

New Species of *Myxine* (Cyclostomata) from Cook Strait

ABSTRACT

Myxine biniplicata n.sp. has 7 branchial pouches; 8/9 lingual teeth, the first and second being fused in each series; mucous glands, 44 + 95 + 25. The ventral fin commences anterior to and extends between the branchial apertures. On either side is a well-formed fin-fold extending from a paramedian point immediately posterior to the branchial apertures anterodorsally to terminate below the line of mucous pores before the level of origin of the ventral fin. Known from two specimens, from the vicinity of Cook Strait.

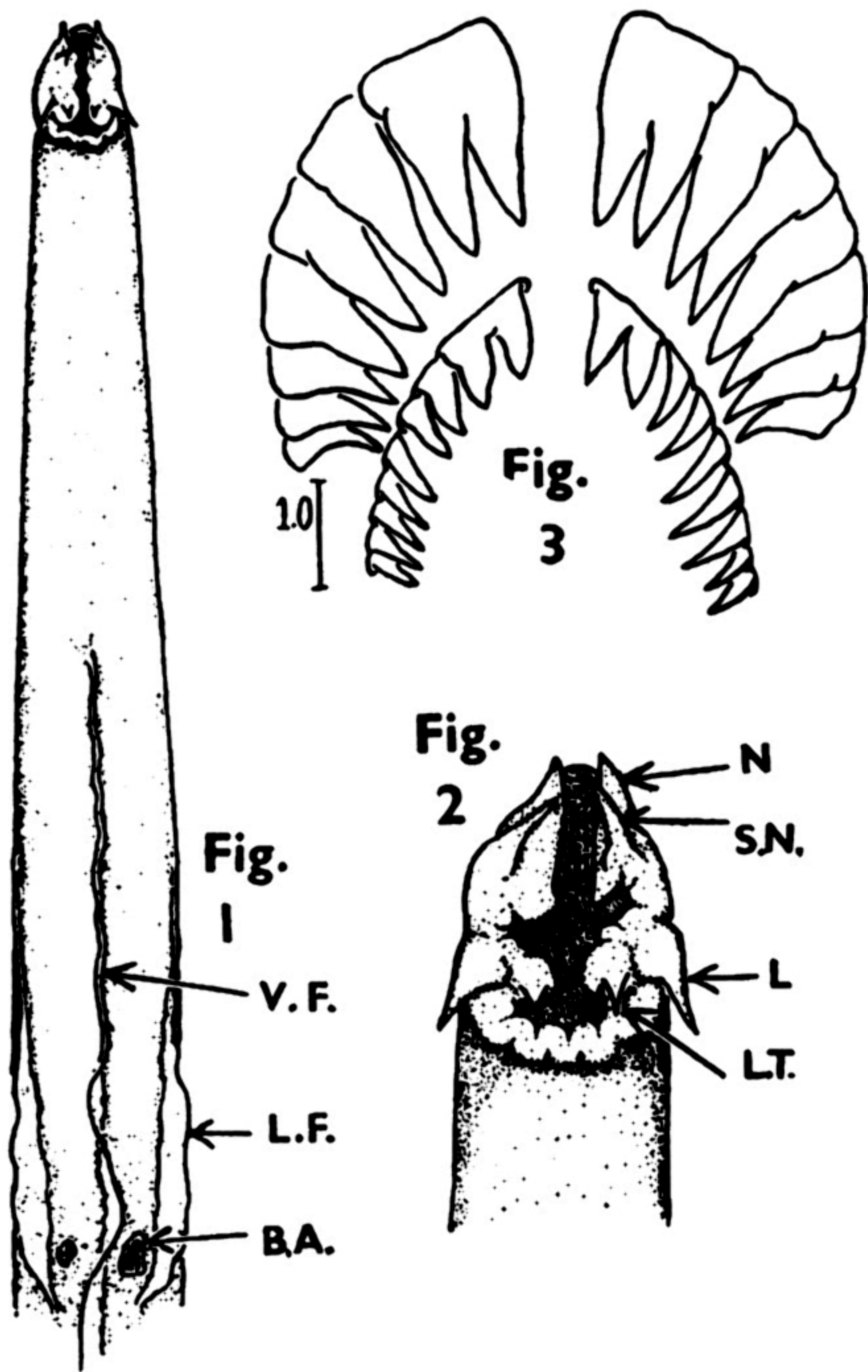
The genus *Myxine* contains hagfish in which the branchial sacs on each side open to the exterior by a common branchial aperture which is ventral in position. Species of this genus are known from the Atlantic oceans, the Straits of Magellan, the coast of Chili, from Japan, and from South Africa. So far, there seems to be no record of the genus from Australian or New Zealand waters. During the clearing-away of a trawl on a fishing trip in Cook Strait in March, 1947, Mr. F. Abernethy noticed a small hagfish which, unlike the common blind-eel, "did not slime," and he preserved the specimen, which he later presented to this Department for examination. An account of this specimen was prepared as a thesis. The present description is based on a re-examination of the specimen, on data obtained from a second, smaller specimen which was found in the stomach contents of a "dogfish" taken off Kaikoura at a depth of 40 fathoms on 15th November, 1946. The latter specimen is partly damaged by digestion.

Bigelow and Schroeder (1948) have reviewed the genus *Myxine*. They distinguish *M. circifrons*, *M. garmani*, and *M. tridentiger* as a group having the first three (the median) anterior lingual teeth on each side fused to a common base; and a second group having only the first two teeth so fused. The second group contains *M. paucidens*, *M. affinis*, *M. glutinosa*, *M. capensis*, and *M. australis*. The Cook Strait specimens are to be included in this second group. *M. paucidens* has 6/7 lingual teeth on each side; *M. affinis*, 10 to 11 teeth in the anterior series; but *M. glutinosa*, *M. capensis*, *M. australis* have 7 to 9 teeth in each series on each side; these three species are not separable from the published accounts, although the validity at least of *M. australis* is certain, since J. R. Norman has handled material and maintains this species.

The difficulty of distinguishing the species allied to *M. glutinosa* arises from the ranges in the diagnostic data for *M. glutinosa*. This species is known as having 6 and 7 pairs of branchial sacs; 7 to 9 teeth in the anterior lingual series, 8 to 10 in the posterior; 53 to 70 abdominal mucous pores, etc. These ranges confuse the data for *M. capensis* (v. Barnard, 1925: 7 branchial pouches; 10 teeth in each series; 58 to 67 abdominal pores) and for *M. australis* (v. Norman, 1937: 6 pouches; 8 teeth in the anterior, 8 or 9 in the posterior; 56 to 64 abdominal pores). Our specimens have 7 branchial pouches; 8 lingual teeth in the anterior and 9 in the posterior series on either side; but are clearly distinct in the greater number of

the mucous gland pores in the abdominal region and the high counts in the other regions. *M. glutinosa* has 26 to 33 pores anterior to the branchial apertures, 53 to 70 in the abdominal region, and 11 to 13 posterior to the vent—a range, all told, of 80 to 116. The range for *M. australis* falls within those figures, there being 30 to 36 + 56 to 64 + 9 to 12, a range of 95 to 112 for this species. Likewise, in the case of *M. capensis*, where the mucous gland pores are arranged as 28 to 31 + 58 to 67 + 10 to 13—a total ranging from 96 to 111.

The larger of our specimens, which is only 315 mm. in total length, has 44 + 95 + 25 actual glands. The number of pores is difficult to count; but this total of 164 glands is only one more than the number of pores counted, and greatly exceeds the total in any other known species. The count is lower for the smaller specimen, which is, at the best estimate, 163.0 mm. in length, coiled and with the skin digested and damaged in the posterior third of the abdomen and over part of the tail. Combining the count of pores, where the skin is in good condition, with that of glands where these are exposed gave 36 + 84 + 17—a total of 137, which is still above that of any other species. In both specimens, the mucous glands are not spaced out from one another, but crowded so that they present



TEXT-FIGURES

1—Ventral view of the head and branchial region showing the ventral fin (V.F.), the lateral fins (L.F.), and the branchial apertures (B.A.). 2—Ventral view of head showing the nasal (N.), subnasal (S.N.), lateral (L.), barbels and labial tentacles (L.T.). 3—The array of lingual teeth.

flattened anterior and posterior faces rather than being rounded in outline, as illustrated in other species. Also, in both specimens the glands are not segmental in number or arrangement. For example, in a space of ten myotomes in the abdominal region of the larger specimen, there are 15 glands, and in the smaller specimen 13 were counted in the equivalent length.

External features have not been found satisfactory in separating one species of *Myxine* from another; but both of the present specimens show a unique external feature in the form of an anterior continuation of the ventral (precloacal) fin which extends between the branchial apertures as a fin diminishing in height to become a low ridge or fold which is quite definite and does not terminate until about half-way to the lower lip. Equally distinctive is the presence on either side of a low but well-formed fin which extends from close to the ventral fin immediately posterior to the branchial aperture in an oblique anterodorsal direction on to the side of the pharyngeal region to terminate just ventral to the row of mucous gland pores at a level nearly two-thirds to the anterior end of the ventral fin. Being truly pharyngeal in position, these resemble metapleural folds.

This occurrence of an anterior extension of the ventral fin, the presence of the lateral fins, and the non-segmental arrangement of the mucous glands are contrary to the generic definition; but no more so than some features in other species. Moreover, since these specimens show agreement in general facies and anatomy, especially of the pharyngeal region, we have no hesitation in referring this species to the g. *Myxine* as a new species named *M. biniplicata* on the basis of the lateral pharyngeal fins.

G. Myxine Linnaeus 1758

Five or six gill pouches on each side opening to the exterior by a single aperture on the ventral surface, close in front of the origin of the ventral finfold, the left-hand gill opening, which receives the oesophagocutaneous duct, being much the larger, fleshy flap overhanging the nostril anteriorly; nostril close to tip of snout; snout with 6 barbels flanking both nostril and mouth; each side with a series of large mucous pores, segmentally arranged, extending from a short distance behind the mouth rearward nearly to the caudal extremity.

Myxine biniplicata sp. nov.

Slender, essentially subcylindrical in the vicinity of the branchial apertures, slightly compressed anteriorly so that the head is ovoidal in section and increasingly compressed posteriorly to the strongly compressed tail, which has symmetrical margins and is bluntly rounded. The head and branchial region, as measured from the tip of the rostrum to the branchial aperture, together equal 25.5% of the total length; the abdominal region, 59%; the caudal region, 16.8%. The rostrum is slightly wider at the base than long, narrowing anteriorly to the obliquely truncate extremity. The naris is guarded above by a thin membranous hood which terminates obliquely, the margin slanting anteriorly. The naris and mouth are distinct; but the lip is elevated, fleshy, much folded, ridged, and deeply grooved. A median groove simulates an oronasal fissure extending from posterior to the nasal barbels, which are flattened and rise one on either side of the base of the nasal hood, between the subnasal barbels, and widens between the bases of the lateral barbels, to narrow again before entering the oral hood between the prominent labial mounds, which each bear a short, broad-based labial "tentacle." The barbels are subequal, the posterior laterals slightly the larger; and all with black tips. The mouth is a small triangular aperture concealed by the heavy, folded lip. The skin in the anterior quarter of the head region is relatively smooth, but definitely wrinkled posterior to this and over the remainder of the body. This transition is at the level of the first mucous sacs, which are difficult to detect externally, since the outline of the individual sacs is not obvious, but dissection shows 44 are present anterior to the branchial apertures. There is no external indication of the eyes.

The two branchial apertures are paramedian in position and at the same level. The left is slightly but obviously larger. The ventral fin commences in the branchial region 51.5 mm. from the tip of the rostrum, about half-way between the lip and the branchial apertures, as a low ridge increasing gradually in height to 1.5 mm. as it passes between the branchial apertures. Anterior to the definitive origin there are two minute diverging ridges which can be traced for 7.5 mm. and appear as anterior extensions of this fin; but they may be a result from preservation. The ventral fin continues as a low thick fold of uniform height back to the cloacal aperture, where it appears to split, forming labia to the aperture which are continuous with the caudal fin.

The lateral fins are more of the nature of a true fold, and apparently lack supporting elements. They rise each at about the same level, nearly one-third of the distance between the origin of the ventral fin and the branchial apertures, just below the line of mucous gland pores. They commence in a low ridge which can be traced anteriorly in an indefinite ridge, but posteriorly each fin increases gradually in height to about 2.5 mm., which is maintained to the level of the branchial apertures, when the fin diminishes rapidly and terminates posterior to the branchial apertures and does not meet with the ventral fin.

The abdominal region, between the branchial apertures and including the cloaca, constitutes more than half of the total length. It is slightly compressed to a sub-circular form anteriorly and increasing so posteriorly. There is no dorsal fin throughout this region, the mid-dorsal line being marked by a low ridge. The line of mucous sacs is poorly marked on the anterior region, where it is situated about three-quarters down on the side of the body; but for the posterior four-fifths of the abdomen the line is situated close to the basis of the ventral fin and the outline of the individual sacs is clearly marked above and below. The ventral fin is slightly higher anteriorly (4.5 mm.), and is of a relatively uniform height (3.5 mm.) throughout its length, diminishing rapidly in the vicinity of the cloaca. It is correctly a "fin-fold"; no skeletal elements were detected. The cloaca is slit-like and measures 5.0 mm. in length.

The tail region is the shortest and most compressed. It is fairly uniform in depth for the first half of its length, and tapers symmetrically in the latter half to terminate obtusely. The ventral lobe of the caudal fin commences at the cloaca, where it is the highest (5.5 mm.), diminishing slightly in height posteriorly, and is continuous around the end of the tail, with the dorsal lobe, which is slightly lower and extends anteriorly only about half-way to the cloaca, being more rounded, softer, and fleshy anteriorly. There are 94 elements supporting the ventral lobe of the caudal fin. The anterior two-thirds of the dorsal lobe is unsupported, the posterior third is supported by 58 elements. None of the elements is bifurcated. The line of mucous glands continues along the basis of the ventral lobe and becomes less obvious as it approaches the tip of the tail. The last sac is situated at three-quarters of the length of the tail from the cloaca.

The row of mucous gland pores commences on the head at about the usual level, 26% of the distance from the tip of the rostrum to the branchial apertures. The glands are arranged as $44 + 95 + 25 = 164$. Throughout the length of the line, the glands are crowded, so that the anterior and posterior aspects are flattened. They are not segmental. Dissection showed a total of 122 myotomes, excluding the myotomes modified in the head. These are arranged $31 + 64 + 27$. In the middle of the abdominal region there are 15 glands in a distance equivalent to 10 myotomes.

The lingual teeth have the usual arrangement, there being an anterior and posterior row on either side. The anterior series has eight teeth on each side; the first and second are fused to a common base. The second series has nine teeth on either side, the first and second also fused to a common base. The teeth are strongly compressed, with a sharp posterior edge, tapered to a point, and cream in colour. The branchial pouches are seven on either side, diminishing in size from the anterior to the posterior pouch, bluntly ovoidal in form, and connected by individual ducts to a short common branchial atrium receiving the oesophageo-cutaneous duct on the left side.

The larger specimen is a female containing elongate ova up to 4.5 cm. in length. The colour preserved in spirits, greyish-brown, darker above. The total length, 315 mm.; depth at middle of body, 18 mm.; from tip of rostrum to level of lower lip, 8 mm.; to level of branchial apertures, 77 mm.; to level of vent, 265 mm. This is designated as the holotype, and is held at the Department of Zoology, Victoria University College.

The smaller specimen has not been sexed. It measures approximately 163.0 mm. The tip of the rostrum to the branchial apertures is 40 mm. The first mucous pore is 12 mm. from the tip of the rostrum. Excepting in the smaller number of mucous pores (a total of 137), the external features are those of the larger specimen.

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