

A New Genus and Species of *Myxinidae* (Cyclostomata)

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Abstract

Nemomyxine elongata n.g. n.sp. has a ventral fin-fold extending between the paired branchial apertures and terminating just short of the true head; mucous glands, one pair per segment; gland formula, 52 to 55 + 130 + 16 to 18, total 200 to 201; teeth 8/8; median teeth, bifid.

In 1951, *Neomyxine biniplicata* (Richardson and Jowett) was described from two specimens taken in Cook Strait as a new species in the Myxinidae having paired branchial apertures, bifid anterior lingual teeth and a cusp formula of 8/9, more than one pair of mucous glands per segment, unique paired ventrolateral pharyngeal fin-folds, a ventral fin-fold extending as a low rounded ridge between the branchial apertures and anteriorly well onto the pharyngeal region. Further material and living specimens showed that while the ventrolateral folds are genuine structures, the continuation of the ventral fold onto the pharynx was an artefact produced during preservation. Accordingly, a new genus *Neomyxine* (Richardson, 1953) was established for this species.

It is remarkable then that a myxinid has now been taken in New Zealand which shows a well-formed ventral fin-fold extending between the paired branchial apertures onto the pharynx and terminating shortly posterior to the true head. *Neomyxine biniplicata* originally impressed me in a lack of pigment and in other ways as possibly an incompletely metamorphosed form, but the type specimen was a toothed female containing eggs 4.5 cm long. On receiving the myxinid described below, it seemed that this might prove to be a true adult form of *N. biniplicata*, but the two are distinct. This specimen has bifid teeth, there being 8/8 teeth, 9/9 cusps on each side. There is no indication of ventrolateral fin-folds. The ventral fin-fold is of the same nature on the pharyngeal as on the abdominal region, and in both is a thin definite fold. The mucous gland formulae provide a positive distinction between the two. In *N. biniplicata* the glands are crowded, more than one per segment on each side, and the formula is 36 to 45 + 91 to 107 + 20 to 24, a total ranging from 147 to 176 based on data from five specimens. In the new myxinid, the glands are arranged as one per segment, well spaced from each other, and the formula is 52 + 130 + 18 = 200 on the left side, and 55 + 130 + 16 = 201 on the right side. These totals exceed those of *N. biniplicata*, which itself totalled some 60 glands per side more than in any previously known myxinid. The very high mucous gland counts in both species may suggest some relationship, but when these are translated into approximate numbers of body segments, the two stand distinct from one another. In *Neomyxine biniplicata*, the glands average 3 for 2 segments, so that the abdomen has some 60 to 72 segments and the caudal region 12 to 16. The latter is a recognised under-estimate. In the new species, there will be in the order of 130 segments in the abdomen and 16 to 18 in the caudal region.

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The extremely attenuate form might be expected to diverge considerably from the body proportions in *Myxine*, *Notomyxine* and *Neomyxine*. This is the case for the diameters at the middle of the total length which in *M. glutinosa*, for example, is 4%, but only 1.46% in the new species. The length of the head plus pharynx relative to the total length in *M. glutinosa* and in species of the *M. affinis/australis* group ranges (Nani and Gneri, 1951) from 27.52% to 31.02%; for *Notomyxine tridentiger*, 22.27% to 26%; for *N. biniplicata*, 23% to 27%. In the specimen described below, the ratio is 26%, so that in spite of the slenderness, the proportions of the major divisions of the body are of the usual order.

The area between the lower margin of the naris and the lower lip differs in the present specimen from the condition in *M. glutinosa*. In the latter, Bigelow & Schroeder, 1948, figure a space here about twice the length of the lateral tentacles, apparently not deeply furrowed nor widely trench-like and marked only by a very narrow oronasal groove. In this specimen, as in *N. biniplicata*, the area is short, the lateral tentacles turned anteriorly reach to the base of the nasal and sub-nasal barbels.

The Myxinidae contains Myxiniformes which have one branchial aperture on each side. The present specimen is distinct from all known Myxinidae in having a ventral fin-fold extending between the branchial apertures nearly to the head. Further, it differs from the G. *Notomyxine*, containing only *N. tridentiger*, which has a separate opening from the oesophagus near the branchial apertures, trifold anterior teeth on the outer row, a mucous gland formula of 17 to 23 + 57 to 65 + 8 to 10; from the G. *Myxine*, which possibly contains only two or three species having a total mucous gland count ranging from 80 to 116, there being one gland per segment; and from *Neomyxine* as discussed above.

Accordingly, it is necessary to establish a new genus for the present specimen, as follows:

Nemamyxine n.g.

Slender myxinids having one pair of external branchial apertures, the left the larger, no separate aperture from an oesophageo-cutaneous duct; no ventrolateral fin-folds, median ventral fin-fold extending between the branchial apertures terminating anteriorly shortly behind the true head; mucous glands segmentally arranged; median teeth of both series, bifid.

Genotype: **Nemamyxine elongata** n.sp. (Figs. 1 to 8) as follows:

An extremely elongate, black-pigmented myxinid, having a sharply terminating conical head expanding posteriorly to the level of the posterior end of the cranium which, as seen from above, is set off distinctly from the narrower pharyngeal region which is compressed and essentially continuous with the deeper and slightly wider, relatively uniform anterior abdominal region. The posterior abdominal region diminishes very gradually in width and depth near the level of the cloaca. Posterior to the cloaca, there is a steadily increasing compression so that the caudal region is deeper than wide and terminates in a rounded caudal fin-fold. This fold is continuous anteriorly as a deeper ventral fin-fold which divides around the cloaca and extends anteriorly passing between the branchial apertures to terminate shortly behind the posterior end of the true head.

The head and branchial region measured from the tip of the rostrum to the branchial aperture is 26% of the total length; the abdominal region measured from the branchial aperture to the cloaca is 62.5%; and the caudal region, 11.4%.

The margin of the nasal aperture is concave in lateral view, convex seen from above, so that the aperture appears hooded. The walls of the hood are thin, but the aperture is widely open and bluntly triangular in form with short sturdy subnasal barbels well separated and rising from each of the angles at the thickened base of the narial aperture. The nasal barbels rise immediately above and posterior to the subnasal barbels so that the bases are contiguous. The barbels of these two pairs are nearly of the same length, about equal to the width of the nasal aperture, with the nasal barbels only slightly the longer. The space between the ventral margin of the naris and the lower lip is about equal in length to the width of the head at the latter level and is broad, well covered by the heavy thick labial tentacles which themselves extend to the level of the lower lip. There is some simulation of an oronasal groove in the space between the labial tentacles, but this area is wide and boldly marked off from the naris. There is not the usual appearance of a stellate form to the mouth which is a widely open semicircle with a smooth thick lip. The lateral barbels are the longest, equalling with their

base nearly the distance from the naris to the lower lip. The skin over the head is smooth and lighter pigmented than the skin of the body so that the posterior margin of the olfactory capsule can be seen on the dorsum at a level about half the length of the true head. Poorly defined less pigmented "eye-patches" can be seen shortly posterior to this on the sides of the head. The head at its widest portion is 7.5 mm deep and 9.0 mm wide.

The true pharyngeal region is marked off distinctly from the true head being narrower (5.5 mm) although as deep (7.5 mm) as the posterior end of the head. These diameters gradually increase so that shortly posterior to the origin of the ventral fin-fold, the depth is 8.0 mm and the width 6.0 mm. At the level of the branchial apertures, the diameters are equal, 8.0 mm. The right external branchial aperture is the smaller, being about 1.0 mm in length, and the right twice this length. Both are close to the midline and obscured by the fin-fold.

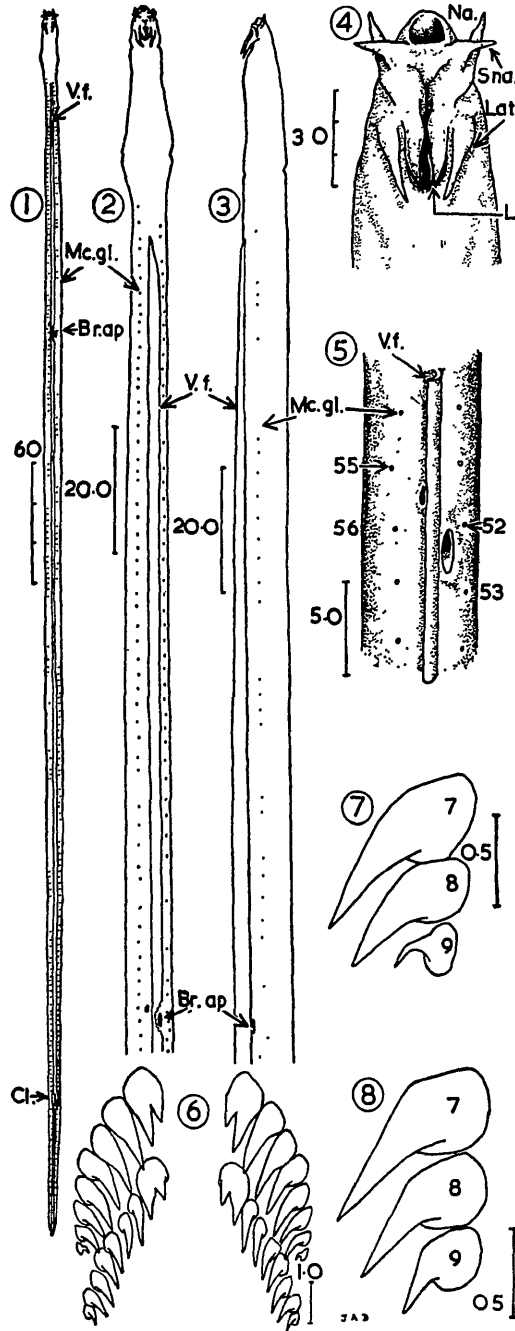
The pharyngeal and abdominal regions are continuous, and the depth and width in the abdominal region are essentially the same for the remainder of the first half of the length of the animal. Posterior to this, the depth increases slightly to a maximum of 9.0 mm at two-thirds of the total length at this level. This compression increases posteriorly so that at the cloaca, the depth is reduced to only 8.0 mm, but the width here is 4.5 mm. Posterior to the cloaca, the width continues for most of the caudal region as 4.5 mm to 4.0 mm, the depth diminishes gradually to 6.5 mm halfway along this region. The body ends with an abruptly vertical tail slightly rounded above and below. The depth at the mid-abdominal point is 1.46% of the total length.

The above data indicate the extremely elongate slender form of this animal which is not modified by the relatively deep ventral fin-fold. This structure commences 35.0 mm from the tip of the rostrum as a well-formed thin fold of about 2.5 mm in height, increasing gradually to 3.0 mm at the branchial apertures and continuing at this height to the level of the cloaca where it is divided and passes around the cloaca. Behind this, it is continuous as a slightly higher (4.0 mm) firmer structure, the anal fin or ventral lobe of the caudal fold.

The ventral fin-fold is lightly pigmented in the anterior half of this region, and in the abdominal region about the outer third of the fold is unpigmented and clear, the inner two-thirds are densely black, as is the entire fold posterior to the cloaca and also the caudal fin. The compressed caudal fin is continuous anteriorly in the dorsal midline with a rather indefinite low, rounded ridge which can be recognised over the posterior half of the caudal region. The presence and distribution of fin rays are not obvious and were not determined.

The mucous glands are not evident superficially except by the excretory apertures. Dissection in the abdominal region shows they are small, rounded, well spaced from one another and arranged as one per segment on each side. The first glands are situated in the region between the posterior end of the true head and the anterior end of the ventral fin-fold, about 34.0 mm from the tip of the rostrum on the left side, but there is a more anterior gland on the right side. The mucous gland formula on the left is 52 for the pharyngeal, 130 for the abdominal, and 18 for the caudal regions, a total of 200; on the right, $55 + 130 + 16 = 201$. Although the two rows have equivalent totals, there is some irregularity since the aperture of the 52nd gland on the left is at the same level as the 56th gland on the right.

The teeth rows of the lingual rasp are not strongly arched. The cusp formula is 9/9 on each side. The first median tooth is bifid on both the anterior and the posterior rows, two cusps rising from the one base. The rest have a single cusp. The first cusp of the anterior row is shorter, about one-half the length of the second, and both are flattened, slightly retrorse, sharply pointed and with a straight cutting ridge along both the anterior and posterior margins. The third cusp is more elongate, about one-third longer than the second, flattened dorso-ventrally and with a stronger cutting ridge on the anterior margin, which is straight until near the sharp tip, than on the posterior, which is slightly emarginate. The fourth cusp is about the length and form of the third, the whole tooth about as long as the bases of first to third cusps combined, but it is more uniformly curved along the anterior margin, more concave along the posterior margin than the third and both margins are armed with sharp cutting ridges. The fifth cusp is slightly shorter than the fourth, less flattened, narrower, more convex along the basal half of the anterior edge and more concave posteriorly, so that it has more the appearance of a sharp curved thorn and the cutting ridges are weaker. The sixth cusp has much the form and size of the fifth, with very slight cutting ridges so that it is even more like a curving thorn. The seventh cusp is obviously shorter and sligher than the sixth, with minute cutting ridges, the anterior edge being slightly convex at the base and straight along the distal half, while the posterior edge is convex at the base and straight over the distal half or third, and the end sharp-tipped. The eighth cusp is smaller, weaker, rounder, more strongly curved than the seventh, and lacking cutting ridges. The ninth cusp is minute, rounded in section, strongly curved, lacking cutting ridges, and appears to be non-functional,



TEXT-FIGS. 1-8. *Nemamyxine elongata* n.g., n.sp. Fig. 1—Ventral view of entire animal, fin-fold shown as cut to display left branchial aperture. Fig. 2—Ventral view of head and pharynx. Fig. 3—Lateral view of head and pharynx. Fig. 4—Ventral view of head. Fig. 5—Ventral view of posterior end of pharynx to show positions and relative size of branchial apertures and of mucous gland pores. Fig. 6—Teeth of the lingual rasp. Fig. 7—Three posterior teeth of the posterior row. Fig. 8—Three posterior teeth of the anterior row.

Br.ap., external branchial apertures; Cl., cloaca; L., labial tentacle; Lat., lateral tentacle; Mc.gl., mucous gland pore; Na., nasal barbel; S.na., subnasal barbel; Vf., ventral fin-fold.

Scales are in millimetres.

the cusp itself being no more than half the length of that of the second to last tooth and less in length than the width of the widest portion of the second cusp. The whole row forms a graded series with the first five cusps being strong, powerful cutting organs.

The cusps of the posterior row are each smaller and less powerful than the equivalent cusp in the anterior row, excepting the ninth which is, on both sides, of the shape but larger, longer and stronger than the ninth cusp of the anterior row. The first cusp is about one-third shorter than the second. Both are relatively straight, more conical than flattened, armed with low cutting ridges on the anterior and posterior margins. The third, fourth and fifth cusps have much the size and form of the second being sharply conical, armed with very weak cutting ridges and the fifth being obviously retrorse. The sixth is of the size and form of the fifth but curving more strongly medially. The seventh is similar to the sixth, but smaller and more curved. The eighth is smaller again and the ninth, the smallest, sharply conical and strongly curved. The cusp of the ninth is longer than the width of the widest part of the second cusp of this series. The posterior row as a whole is weakly sectorial but strongly raptorial and all teeth appear functional.

The specimen has not been sexed. The colour preserved in spirits is black, lighter on the head than elsewhere, unpigmented only along the free edge of the abdominal portion of the ventral fin-fold. The total length is 614.0 mm; the depth at the middle of the body is 9.0 mm; from tip of rostrum to level of lower lip, 6.0 mm; to level of branchial apertures, 160.0 mm; to level of cloaca, 544.0 mm. This specimen assigned the Dominion Museum No. 2006 is deposited there and designated as the type of the species.

The specimen is recorded as taken in a whitebait net, 150 yards upstream from the mouth of the Kaituna River, Bay of Plenty.

I wish to express my appreciation to the Director of the Dominion Museum for permitting me to examine and report on this new myxinid, and also to record the very helpful assistance given me in this study by Miss Judith Davenport.

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