

Observations on some Tasmanian Fishes: Part VII.

By

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WITH 1 PLATE

ABSTRACT

Two Tasmanian records of *Lepidotus squamosus* (Hutton, 1875) (Lepidotidae) are given. *Clinus johnstoni* Saville-Kent, 1866 (Clinidae) is referred to *Peträites* Ogilby, 1885, and a key to the family is provided. *Syngnathus mollisoni* sp. nov. (Syngnathidae) and *Clinus puellarum* sp. nov. are described and figured.

[By an unfortunate mischance, the outcome of a curious train of circumstances the last contribution in this series published in the 1952 number of this Journal (Vol. 87, pp. 141-166), issued August 1953, was misnumbered Part V: it should have been numbered Part VI, Part V having appeared in the volume for 1941 (pp. 45-53), issued June 1942.]

Except where otherwise specified linear dimensions are given throughout in millimetres, the name of the unit normally being omitted.

Family SYNGNATHIDAE

Genus *Syngnathus* Linné, 1758

Syngnathus mollisoni sp. nov.

(PLATE I, FIG. 1)

Diagnosis.—Size about average for Australian species of *Syngnathus*, habit slender. Mediolateral trunk ridge not continuous with inferolateral tail ridge. Annuli 20 + 44. Dorsal with 28 rays; base not distinctly elevated, length about half distance from pectoral origin: subdorsal annuli 2·8 + 7·0. Snout about three-fifths head, about one-fourth length to vent; low rostral ridge. No opercular keel. Shields without spines. No filament above eye. Trunk about one and two-thirds, tail with fin about four, times head. Tasmania.

Description of Holotype.—Head 2·5, 2·7, 6·4, 6·6 in length to dorsal origin, vent, caudal base, caudal tip. Eye 5·6 in snout; the latter 1·7 in head. Interorbital 1·5 in eye. Length of pectoral from front of base 4·8, from middle of base 9·6, in snout. Length of a middle dorsal ray 4·8 in base of fin; the latter 3·6 in its distance from tip of snout. Caudal 6·9 in head. Width in depth at levels noted: middle of snout 1·3, front of eye 1·0, opercular margin 1·4, vent 1·3, middle of tail 1·1; maximum width in maximum depth 1·2.

Smooth, without spines. Main longitudinal ridges low, but clearly defined. Head long; in general little compressed, but with distinct lateral constriction at junction with trunk. Snout long, subequal to twice distance from middle of eye to opercular margin, less than dorsal base by about one eye-diameter; slightly compressed; at nostril about half as high again as immediately behind mouth, but no conspicuous

crest formed: in anterior two-thirds dorsal surface narrow, almost flat; thereafter each dorsolateral ridge, diverging from its fellow, swings down below middle of front of orbit, bounding narial basin inferiorly *en route*, the dorsal surface thus coming to be constituted posteriorly of two upwardly and inwardly sloping planes, enclosing an angle of 70-80 degrees: an obscure mesial ridge from tip of snout to level of nostrils, where it appears to subside, being replaced by two still more faintly indicated ridges, which rapidly diverge, and cease near posterosuperior border of orbit. Supraorbital ridge low, but distinct; continued anteriorly to posterosuperior angle of narial concavity, where it joins a very low ridge that constitutes the superior border of the basin and thereafter runs forward to meet the downswinging rostral ridge; continued posteriorly, rather faintly, to near highest point on operculum, its maximum distance from its fellow, occurring here, about half as great again as its minimum separation between midorbits. A short proconvex elevation from near point of concurrence of supraorbital, supranarial, postnarial ridges to junction of median rostral ridge with faint paired interorbital ridges. Eye moderate, diameter about one-third distance from middle of pectoral base; twice as far from ventral as from dorsal profile. Interorbital space very slightly concave: a narrow groove from end of mesial rostral ridge to level of hinder border of orbit; this groove median anteriorly, but (doubtless an individual peculiarity) posteriorly curving somewhat towards right orbit, the asymmetry thus introduced permitting of much more definite development on left than on right side of a largish fan of striae diverging from near posterosuperior border of orbit. Occiput and nape not, or barely, elevated: feeble occipital and nuchal crests, former about half latter, which is subequal to eye. Opercle moderately inflated; bounded above and in upper half of hind margin by a well-defined ridge, but wholly devoid of a horizontal keel or ridge on its surface. Gape almost vertical.

Trunk with 20 subequal annuli; somewhat compressed; shallower from about 3rd to about 6th annulus than elsewhere; depressed also for several annuli on either side of 13th. Seven trunk ridges; superolaterals (dorsolaterals), mediolaterals, midventral ending on 6th caudal, beginning of 1st caudal, front of last body, scute, respectively: inferolaterals (ventrolaterals) continuous with corresponding ridges of tail. Dorsal surface slightly, superolateral surface very slightly, convex; other surfaces virtually plane. At middle of trunk dorsal surface is subequal in transverse extent to superolateral, slightly greater than ventral, about one and one-third times inferolateral, surface. Lateral surfaces meet at about 140, ventral at about 130, degrees.

Tail with 44 annuli: in cross section trapezoidal, height slightly exceeding ventral width, which distinctly exceeds dorsal width; surfaces virtually plane, except ventral, which is gently convex. Upper ridge originating near front of last body scute (thus overlapping mediolateral trunk ridge by nearly one annulus-width), a trifle nearer superolateral than mediolateral ridge of trunk; attaining dorsal profile at 8th caudal annulus. Lower ridges continuous with, but shortly behind vent wider apart than, lower trunk ridges.

Dorsal moderate; with 28 rays, the longest (middle) subequal to horizontal extension of two thoracic annuli; base not distinctly elevated,

on 2.8 trunk and 7.0 caudal annuli, subequal in length to combined eye and snout: length to origin 2.6 in standard length, or 3.6 its own base. Pectoral with 18 rays, longest three-fourths eye; free margin rounded; base wide, oblique, not prominently ridged, rather shorter than longest ray. Anal minute. Caudal with 6 rays; length exceeding eye-diameter; pointed.

Extensively and completely sculptured; chief motifs, fan, double fan or spindle, rotula, festoon. In trunk, on dorsal surface each annulus with about 8-10 well-marked ridges, the middle 3 or 4 tolerably straight, the rest increasingly bowed outwards, the whole pattern suggestive of a blunt achromatic spindle, with equator along main anteroposterior axis of fish; a curved longitudinal ridge, exhibiting varying degrees of development in different annuli, crossing scute near, but not necessarily at, middle; annuli separated by stout ridges, most with some traces of mesial thickening, the first four with a central segment convex cephalad, the rest mainly convex caudad: on superolateral surface a rather less clearly defined spindle in each annulus, with, between successive spindles, a variously shaped, usually more or less elliptical shield, embossed centrally with a delicate rosette or rotula; a raised longitudinal line, festoon-like but convex upwards, in each annulus, lying in early and late annuli towards superolateral ridge, in other annuli near middle of pattern: on superolateral surface a broad-based upright fan; interfan shields bearing a series of spokes with or without clearly marked circular rim; fans delimited above by an inverted festoon, the annulus-wide arcs transgressing the mediolateral ridge in the middle annuli, but falling below it in the anterior and posterior body rings: on ventral surface each annulus with an escutcheon traversed longitudinally by midventral trunk ridge and crossed by a dozen transverse ridges, the anterior concave cephalad, the posterior concave caudad; at each end of line of junction between successive escutcheons a triangular or rounded buckler, delimited by well-developed ridge, and usually bearing a few radiating ridges; below, and largely hidden by, escutcheons a transverse spindle, extending in hinder annuli, where escutcheons are narrower, well beyond lateral borders of latter. In tail behind dorsal, each surface with a more or less clearly defined spindle, the pattern tending to become less evident caudad; a rotula-embossed shield between spindles on lateral surface, not, or obscurely, present on other surfaces. Nuchal shield with a subelliptical group of ridges in two fans flanking the keel: on occiput a smaller hexagonal area of radiating ridges, embracing the keel, and preceded by a still smaller median rosette. Interorbital region with some longitudinal ridging and a small amount of pitting. On lateral surface of snout four rosettes, the first (smallest) and second tolerably complete, third (largest) with inferior moiety much more extensive than superior, fourth, below nostril, an imperfect fan.

Collector observed of living specimen, 'a brown pipefish . . . looks like a piece of drift kelp'. The coloration following preservation in alcohol is as follows. Trunk (except near pectoral base) and tail without pronounced markings. Trunk with dorsal surface light, somewhat greenish brown; lateral surface above mediolateral ridge a shade lighter, less greenish than dorsal surface, below ridge lighter still;

ventral surface mostly fawn, a trifle more yellowish towards head, and darker, somewhat greenish yellow round 15th-17th annulus. Tail with dorsal surface approximately concolorous with that of trunk; lateral surface brownish fawn, lighter than any part of side of trunk; ventral surface pale, somewhat silvery fawn; longitudinal ridges darker, brownish. Nape and occiput concolorous with dorsal surface of trunk; dorsal surface of snout rather more dusky; two small obscure dark patches near middle of interorbital: side of head in general concolorous with flank; snout distinctly more dusky; lighter below eye; opercle greenish, somewhat silvery: ventral surface below eye silvery, with some median greenish, becoming dusky greenish on snout. Iris blackish externally; an ill-defined pinkish annulus surrounding pupil. Dorsal membrane translucent, faintly greenish; small patch of minute greenish chromatophores at base of majority of rays; borders of rays slenderly outlined in blackish, but body of ray virtually concolorous with membrane. Pectoral membrane almost colorless; one or both borders of each ray defined by very narrow dark-brown line. Caudal pale greenish in proximal one-third, becoming increasingly dusky distally.

The only notable color marking in the specimen as preserved is a pair of conspicuous reddish brown stripes running longitudinally along side of face, just on to trunk. Beginning near ventrolateral edge, shortly behind middle of snout, the two lines, whose summed width is subequal to their distance apart, run parallel and nearly straight backwards and upwards to meet orbit at about 8 o'clock (left eye): from 4 o'clock on posterior orbital border they continue across middle of opercle, straight and parallel save at anterior opercular margin, where they briefly divaricate: beyond opercle they extend uninterruptedly, as a short loop, on to first thoracic annulus, terminating on pectoral base. For most of their length stripes are of equal intensity, but anteriorly on snout the upper is better developed.

Dimensions.—Standard length 159.2 mm., total length 162.8. Length to origin of pectoral at front of base 25.0, at middle of base 26.5, to origin of dorsal 61.6; to termination of adpressed pectoral 27.6, of dorsal base 78.9; to vent 66.0. Head 24.8, snout 15.0, eye 2.7, interorbital 1.8. Depth (and, in brackets, width) at middle of snout 2.3 (1.8), front of eye 3.4 (3.3), opercular margin 5.0 (3.7), vent 4.9 (3.8), middle of tail 2.9 (2.6), origin of caudal 1.1 (0.9): maximum 5.1 (4.1) at 16th (18th) annulus, about 58 (63) behind tip of snout; the maximum depth of trunk (5.1) being equalled at level of back of eye if measurement includes mental prominence. Length of pectoral base 1.8, longest pectoral ray 2.1, longest dorsal ray 3.6.

Type Material.—Described and figured (Plate I, Fig. 2) from the unique holotype, collected by Mr. Bruce Mollison; deposited in the Queen Victoria Museum, Launceston: Reg. No. 1954.5.2.

Type Locality.—Off Bivouac Bay, Tasman Peninsula, south-eastern Tasmania; 25 fathoms; clean sandy bottom; 29th March, 1953; 'came up fastened to handline': other fish secured by Mr. Mollison's boat, working from Fortescue Bay, included '70 lbs. of flathead, box of perch, gurnet, cod . . . 6 doz. barracouta (and two squid)'; also one specimen of *Paraperca allporti* (Günther, 1876).

Discussion.—Four Australian species of *Syngnathus* Linné, 1758 are recorded in the check-List (McCulloch, 1929); of which one, *S. pelagicus* Linné, 1758, is doubtful, the entry apparently being based on a mis-identification—*cf.* Waite & Hale (1921)—by A. Zeitz (1908: 298) of some of Verco's material from Spencer Gulf. From these and the subsequently-described *S. tuckeri* the new species may be separated by the subjoined key. Recent fission of *Syngnathus* as understood by McCulloch would distribute *S. curtirostris* Castelnau, 1872, *S. tigris* Castelnau, 1879, *S. superciliaris* Günther, 1880, *S. tuckeri* Scott, 1942, to *Pugnaso* Whitley, 1948, *Tigricampus* Whitley, 1936 (via *Yozia* Jordan & Snyder, 1801) *Filicampus* Whitley, 1948, *Mitotichthys* Whitley, 1948, respectively—each of these genera apparently being, at date of publication, monotypic.

KEY TO AUSTRALIAN SPECIES OF SYNGNATHUS LINNÉ, 1758

- A. Mediolateral trunk ridge descending near vent to become continuous with ventrolateral tail ridge. Dorsal about equally on trunk and tail.
- B. A filament above each eye. Snout = post-orbital head. Annuli about 58.
Trunk and tail without ocellate markings *S. superciliaris*
- BB. No filament above eye. Snout > postorbital head. Annuli about 53.
Each annulus of trunk and tail with a more or less distinct lateral ocellus *S. tigris*
- AA. Mediolateral trunk ridge not continuous with ventrolateral tail ridge; terminating on side of trunk at about level of vent. Dorsal not equally on trunk and tail.
- C. Dorsal mainly on trunk; rays > 33. Trunk annuli > 22. Subdorsal annuli > 11 *S. tuckeri*
- CC. Dorsal mainly on tail; rays < 33. Trunk annuli < 22. Subdorsal annuli < 11.
- D. Trunk annuli < 39. Total annuli < 55. Opercle with faint horizontal ridge anteriorly *S. pelagicus*
- DD. Trunk annuli > 39. Total annuli > 55. Opercle devoid of horizontal ridge.
- E. Snout < $\frac{1}{2}$ head. Head 3-4 in trunk. Dorsal base 3-4 in trunk. No brown facial stripe *S. curtirostris*
- EE. Snout > $\frac{1}{2}$ head. Head 1-2 ($1\frac{2}{3}$) in trunk. Dorsal base 2-3 ($2\frac{2}{3}$) in trunk. Double brown stripe on hinder snout and opercle *S. mollisoni*

From the New Zealand *S. norae* Waite, 1911, with which it has much in common, including a longitudinal brown face marking, *S. mollisoni* differs notably in lacking the former's characteristic color pattern on trunk and tail, and in having 10-12 more dorsal rays, but some 4-7 fewer trunk annuli. Of the four Australian species of *Leptonotus* Kaup, 1853 (in which only females differ trenchantly from *Syngnathus*), three—*L. blainvillianus* (Eydoux & Gervais, 1837), *L. caretta* (Klunzinger, 1879), and *L. (Kaupus) costatus* Waite & Hale, 1921—differ at sight from *S. mollisoni* in having snout less than half head, and head twice, or more than twice, in trunk; while compared with *L. semistriatus* Kaup, 1856, with which it agrees in many points, our form has 10-12 fewer dorsal rays and 3-5 fewer trunk annuli. *S. mollisoni* makes a rather close approach to *Corythoichthys pæcilolæmus* (Peters, 1869)—which has been referred by Whitley to *Parasyngnathus* Duncker, 1915—but is clearly distinguished from that species by the two main features in respect of which *Syngnathus* and *Corythoichthys* have commonly been

held to stand in contrast: the new species wholly lacks the opercular ridge, and it is of decidedly more slender habit, having maximum depth of trunk proper 3.5 in dorsal base, 1.4 in postorbital or 5.0 in total head, and equal to anteroposterior extent of about 2.5 thoracic annuli, compared with 2.0-2.3, 1.0-1.1 or 3.5-3.9, and about 3.0-3.5; further, neither species shows any of the markings occurring in the other.

Remarks.—The species is named in honour of the collector, Mr. Bruce Mollison. Mr. Mollison has noted a curious habit shown by this fish of which I do not recollect any mention in the literature. Amplifying an entry in his diary, 'clicks head backwards like a flip-beetle', he observes in a letter, 'That pipefish "clicked" happily long after I caught him—jerking his head stiffly backwards and then slowly forwards, and so on in a really foolish manner that it gave one a headache to see'. An accompanying series of four rough sketches shows: first, pipefish with head (and neck?) bent sharply back virtually at a right angle with trunk—with notation 'click'; second, head and trunk in normal relative positions; third, fourth sketches like first, second. There is of course at the moment no evidence available as to whether this behaviour-routine is a specific characteristic or merely an individual or pathological peculiarity. In the preserved specimen the anterior 35 mm. or so (*i.e.*, to about 4th annulus) can be bent back fairly readily till it is normal to the rest of the fish.

Family LEPIDOTIDAE (BRAMIDAE *olim*)

Genus *Lepidotus* Asso, 1801

Lepidotus squamosus (Hutton, 1875)

- Toxotes squamosus* Hutton, 1875, Ann. Mag. Nat. Hist. (4), XVI: 313. Type locality: Cook Strait, New Zealand.
 [non] *Sparus raii* Bloch, 1791, Nat. aush. Fische, v: 95, pl. CCLXXXIII. Type locality: Northern Seas [= England].
Brama raii (Bloch). Castelnau, 1879, Proc. Linn. Soc. N.S.W., III: 352. McCulloch, 1929, Mem. Aust. Mus. Sydney, v. 11: 194. And Australian authors generally.
Brama rayi (Bloch). McCoy, 1887, Prodr. Zool. Vict., dec. XIV: 127, pl. CXXXIII.
Lepidotus squamosus (Hutton). Whitley, 1938, Aust. Zool., 9, 2: 193.

Status.—Ray's Bream (named after John Ray), or the Pomfret, is usually called *Brama raii* (Bloch, 1791), and its few Australian appearances have been recorded under this name. Whitley (1938), who has devoted a paper to this species and its allies in Australia, considers there is a distinct Australian and New Zealand form, which should be known as *Lepidotus squamosus* (Hutton, 1875).

Tasmanian Records.—In July, 1953, Mr. J. B. Ralston, Mowbray Park, Mella, forwarded to the Queen Victoria Museum, Launceston, for identification photographs of a fish caught south of Temma, West Coast, during April: the specimen, which weighed about four pounds, appeared to be stranded in about a foot of water, and was caught with a knife. From an examination of these photographs and from consideration of additional information supplied by Mr. Ralston in reply to a questionnaire, there seems little doubt the fish was this species.

On 27th November (after the above record had been made in the MS of the present paper) there appeared in the Launceston *Examiner* a report, accompanied by a photograph, of a second specimen, obtained by the *Liawenee*, the research vessel of the State Fisheries Division.

In response to an inquiry regarding the most convenient procedure in making a record of the occurrence of this species in our waters, Mr. M. M. Hodgson, Biologist, Fisheries Division, Department of Agriculture, has expressed the wish that the two captures should be noted in the present account, and I am indebted to his courtesy for the following details about the second example: caught on a long line in 250 fathoms E.S.E. of Fortescue Bay, Tasman Peninsula, 20th November, 1953; length to caudal fork 520 mm.; preserved in freezer on board the vessel, and later donated to the Tasmanian Museum, Hobart.

Remarks.—The species, which is rare and sporadic, has been recorded from New South Wales—a record by Castelnau, the validity of which was doubted by McCulloch (1927); Victoria, where it occurred in considerable numbers in April, 1884 (McCoy, 1887); Lord Howe Island; New Zealand: the capture, within a few months, of two examples in Tasmanian waters is of interest.

Family CLINIDAE

In a previous key (1939) the local Clinidae as then known are diagnosed along with the Blenniidae. The invalidation of the entry there given for '*Clinus johnstoni*' consequent upon the recognition of this fish as a *Peträites* (see below), and the addition here of a new species of *Clinus* render expedient the provision of a revised synopsis. (In the 1939 key number of spines in second dorsal of *C. perspicillatus* appears as XXII-XXIV, a misprint for XXXII-XXXIV.)

In the subjoined synopsis entries marked * are valid for Tasmanian, but not necessarily for all Australian, species.

KEY TO CLINIDAE RECORDED FROM TASMANIA

- A. Three distinct dorsal fins: first spinous (III), second spinous (XIV-XVI)*, third soft (10-12)*. Lateral line with anterior section running parallel to dorsal profile to below third dorsal (*i.e.*, for about half standard length); a posterior section, if present, separate, in the form of a secondary series of incised scales extending from caudal base along middle of tail.
- B. Head naked *Tripterygion*
 [D. III, XVI, 11. A. 23. Teeth villiform; several in
 maxilla caniniform. Total length about 75] *T. clarkei*
- BB. Head scaly *Gillias*
 [D. III, XIV, 10-12. A. I, 21. Teeth in jaws sub-
 equal] *G. macleayanus*
- AA. Two dorsal fins, separate or connected by membrane: first spinous (III), second mixed (XXVI-XXXVII, 3-8)*. Lateral line continuous: with an anterior segment in upper one-fourth of side, subparallel for about one-fourth standard length, then dipping down, behind pectoral, and continued (with more widely spaced pores) along mid-flank to caudal peduncle.
- C. First dorsal spine inserted over, or in front of, eye. Orbital tentacle long, simple. Minimum depth of caudal peduncle $< \frac{1}{2}$ its length (from anal membrane to level of hypural) *Cristiceps*
 [First spine behind middle of eye, about twice third
 spine. D. III, XXVI-XXIX, 6-8. A. II, 24-26. Total
 length about 100] *C. australis*
- CC. First dorsal spine inserted behind eye. Orbital tentacle with some lobes*. Minimum depth of caudal peduncle $> \frac{1}{2}$ its length (measured as for C).

- D. Membrane of third dorsal spine free of first spine of second dorsal or connected only to its base. Ventral origin behind last spine of first dorsal*. Maxillary to about level of hinder margin of orbit or beyond it*. Total length about 250-400* *Petraites*
- E. First dorsal spine > third spine, about twice first spine of second dorsal, $\leq \frac{1}{2}$ longest ventral ray. Maxillary to, or nearly to, posterior margin of orbit. Tentacle of anterior nostril minute ($\leq \frac{1}{2}$ of orbital tentacle), not reaching to lip; carried towards eye, falls far short of orbit. Orbital tentacle slender, elongated, with a few small lobes; adpressed, reaches first dorsal spine. Teeth behind anterior villiform patch cardiform in both jaws; in upper jaw about 14-18 behind each villiform patch. Depth of caudal peduncle about = its length (see C). D. III, XXVIII-XXIX, 4-5. A. II, 23-24. Total length about 275 *P. forsteri*
- EE. First dorsal spine \leq third spine, subequal to first spine of second dorsal, about = longest ventral ray. Maxillary to beyond posterior margin of orbit. Tentacle of anterior nostril large (about = orbital tentacle), tubular, surmounted by about 6 long filaments overhanging mouth; carried towards eye, reaches orbit. Orbital tentacle broad, much branched; adpressed, reaches about halfway to first dorsal spine. Teeth behind anterior villiform patch caniniform in both jaws; in upper jaw about 5-8 behind each villiform patch. Depth of caudal peduncle about = $\frac{1}{2}$ its length (see C). D. II-III, XXXII-XXXIV, 5-6. A. II, 25-27. Total length about 400 *P. johnstoni*
- DD. Membrane of third dorsal spine connected to about middle (or slightly below middle?) or to upper half of first spine of second dorsal. Ventral origin in advance of last spine of first dorsal*. Maxillary to about level of middle of eye. Total length about 50-100* *Clinus*
- F. First dorsal connected to about middle of first spine of second dorsal. Orbital tentacle large, with about 5 fingerlike processes. Pectoral to level of vent. D. III, XXII-XXXIV, 3-5. A. II, 24-26. Total length about 100 *C. perspicillatus*
- FF. First dorsal connected to top of first spine of second dorsal. Orbital tentacle small, with 1 or 2 minute flat lobes. Pectoral fails to reach level of vent. D. III, XXXV-XXXVII, 5. A. 11, 29. Total length about 50 *C. puellarum*

Genus *Petraites* Ogilby, 1885

Petraites johnstoni (Saville-Kent, 1866)

Clinus johnstoni Saville-Kent, 1866, Rept. Fish. Dept. Tasm., 1866 : 13. Type locality: Adventure Bay, Tasmania.

Clinus johnstoni Saville-Kent. Saville-Kent, 1867, Pap. Proc. Roy. Soc. Tasm., 1886 : XXXIV and 121. Johnston, 1891, Pap. Proc. Roy. Soc. Tasm., 1890 : 33. McCulloch, Proc. Linn. Soc. N.S.W., XL, 2, 158 : 273, pl. XXXVII, fig. 2. Scott, 1935, Pap. Proc. Roy. Soc. Tasm., 1934 : 69.

Status.—McCulloch (1915), with two specimens 227, 341 long before him, stated 'membrane from last [spine of first dorsal] extends about one-third up the spine of the second dorsal'. In three individuals of standard length 239, 297, 353 I find first spine of second dorsal measures 17.4, 19.0, 10.3, while membrane from first dorsal extends 4.6, 5.0, 3.8 up spine, *i.e.*, for 26, 26, 37 per cent of spine-length.

The relations between *Clinus* Cuvier, 1816, *Cristiceps* Cuvier & Valenciennes, and *Peträites* Ogilby, 1886, which last was proposed—following a suggestion by Macleay (1882 : 20)—to accommodate the species 'which oscillate between the two [other] genera', are not very satisfactorily defined. The question has been discussed by McCulloch (1908), who suggested that species with first dorsal spine over, or in front of, eye should be placed in *Cristiceps*, while species with that spine behind eye should be referred to *Peträites* if third spine is connected to 'basal portion only' of first spine of second dorsal, and to *Clinus* if the connexion is to 'the middle or upper half'. In the orthotype of *Peträites*, *P. heptæolus*, however, the first dorsal at times barely reaches the second dorsal, and the scope of the genus probably could profitably be extended to cover all stages between, and including, connexion up to first half of dorsal spine and non-connexion.

McCulloch's observations together with the fresh data cited above make it clear that Saville-Kent's fish, hitherto regarded as a *Clinus*, is really a *Peträites*.

With a number of the Clinids described early remaining unrecognised, our knowledge of the group is still somewhat sketchy: but it begins to look as if in *Cristiceps* the first dorsal is elevated, in *Clinus* not elevated, above the second dorsal, with *Peträites* here also ambivalent.

Genus *Clinus* Cuvier, 1816

Clinus puellarum sp. nov.

(PLATE I, FIGURE 1)

Diagnosis.—In general facies approaching *C. perspicillatus* Cuvier & Valenciennes, 1836. D. about XXXVIII-XL (III, XXXV-XXXVII), 5. A. about II, 29. First dorsal originating slightly behind posterior border of preoperculum; its spines subequal, not noticeably higher than anterior spines of second dorsal, its membrane joined to top of first spine of second dorsal, the free margins of the two fins continuous, with a very slight dip above 'interdorsal': rays somewhat elevated above spines, 3rd, 4th, 5th a trifle closer together than 1st, 2nd, 3rd; last united by membrane to caudal base. Membrane of anal moderately incised; briefly attached to caudal peduncle. Orbital tentacle small; surmounted by one or two small flat lobes. Tentacle of anterior nostril with one flat appendage. Teeth in both jaws in an anterior patch, followed by a single row; all teeth subequal, no outer caniniform row in upper jaw: vomerine patches not contiguous. Maxilla to below about middle of eye. Interorbital more than half diameter of eye. Adpressed pectoral fails to reach level of vent. Interval between middle of vent and hinder base of ventral exceeds length to latter point. Head and trunk in general more or less uniform brown, with some lighter areas below dorsal base: no recognizable cross bars, no dark spot below first dorsal. Apparently small (ca 50 mm.) Tasmania.

Description of Holotype.—B. 6. D. XL (III, XXVII), 5. A. II, 29. P. 13. V. I, 3 (spine hidden). C. 12 + $\frac{5}{8}$. Myotomes ca 16 (12 post-pectoral) + 36, last few highly angulate. Standard length 1.1 in total length. Maximum depth, occurring about level of 3rd anal ray, 5.8 in standard length, subequal to length to origin of dorsal; depth at vent 6.0 in standard length, slightly exceeding length to insertion of ventrals.

Head to end of operculum (hereinafter, 'bony head') 4.3 in standard length, one-fourth length to anal termination; head to end of opercular flap ('total head') 3.9 in standard length, less than half anal base. Eye 4.4 in total head. Snout without lips ('simple snout') 1.7, total preorbital length ('full snout') 1.2, in eye. Interorbital 1.7 in eye (horizontal diameter). Length to vent 2.5 in standard length, slightly exceeding thrice postorbital bony head. Depth of caudal peduncle 4.1 in bony head, equal to eye, subequal to distance from base of last dorsal ray to level of hypural joint. Total head, trunk, tail 26, 15, 59 per cent of standard length.

Trunk and tail elongate, compressed. Width immediately behind pectoral base, at vent, at middle of caudal peduncle 1.5, 2.0, 8.0 in depth at these points. With general sense of dorsal profile horizontal, ventral profile descends tolerably evenly to just beyond vent, after which it rises in a curve of increasing steepness: caudal peduncle tilted upwards, bringing tips of highest caudal rays about to level of tips of dorsal rays. (Some upturning of caudal peduncle is not uncommon in formalin specimens—usually not present, or slight, in spirit material—of *Clinus perspicillatus*: and in present species peduncle is probably carried more or less horizontally in life.)

Head subconical: width at front of eyes 3.0 in total head, slightly less than depth there, subequal to distance from lowest point on orbit to tip of orbital tentacle; at level of dorsal origin 1.8 in total head, slightly less than depth there, subequal to extension beyond opercular angle of first segment of lateral line. Simple snout short, subequal to distance from tip of maxilla to orbit: viewed laterally, gently convex; viewed superiorly, bluntly rounded. Mouth moderate, oblique, its cleft at about 30 degrees to the horizontal: upper lip large, tumid, bounded above by deep sulcus; extending beyond tip of simple snout by more than half its own shortest distance from orbit; rounded, but scarcely expanded, free end of maxillary reaching to below 0.4 of eye; lower lip less tumid than upper, but projecting slightly beyond it. Eye moderate; wholly in anterior half of total head; not cutting dorsal profile. Interorbital decidedly less than eye; strongly convex, but with mesial longitudinal depression, extending from level of pore between anterior and posterior nostrils to level of orbital tentacle. Gill-covers expanded; united for two-thirds of their anteroposterior extension, almost to insertion of ventrals; forming a free fold across isthmus. Gill-openings large, more than thrice height of pectoral base; separated by less than eye-diameter. Preoperculum with upper posterior margin subcutaneous; its angle, up to just beyond which it is free, broadly rounded. Operculum unarmed: its fleshy lobe broad, falcate. Anterior nostril tubular; its height about twice its anteroposterior, which somewhat exceeds its transverse, diameter; surmounted posteriorly by a single simple ovate or obovate lobe, subequal in length to anteroposterior axis of supporting tube, directed upward, forward, slightly inward; the total height subequal to width of upper lip; inserted between 9 and 10 o'clock, relative to middle of eye (left side); about thrice as far from orbit as from anterior margin of preorbital: internarial distance subequal to distance from nostril to orbit. Posterior nostril a very short backwardly and inwardly directed tube,

the anterior wall decidedly oblique, much longer than posterior wall; located at a little earlier than 11 o'clock, its distance from its fellow subequal to its distance from anterior nostril, and to its distance from orbital tentacle. Orbital tentacle at top of orbit, its origin slightly nearer to tip of full snout than to origin of dorsal; its base inserted almost wholly on the eye itself, the anterior line of attachment running inward and very slightly forward; compressed, along main axis of fish, to paper-thinness; length about thrice base, subequal to total length of anterior nostril: left tentacle cleft for about half its length into two subequal erect, moderately pointed lobes; right tentacle with one large falciform outer lobe, with at its base a minute inner lobe (result of injury?).

Teeth in upper jaw comprise, on each side: first, an anterior elongated subtriangular patch (outer margin curved to follow line of jaw), separated from its fellow in other half of jaw by about twice a tooth interval, extending to just beyond middle of jaw, its maximum width about one-fourth its length, the teeth stout, conical, some somewhat recurved, widely spaced, about 12 in outer row, about 10 in inner row, and about 12-14 in from one to (anteriorly) three irregular others rows; secondly, from posterior angle of patch a single row of about 6. All teeth in upper jaw subequal; no outer caniniform row. Mandibular teeth in each ramus: first, an elongate ovoid group, virtually continuous at its anteroexternal tip with its fellow, extending for two-fifths of length of jaw, comprising about 12 teeth, in part in three rows; secondly, a following line of 3 or 4: teeth in lower jaw subequal to one another and to those of upper jaw. Vomerine teeth standing on, but not defining the outline of, two ovate-acuminate slightly raised granular regions, widest internally, each about one-fourth as long as one dentigerous triangle of jaw; these patches just contiguous, but nearest teeth of the two elements well apart: each set of 6-8, subequal to one another, a little more widely spaced, and a trifle larger, than those of jaws.

A deep frenum across upper jaw, extending mesially to level of vomer, laterally to behind last tooth, its free margin deeply excavate; beset with numerous dermal tubercles, subequal in size, and more or less similar in shape, to teeth. Tongue largely adnate; narrowing anteriorly to form a partly free, rather bluntly rounded lobe, its width, which is about one-third maximum width of tongue, somewhat less than its length: whole upper surface with closely-set papillae, extending, in adnate portion, just on to lateral surfaces, so that, viewed from above, outline here becomes denticulate.

Head with numerous open pits, including, on each side: circumorbital ring of 7, anterior preorbital arc of 3, infraramal line of 4, preopercular series of 7 comprising short upper arc of 3 and longer lower arc of 4, 2 upper genal immediately in advance of upper preorbital, 5 running from behind anteroposterior border of eye to near origin of lateral line and thence forward and upward towards dorsal profile shortly in advance of level of first dorsal spine: also one median nuchal pore. Lateral line comprising a short conspicuous earlier superolateral segment and a long inconspicuous later mediolateral segment. Anterior segment originating just behind level of 2nd dorsal spine, proceeding in an arc, gently convex upward, to level of 11th spine of combined dorsal, and then running down and back in a spur of several tubercles; nearest approach to dorsal profile,

occurring above hind border of pectoral base, equal to half maximum departure of non-spur portion from dorsal profile; tubercles well-marked, heavily pigmented mounds, with basal diameters subequal to their interspaces; pores 25 on left side, 24 on right, one to each mound, always with some rim (usually crenulate), and in larger, more anterior tubercles with distinct chimneys; modal diameter of pore 120 μ , mean pore-interval 380 μ . Posterior segment scarcely recognizable without lens; pores not in mounds, without noticeably elevated rims; an oblique downward series of 4 from end of anterior segment, the last below 14th dorsal spine; thereafter a mediolateral series of about 38 to near caudal base, the later ones very small.

Covered everywhere, except on head, nape, inner pectoral base, with small cycloid scales, more or less buried in skin: in closely set, sometimes contiguous, but not or barely imbricating, rows on most of trunk and tail, but less densely, and more irregularly disposed towards, and on, caudal peduncle, where area of interspace may exceed area of scale: sc.l., approximately 150; sc.tr., at level of end of adpressed pectoral, about 10 to tip of anterior segment of lateral line, followed by about 30, but exact counts scarcely practicable.

The superior margin of the dorsal fin is so nearly continuous throughout that if continuity of membrane be taken as the criterion of unity it can be regarded as a single fin: at the same time, the 3rd-4th spine interval, though small, exceeds any other interspine distance, and can be regarded as the characteristic interdorsal of the genus.

Dorsal treated as single fin: length to origin 1.5 in total head, subequal to depth at vent; first spine inserted very slightly behind level of hinder border of preoperculum, equidistant from tip of opercular lobe and base of orbital tentacle; base 1.1 in standard length; lengths of spines (without membranous pencils) subequal in first 6 (3rd > 1st: 4th > 5th > 2nd: 6th; shortest = 1.1 longest), about an eye diameter, thereafter increasing regularly, with 20th spine 1.3, 40th (last) 1.9, times 1st; anterior spines differentially spaced, the 2nd, 3rd, 4th, 5th interspaces (spine-base to spine-base) being 1.6, 2.0, 1.5, 1.5 times 1st interspace; membrane dipping very slightly anteriorly, lowest between 4th and 5th spines, where its minimum oblique height, measured parallel to these spines, is 0.8 of their mean length, or 1.1, 1.2 in corresponding measurements for membranes linking 3rd and 4th, and 1st and 2nd spines; tips of all spines with backwardly directed pointed membranous pencils; rayed portion of fin elevated somewhat above spinous portion, its longest (3rd) ray 1.4 longest (40th) spine, its base about two-fifths its maximum oblique height; 3rd, 4th, 5th rays equidistant, their intervals a trifle less than intervals between 1st, 2nd, 3rd, which are equal *inter se* and to those between posterior spines; last attached to base of caudal by membrane extending behind level of hypural by about length of anterior nostril; tips with membranous lobes broader than those of spines.

Dorsal treated as two fins: base of first 24.1 in base of second, equal to simple snout; interdorsal 1.4 in first dorsal base, about half depth of caudal peduncle; second dorsal originating at level of confluence of superior margin of opercular lobe and auriform end of subvertical post-pectoral fold, length to its first spine 3.6 in its own base, subequal to interval between hinder aspect of ventral base and middle of vent.

Anal fin originating below 15th spine of combined dorsal, length to its origin 2.4 in standard length, half base of composite dorsal; terminating about one eye-diameter in advance of dorsal termination; base 1.8 in standard length; behind the two shortish spines, fin subequal in height, somewhat higher than dorsal, to within last half dozen rays, which are somewhat elevated, the local increase in height thus paralleling increase of rayed over spinous dorsal; membrane markedly incised anteriorly, only shallowly excavate posteriorly; last ray joined to caudal by narrow slip of membrane.

Pectoral fin somewhat pointed; length to its origin 4.4 in standard length; all rays simple; membrane excavated moderately between upper rays, boldly between lower; longest (6th) ray 7.5 in standard length; adpressed fin extending to below 12th dorsal spine, failing to reach level of middle of vent by more than half an eye-diameter. Ventral fins almost contiguous basally, inserted very slightly in advance of level of first dorsal spine; length to origin 6.4 in standard length; extending about two-thirds of distance from origin to vent; estimated length of spine, hidden in flesh, 3.3 in total head; 1st and 2nd rays 2.1, 1.5 in total head, conjoined for more than half length of longer; 3rd (innermost) ray small, weak, 7.6 in bony head, free for about one-sixth of its length. Caudal somewhat obliquely truncate; all rays simple, upper slightly longer than lower; longest (4th, 5th) 1.8 in total head.

Sides of trunk and tail in general almost uniform dark-brown, with a hint of purple; a trifle lighter, more reddish behind pectoral base: at six points along dorsal profile, immediately subtending fenestrae in fin, small irregular regions in which color is somewhat lighter: ventral surface of trunk mid-brown, rather paler, more reddish anteriorly, touched with purplish posteriorly; brownish white at vent; ventral surface of tail, which is scarcely wider than anal base, concolorous with flank. Side of head brown, about concolorous with flank superiorly, progressively lighter inferiorly; in much of lower half delicately vermiculated with pinkish fawn and pinkish grey; a little more ferruginous below and behind eyes: two short indefinite darkish spokes from orbit, round 2 and 4 o'clock (left side), a more obscure dark patch near 9 o'clock. Eye dark purplish; a lunule of pinkish brown concentric with much of lower, and part of anterior, border of orbit. Dorsal surface of head mostly dark-brown; an ovoid lighter occipital patch, partly bordered laterally by upper postorbital dark spoke. Ventral surface of head greenish brown, palest along borders of isthmus. Branchiostegal membrane pale, almost translucent greyish. Anterior nostril and its distal lobe flesh colored, minutely punctulated with brownish. Orbital tentacle pale brownish, approaching flesh; blotched proximally with dark-brown.

Membrane of dorsal in general dark, somewhat reddish brown, pigmentation more intense and net result less ferruginous caudad: in second dorsal six irregular fenestrae, the earlier light orange, the later pale amber, occurring approximately at interspinous intervals 1.0-2.5, 6.0-7.5, 12.0-13.5, 19.0-20.5, 27.5-29.5, 35.0-36.0, decreasing in size, particularly in vertical extent, caudad: in first dorsal pigmentation greatest in 1st, least in 3rd (interdorsal) spinous interval: whole fin, especially in posterior half, lighter proximally than distally; dark, almost black blotches between outer halves of rays, the markings progressively decreasing in size and intensity, traceable cephalad for one-third length of fin,

or more: indications in places of a narrow orange marginal band: spines and rays silvery, their color largely hidden by the sheathing membrane; their distal pencils white. Membrane of anal dark-orange, very heavily punctulated with blackish brown; a dark stripe, widest distally, behind each ray, the marking best developed posteriorly; tips of rays white. Pectoral membrane with ground color very pale, translucent: upper 4 or 5 rays greenish in basal one-third, thereafter almost colorless; other rays pale greenish, the color deepest in middle rays; whole base blotched heavily with dark-green, involving about one-third of upper, half of middle, more than half of lower, rays; traces of two or three greenish cross bars on central, scarcely distinguishable on upper, rays. Ventral with first (innermost) ray grey, minutely blotched, except on ashen tip, with brownish green: other rays dark greyish lavishly mottled with green up to, and slightly beyond their bifurcation, just below which the green shows indications of forming a darker ring, and beyond which a gradual decrease and final cessation of the pigmentation leaves about one-fifth of whole length clear, faintly pinkish; a small whitish spot on inner surface of base, thrice its own diameter from insertion of fin. Caudal membrane dark-brown, virtually uniform except for distinct white subtriangular patches at tips of rays and basal subcircular whitish spot: rays concolorous with, or slightly darker than, membrane proximally, darkening distally to become, in middle rays, almost black.

Differences Exhibited by Paratype.—A paratype agrees in general fairly closely with the rather larger holotype. Chief differences: (a) two fewer spines in second dorsal (D. III, XXXVII, 5); (b) maxilla to 0.6 of eye; (c) caudal less elevated, longer absolutely, 5.7 in standard length; (d) coloration a great deal lighter, the ground color yellowish brown punctulated profusely with reddish brown and blackish, some elements of color pattern obscure or indistinguishable. The marked difference in general color between holotype and paratype is attributable primarily to the degree of expansion of the chromatophores, which are contiguous or virtually so in former, but several times their own diameter apart in latter.

Dimensions.—The principal dimensions (in mm.) of the holotype are as follows. Standard length 52.0, total length 59.2. Head to end of operculum 12.2, to end of opercular flap 13.3. Eye 3.0; interorbital 2.0. Snout with upper lip 2.5, without 1.8. Length to middle of vent 21.1. Depth (and, in brackets, widths) at points specified: front of eye 4.6 (4.4), origin of dorsal 8.0 (7.5), immediately behind pectoral base 8.0 (5.5), vent 8.7 (4.3); maximum depth 8.9, at about 5 behind vent. Depth of caudal peduncle 3.0. Dorsal: lengths to origin, termination 8.6, 52.4; base of first dorsal 1.7, interdorsal 1.2, base of second dorsal 40.9; lengths of 1st, 2nd, 3rd spines of first dorsal 2.3, 2.5, 2.2, of 1st, 2nd, 3rd, 17th, 37th spines of second dorsal 2.3, 2.4, 2.5, 3.1, 4.3; interspaces of first dorsal 0.60, 0.95, interdorsal 1.20, first interspace of second dorsal 0.90; oblique heights of 1st, 3rd, 5th rays 5.8, 5.9, 4.0. Anal: lengths to origin, termination 21.7, 49.9; lengths of 2nd spine, 5th ray, 25th ray 3.0, 4.2, 4.8. Pectoral: length to origin 11.9; longest (6th) ray 6.9. Ventral: length to insertion 8.1; spine *ca* 4, 1st, 2nd, 3rd rays 6.1, 8.2, 1.6. Longest caudal ray 7.4.

Five scales: lengths 210, 280, 240, 270, 270, mean 254 μ ; respective widths 180, 250, 190, 270, 270, mean 232 μ .

Paratype: standard length 45.6, total length 53.6 mm.

Type Material.—The holotype was collected by Miss B. McCormick, Miss J. Paterson and Miss B. Townsend. It is deposited in the Queen Victoria Museum, Launceston: Reg. No. 1954.5.1. The single paratype, which was recognized as belonging to this species during the working-over of some general material in the Aldie Museum, the private museum of Mr. Peter Mercer, Launceston, was collected by Mr. Mercer. It will be offered to the Australian Museum, Sydney.

Type Locality.—The holotype was collected in a rock pool at East Beach, Low Head, Northern Tasmania, on 21st February, 1952: species associated with it included *Clinus perspicillatus* Cuvier & Valenciennes, 1836, *Volgiolus cardinalis* (Ramsay, 1882), *Pictiblennius tasmanianus* (Richardson, 1839) in adult and prepigmentation stages, *Alabes rufus* (Macleay, 1881). The paratype also came from Low Head.

Discussion.—Of the three species of *Clinus* Cuvier, 1816, recorded in the Check-List (1929), one, *C. marmoratus* Klunzinger, 1872 (type locality Port Phillip), does not seem to have been encountered by local workers; the others, *C. perspicillatus* Cuvier & Valenciennes, 1836, and *C. johnstoni* Saville-Kent, are known from Tasmania, the former also from Victoria and New South Wales (and—*vide* Waite (1923)—South Australia). Reasons have been given earlier in this paper for relegating *C. johnstoni* to *Peträites* Ogilby, 1885.

The new species differs from both *C. perspicillatus* and Saville-Kent's fish in the following features: membrane of first dorsal attached to top of first spine of second dorsal (to about middle, *C. perspicillatus*; to lower one-third, *C. johnstoni*): more dorsal rays, 38-40 (*cf.* 35-37; 34-36), more anal rays, 29 (24-26, 25-26); orbital tentacle small, with one or two short leaf-like processes (in both, large, with four or more long lobes or processes); virtually uniform coloration of trunk and tail (about 8 cross bars, annulated dark spot under first dorsal; 8-9 dark cross bars, row of annuli below dorsal profile—the latter perhaps a development of the series of lightly pigmented areas in *C. puellarum*); pectoral fails to reach vent (to, or beyond, vent in both species).

Three specimens of *C. perspicillatus* of standard length 43.6, 48.5, 50.9 collected with the holotype of *C. puellarum* differ from it in having inter-orbital less than or equal to half eye, and interval between middle of vent and hinder base of ventral not exceeding length to latter point—but this second feature does not appear to characterize the standard figure of that species. (McCulloch, 1908).

The description of *C. marmoratus* Klunzinger, 1872, is not sufficiently detailed or precise to permit of its unequivocal recognition. *C. puellarum* appears to differ from it chiefly in exhibiting the following features: larger head, shallower body: earlier origin of dorsal (?); color pattern, especially absence of dark spots and presence of light patches; lesser size.

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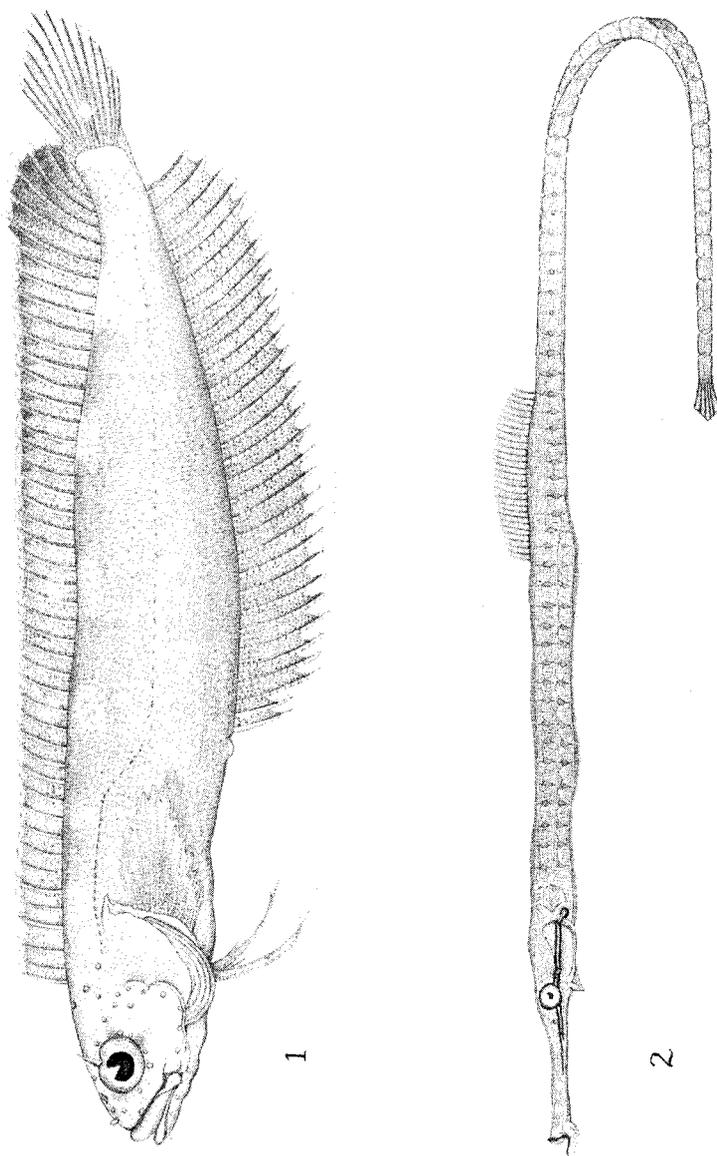


PLATE I

FIG. 1.—*Clinus puellarum* sp. nov. Holotype. East Beach, Low Head, Tasmania. Standard length 52.0, total length 59.2 mm.

FIG. 2.—*Syngnathus mollisoni* sp. nov. Holotype. Off Bivouac Bay, Tasman Peninsula, Tasmania. Standard length 159.2, total length, 162.8 mm.

