Islands by Mr. W. R. Oliver in 1908, and was forwarded to the Australian Museum by Mr. Edgar R. Waite.

This species differs from the figures of *G. nebulosus*, Kendall and Radcliffe, principally in having markedly fimbriate nostrils, but this character is unfortunately not referred to in the description of that species. The development of a few teeth in an inner series in each jaw also distinguishes it from *G. nebulosus*, in which they are wanting.

Loc.—Kermadec Islands.

Family LABRIDÆ.

Genus CORIS, *Lacepède*.

CORIS REX, *Ramsay and Ogilby*.

(Plate xiv., fig. 2.)

Coris rex, Ramsay & Ogilby, Proc. Linn. Soc. N.S.Wales, x. 4, 1886, p. 851.
Id., Ogilby, Cat. Fish. N.S.Wales, 1886, p. 46. *Id.*, Waite, Mem. N.S.Wales Nat. Club, No. 2, 1904, p. 39. *Id.*, Stead, Ed. Fish. N.S.Wales, 1908, p. 84.

D. ix/12; A. iii/12; V. i/5; P. 13; C. 14. L. lat. 98; about 9 scales between the bases of the anterior dorsal spines and the lateral line, and about 35 more to the ventral surface.

Depth before the ventrals 3.28 in the length to the hypural joint; head, from the lips to the end of the opercular lobe, 3.45 in the same. Eye-opening 8.3 in the head, and 2.2 in the interocular width; snout, including the lips, 3 in the head. Posterior dorsal spine 2.7, average dorsal and anal rays 2.2 in the head.

Body compressed, the dorsal and ventral profiles almost evenly convex. Caudal peduncle deep and compressed, its length equal to about two-thirds of its depth. Head naked, rhomboidal, the snout sharply conical and the operculum produced into a broad lobe. Eye small, interocular space convex. Mouth a little oblique, the upper jaw slightly longer than the lower, the maxilla reaching backward to below the posterior nostril. Teeth conical, in two rows in each jaw, the inner ones much smaller and less numerous than the outer; the anterior pair of premaxillary teeth project forward as strong canines, and are followed by a pair of curved smaller ones, behind which the succeeding teeth decrease in size backwards; anterior mandibular canines closing within the upper ones, the following teeth similar to but larger than those of the premaxillaries; a pair of canines at each posterior angle of the mouth. Opercular bones with thin membranous margins, the preopercular angle rounded.

The scales commence on an oblique line extending back from the nape above the eye to the upper angle of the gill-opening, and leave a median area on the neck before the dorsal fin almost naked. They are cycloid and subequal in size, and extend over the basal third of the caudal fin. Lateral line curved upward toward the back anteriorly and then extending in a straight line backward and slightly downward to below the ninth and tenth dorsal rays, where it drops sharply to the median line of the caudal peduncle; its tubules are simple, and cease on about the third scale behind the hypural joint.

Dorsal fin commencing above the middle of the operculum, its margin uninterrupted and somewhat rounded. The anterior spines increase a little in height backward, but the remainder are subequal in length; the rays are higher than the spines and of subequal length. Anal similar to and opposite the soft dorsal. Ventral inserted below the anterior pectoral base, the first ray elongate and reaching to the vent. Caudal apparently subtruncate.

Colour-marking.—Very faded after long preservation in alcohol. Head nearly uniform, but darker above, while the opercular lobe is dark bluish-black towards its edges. Anterior half of the body light yellowish with two dark purplish-brown cross bands; the posterior half is brown, and the junction of the two is sharply defined. A broad dark purplish-brown area on the back between the first and sixth spines extends across the sides towards the ventral region as a well defined band, and becomes rapidly narrower as it descends beneath the pectorals; it is lost below in a rather ill-defined darker area on the breast and pectoral region. The second cross band is still darker and better defined; it descends from the bases of the last two dorsal spines and the first ray towards the vent and

spinous portion of the anal. Spinous dorsal uniformly dark except around the base of the seventh spine; soft dorsal light basally but darker along the middle of its length and with a narrow marginal stripe. Anal almost uniformly faded but with a narrow marginal stripe like the dorsal. Pectoral with an ill-defined oblique band at about the middle of its length and a broad dark terminal and marginal band. Ventrals and caudal uniform, the membrane of the latter apparently darker than the rays.

Described and figured from the holotype, 404 mm. long, which is in a rather poor state of preservation. It does not show the details of the dorsal and anal fin markings very well, so these have been supplemented in the figure from those of a second specimen of similar size and characters from New Zealand.

The original description of this species was based upon a fresh specimen, and the details of the colour-marking as given by Ramsay and Ogilby are so different to what is now observed in the same example that it is difficult to understand how such extraordinary changes have taken place. It must be noted also, that the length of the specimen was stated to be 16.50 inches, whereas it is now slightly less than 16 inches. Its authenticity however, is beyond doubt, since its registration number and accompanying data tally exactly with those given by Ramsay and Ogilby, and no other specimen in the Australian Museum collection can be associated with their description.

But few specimens of this species appear to have found their way to museum collections, only one other having reached the Australian Museum since the holotype was acquired. This is 460 mm. in length, and is generally darker in colour with less contrast between the lighter and darker markings, though this may be the result of its imperfect preservation. Stead records a third large example from Sydney, while a fourth about 390 mm. long (tail imperfect), has been sent to me from New Zealand for identification by Mr. Louis T. Griffin, which is very similar in all details to the holotype.

Locs.—Bondi, Sydney, holotype. Cuvier Island, near the entrance to Hauraki Gulf, North Island, New Zealand.

Family ODACIDÆ.

Genus OLISTHOPS, *Richardson*.

OLISTHOPS CYANOMELAS, *Richardson*.

(Plate xiv., fig. 3.)

Olisthops cyanomelas, Richardson, Proc. Zool. Soc., xviii., November 1850, p. 75, Pisc. pl. iii., figs. 1-2, and Ann. Mag. Nat. Hist. (2), vii., 1851, p. 291. *Id.*, Castelnau, Proc. Zool. Soc. Vict., i., 1872, p. 155. *Id.*, Waite, Mem. N.S.Wales Nat. Club, No. 2, 1904, p. 40, and Rec. Austr. Mus., vi., 1905, p. 71. *Id.*, Stead, Fish. Austr., 1906, p. 147, and Ed. Fish. N.S.Wales, 1908, p. 85, pl. lvi. *Id.*, Ogilby, Proc. Roy. Soc. Qld., xxi., 1908, p. 25.

- Olistherops cyanomelas*, Günther, Brit. Mus. Cat. Fish., iv., 1862, p. 243. *Id.*, Castlenau, Proc. Linn. Soc. N.S.Wales, iii., 1879, p. 354. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, vi., 1882, p. 110. *Id.*, Ogilby, Cat. Fish. N.S.Wales, 1886, p. 47. *Id.*, Lucas, Proc. Roy. Soc. Viet. (2), ii., 1890, p. 33. *Id.*, Ogilby, Ed. Fish. N.S.Wales, 1893, p. 145.
- Olistherops brunneus*, Macleay, Proc. Linn. Soc. N.S.Wales, iii., 1878, p. 36, pl. v., fig. 1, and vi., 1882, p. 110.
- Olistherops brownii*, Johnston, Proc. Roy. Soc. Tasm., 1883 (1884), p. 193, and 1890 (1891), p. 35. *Id.*, Macleay, Proc. Linn. Soc. N.S.Wales, ix., 1884, p. 443.

D. xviii/9; A. iii/9; P. 11; V. 5; C. 12. L. lat. 52; l. tr. 7/15. Depth before the ventrals about 4·7 in the length to the hypural joint; head including the opercular lobe, 3·9 in the same. Eye 1·6 in the snout, and 5·8 in the head. Interorbital space equal to the length of the snout, and 3·5 in the head. Caudal peduncle almost half as deep as long. Second dorsal spine 2·5, penultimate dorsal ray 2, and pectoral 1·6 in the head.

Body rather elongate, compressed, almost evenly arched above and below. Head almost naked, only a few small scales forming a patch above the operculum. Lines of pores extend around the eye, on the snout, around the preopercular margin, and across the nape. Eye of moderate size, rounded; interorbital space slightly convex. Nostrils separated by a short space, minute, the anterior in a short tube, the posterior a simple opening near the eye. Upper jaw overhanging the lower; mouth horizontal, the opening extending a little farther back than the vertical of the anterior nostril. Teeth coalesced into two laminae in each jaw, which have crenulate edges and are peaked at their symphyses. Preopercular margin largely hidden in the membrane, only the rounded discal margin being free. Operculum produced into an angular lobe, unarmed.

Body covered with cycloid scales which commence abruptly on the nape, and increase in size as they extend backward to the tail. They cover the extreme bases of the dorsal and anal rays, and enlarged scales extend over the basal third of the caudal fin, but the pectoral base is naked. Lateral line formed of simple tubes, a little arched anteriorly, and then extending downward till it reaches the middle line of the body.

Second dorsal spine highest, the others decreasing in height till the sixteenth, which is much shorter than the eye; the seventeenth and eighteenth are longer, and are scarcely distinguishable from the rays. The rays increase in length to the eighth or ninth, and the last is divided to its base. Anal similar in form to the soft dorsal, but both its origin and termination are behind those of that fin. Pectoral inserted in advance of the dorsal origin, its second ray longest. Ventral inserted below the anterior half of the pectoral and reaching almost half its distance from the vent; the spine is slender, and there are only four rays, of which the first is longest. Caudal margin lunate, the outer rays prolonged.

Colour.—Head and body olive brown above, changing to rich orange on the sides and light salmon-colour on the belly, when in a fresh condition. Head with anastomosing dark blue lines and spots, which become pale green and less numerous on the upper surface. Each scale

of the body with a large dark blue spot, which is often elongate and coalescent with its neighbours. Spinous dorsal transparent orange-brown, with a few pale green spots on the spines; soft dorsal, anal, and caudal orange like the body, with dark blue lines and spots between the rays. Pectoral olive-brown, with blue lines and spots. Ventral orange and pink, mottled with olive. Eye light green and pale gold.

Described and figured from a specimen 294 mm. long from the snout to the end of the middle caudal rays.

Variation.—An extraordinary range of variation in the colour and marking has been recorded by both Castelnau and Stead. The male, which has been figured by Richardson, is usually dark bluish-black with a rich blue streak on each lobe of the caudal and sometimes on the pectoral also; the female is lighter in colour, and ornamented in the manner described above. But this colour marking is not constant, and Stead (1906) records a male example having all the colouration of the female.

The posterior dorsal spines resemble the rays so closely that it is difficult to determine their number, while the first two anal spines are so hidden in the membrane as to be easily overlooked. The following table illustrates some variation in these and other details.

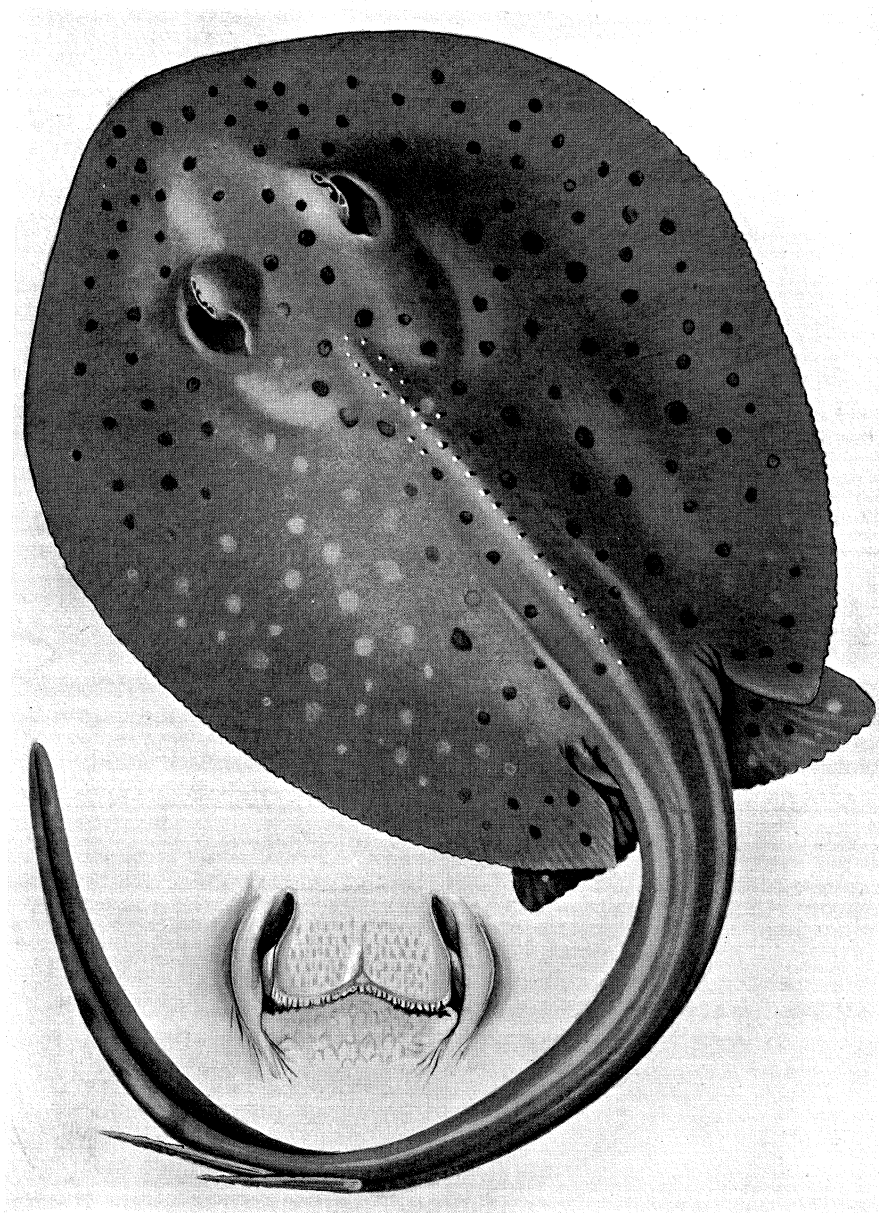
Locality	Dorsal spines & rays	Shortest spine	Anal spines & rays	Lateral line
N.S.Wales ...	26	15	iii/8	52-53
Port Jackson	27	15	iii/10	55-55
Tasmania ...	27	16	iii/9	55-56
Abrolhos Ids.	27	15	iii/9	58-56

Synonymy.—According to Richardson's original description, the type of *O. cyanomelas* had only 48 scales in a longitudinal series instead of the usual 52-58. This statement, combined with the difficulty of counting the dorsal and anal spines and rays, and also the extraordinarily variable colouration, has led to the establishment of two other specific names, *O. brunneus*, Macleay, and *O. brownii*, Johnston, both of which are apparently synonyms of *O. cyanomelas*. Castelnau regarded *O. brunneus* as a mere colour variation of *O. cyanomelas*, and though this synonymy was doubted by Macleay, it has been accepted by all later authors; the type is brown in colour without markings, but it does not differ in any structural details from the specimen here described and figured. The validity of *O. brownii*, was even doubted by its author, and I find no reason to separate it from Richardson's species.

Localities.—Several specimens are in the Australian Museum from near Sydney, one from Tasmania, and one from the Abrolhos Islands, Western Australia. The species has been recorded from Southport, Queensland, by Ogilby so that its range extends from Southern Queensland to Tasmania and south-western Australia.

EXPLANATION OF PLATE X.

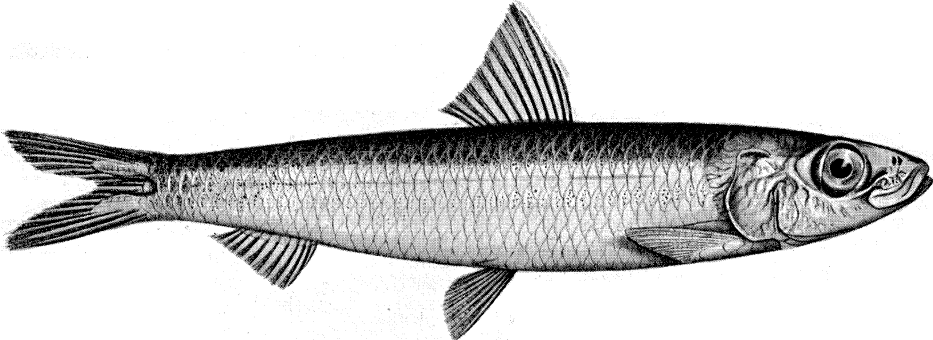
Taeniura lymma, Forskal. A female, 229 mm. wide, from Murray Island,
Torres Strait.



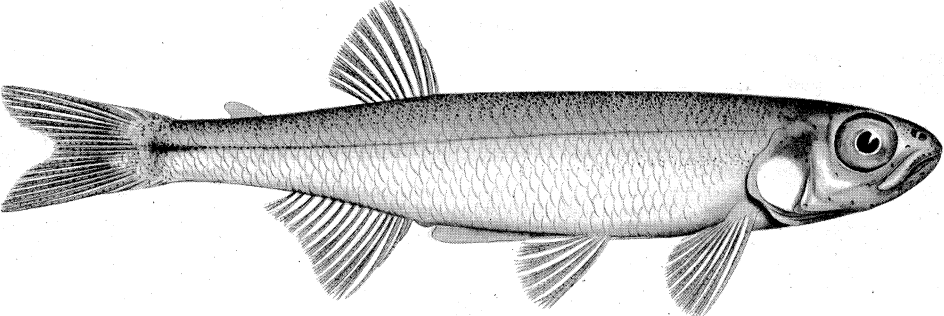
A. R. McCulloch, del.

EXPLANATION OF PLATE XI.

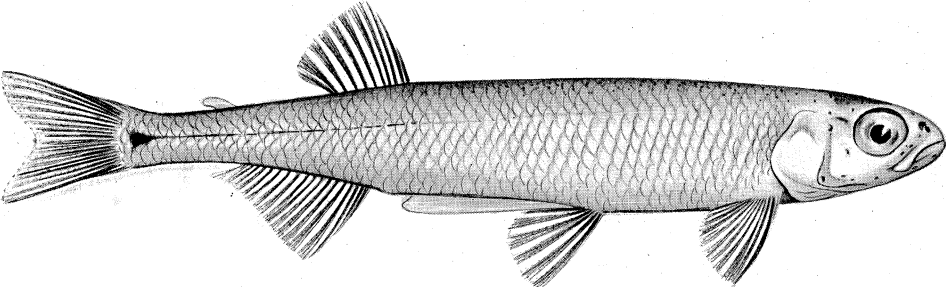
- Fig. 1. *Stolephorus robustus*, Ogilby. Lectotype, 63 mm. long, from Maroubra Bay, near Sydney.
- „ 2. *Retropinna semoni*, Weber. A specimen 41 mm. long, from Ithaca Creek, Brisbane.
- „ 3. *Retropinna semoni*, Weber. A specimen 55 mm. long, from Sackville, Hawkesbury River, New South Wales.
- „ 4. *Retropinna tasmanica*, sp. nov. Holotype, 67 mm. long, from the Huon River, Tasmania.



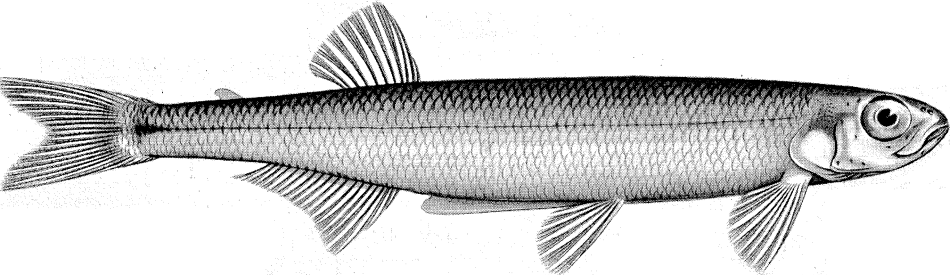
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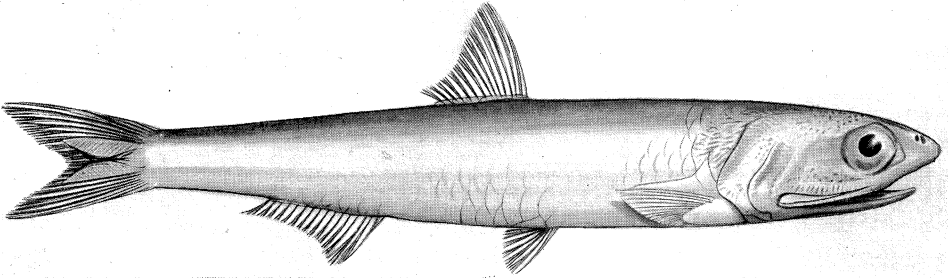


4

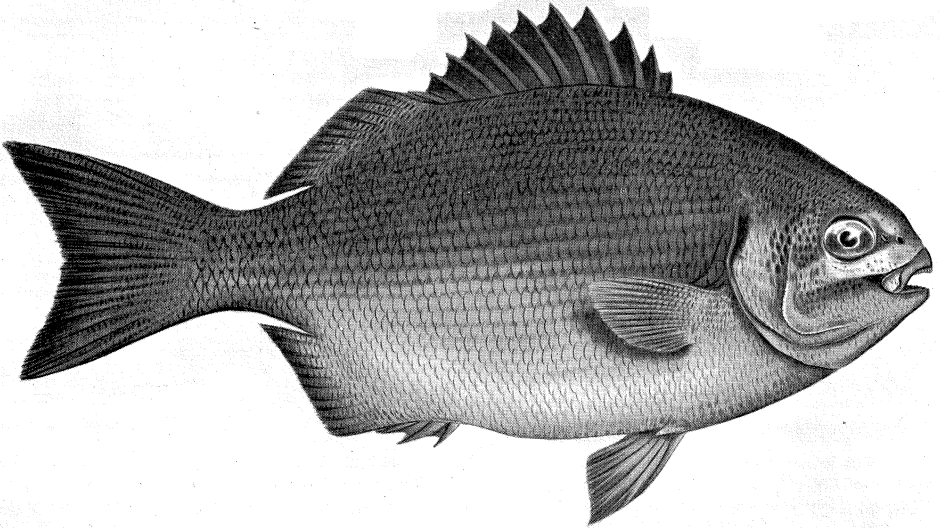
A. R. McCulloch, del.

EXPLANATION OF PLATE XII.

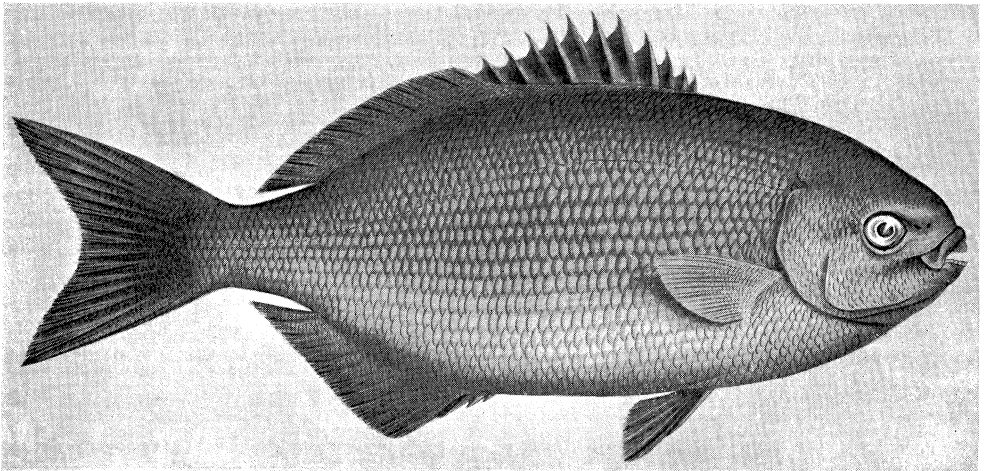
- Fig. 1. *Engraulis australis*, Shaw. A specimen 107 mm. long, from Port Hacking, New South Wales.
- „ 2. *Kyphosus sydneyanus*, Günther. A young specimen 245 mm. long, from near Sydney.
- „ 3. *Kyphosus gibsoni*, Ogilby. Holotype, 387 mm. long, from Moreton Bay, Queensland.



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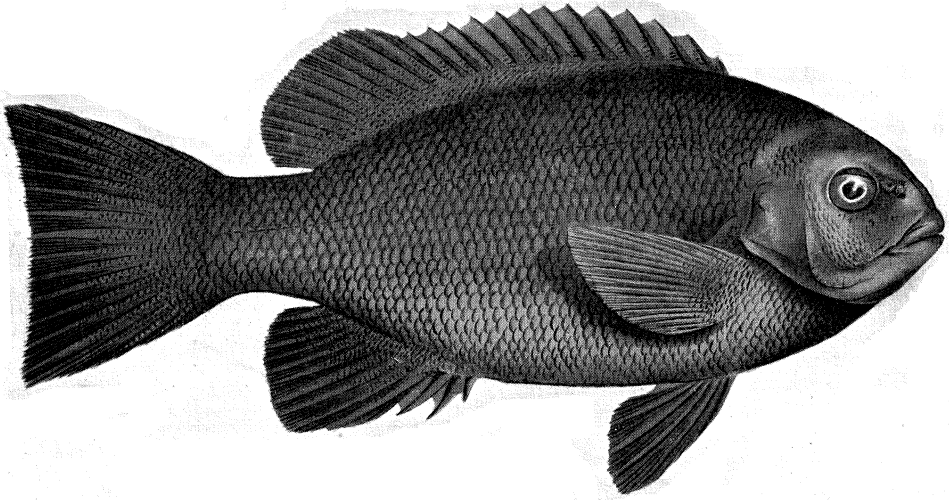


3

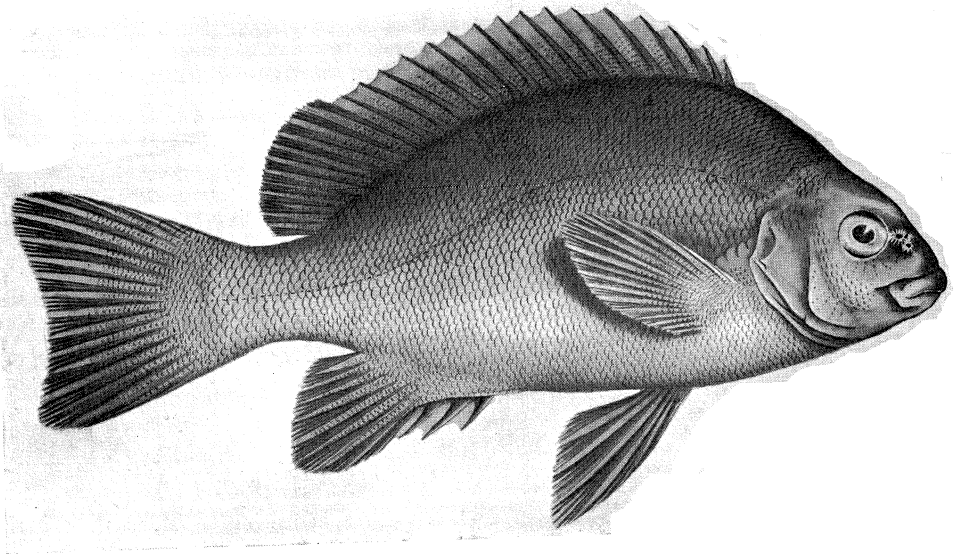
A. R. McCulloch, del.

EXPLANATION OF PLATE XIII.

- Fig. 1. *Girella elevata*, Macleay. A young specimen, 216 mm. long, from Maroubra, near Sydney.
- „ 2. *Girellops jimbriatus*, sp. nov. Holotype, 159 mm. long, from the Kermadec Islands.



1

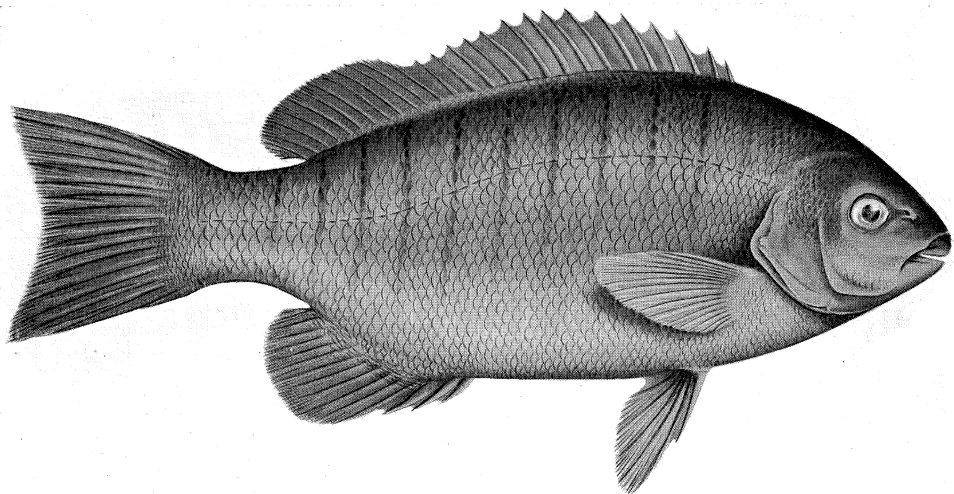


2

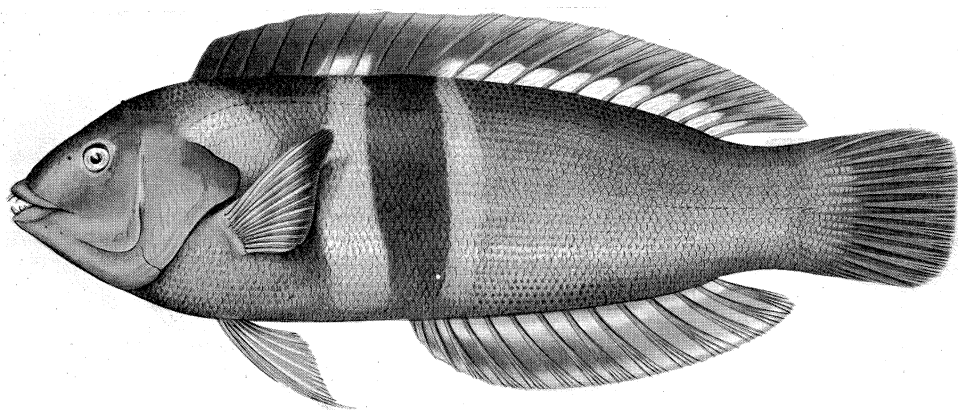
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EXPLANATION OF PLATE XIV.

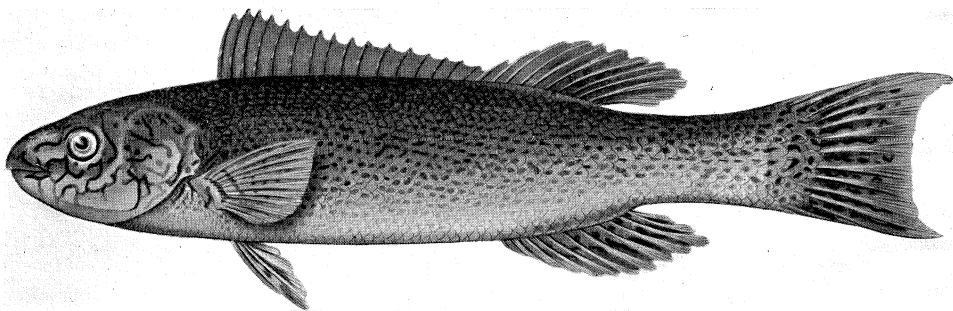
- Fig. 1. *Girella tricuspidata*, Quoy and Gaimard. A female specimen 290 mm. long, from Port Macquarie, New South Wales. The colour-marking is copied from another specimen.
- „ 2. *Coris rex*, Ramsay and Ogilby. Holotype, 404 mm. long, from Bondi, near Sydney.
- „ 3. *Olisthops cyanomelas*, Richardson. A specimen 294 mm. long, from near Sydney.



1



2



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