

Studies on New Zealand Elasmobranchii. Part III.

A New Species of *Triakis* (Selachii) from New Zealand.

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Abstract

Triakis attenuata n.sp. from New Zealand waters has the second dorsal originating just anterior to the anal origin and the rear tip extending beyond the rear tip of the anal; the first dorsal originating above the pectoral insertion with the rear tip terminating well anterior to the pelvic origin

THE genus *Triakis* includes those smooth dogfishes in which the nostrils are distinct from the mouth; the anterior margin of the nostril is expanded as a small lobe but not produced as a nasal barbel; the teeth are small, crowded and carry a pointed major cusp flanked by one to several lesser cusps on each side; a labial furrow is present on each jaw; and the spiracles are relatively large. Species of this genus are known from the western North Pacific, the China Sea, the eastern Pacific both north and south, and Cuban waters in the Atlantic. Bigelow and Schroeder (1948) also give Indian Ocean (including the Red and Arabian Seas), Malaysia, Melanesia and Polynesia, but in a private communication Schroeder says that these localities are included due to an error in transcription. One species, *T. scyllia* Muller and Henle 1841, known from Japan, Korea, China and Formosa, has once been recorded from South Australia, but Whitley (1940, p. 115) doubts the validity of this record. There appears to be no record of the genus from New Zealand waters.

In December, 1953, the S.T. "Maimai" was trawling off the southern part of the East Coast of the North Island, in much deeper water than usual, due to a local scarcity of fish on the shallower (40 to 50 fathoms) grounds, and collected from 120 fathoms one specimen of smooth dogfish which was very unlike the smooth hound *Mustelus lenticulatus* Phillipps 1932, normally taken in the trawl. This specimen was very attenuate, almost anguilliform as though emaciated, but with a flat depressed head. It was complete, but showed recent injuries in the form of two vertical rows of tooth punctures, traversing the whole depth of the right side of the body at the level of the 1st dorsal, with some of them at least perforating the abdominal wall. The specimen was recognised as a novelty, kept in cold storage, and later given to the author. This specimen forms the basis for the following account of a new species of *Triakis*.

Bigelow and Schroeder (1948) recognise seven species of *Triakis*. Using the position of the 2nd dorsal relative to the anal, and the length of the labial furrows as key characters, they group *T. venusta* and *T. barbouri* in having the 2nd dorsal origin over or behind the origin of the anal with its rear tip over or posterior to the tip of the latter, and short labial furrows. The remaining species, *T. maculata*, *T. leucoperiptera*, *T. henlei*, *T. scyllia* and *T. semifasciata* have the 2nd dorsal

origin considerably anterior to the origin of the anal with its tip anterior to the rear tip of the latter, and long labial furrows. The "Maimai" specimen has the 2nd dorsal origin just anterior to the anal origin, the tip terminating just posterior to the anal tip, and labial furrows of moderate length. On these criteria, the "Maimai" specimen falls within the *T. venusta*-*T. barbouri* group, though the length of the labial furrows, 2.5 in the horizontal diameter of the eye, is about intermediate between that in the *T. venusta*-*T. barbouri* group (where it is about 3.0 in the horizontal eye diameter for *T. barbouri* as illustrated by Bigelow and Schroeder, 1948, p. 237) and the opposing group of five species; about 2.0 in the upper jaw length for *T. scyllia* in Fowler's description (1941, p. 198). However it differs from *T. venusta* and *T. barbouri* essentially in the great attenuation of the trunk and the extreme depression of the head, for along with the species of *Pseudotriakis* and *Chlamydoselachus anguineus* it may be regarded as one of the more attenuate of sharks. In *T. venusta* the depth is contained 9.4 in the length to the subcaudal origin, while in *T. barbouri*, which is a slightly more heavy-bodied species, the ratio is about 7.0. In the "Maimai" specimen the depth is contained 12.0 times in the precaudal length. It is possible that emaciation of the specimen may account in part for its extreme slenderness. But as the depth is measured at the origin of the pectoral, and hence the approximate location of the pectoral girdle, any measurements in this region should not be greatly affected by the condition of the animal. Therefore even if the specimen is emaciated, the error in the proportion of depth to precaudal length should not be large. Other salient differences between *T. venusta*, *T. barbouri* and the "Maimai" specimen are as follows: In *T. venusta* the tail is about 5/9ths (= 55%) of the total length (Garman, p. 456); in *T. barbouri* it is $\frac{1}{3}$ longer than the body sector, thus equalling about 7/13ths (= 54%) of the total length (Bigelow and Schroeder, p. 238); while in the "Maimai" specimen it is just shorter than the body sector and only 15/31sts (= 48%) of the total length. In *T. venusta* the 1st dorsal originates 'about midway from the bases of the pectorals to the ventrals, end of fin hardly reaching to a vertical from the latter' (Garman, p. 456); in *T. barbouri* 'the origin of 1st dorsal a little behind inner corner of pectoral . . . the rear end a little anterior to origin of pelvis' (Bigelow and Schroeder, p. 239); and in the "Maimai" specimen the 1st dorsal origin is immediately above the insertion of the pectoral base, with its posterior tip terminating anterior to the pelvis by a distance equal to the base of the latter.

Comparison of other features of the "Maimai" specimen with those of all the species of *Triakis* shows that *T. barbouri* and the "Maimai" specimen agree in having strongly tridentate dermal denticles, though in the former species the lateral denticular teeth point slightly outwards as illustrated by Bigelow and Schroeder (p. 237), whereas in the "Maimai" specimen the lateral teeth point inwards. *T. venusta* and *T. maculata* have weakly or imperfectly tridentate denticles, while in *T. henlei*, *T. scyllia* and *T. semifasciata* the denticles are simple and lanceolate. Complete information is not available on the nature and number of the teeth in all the species, but characteristically the teeth are numerous, small, and carry one strong major cusp flanked by one to several lesser cusps on each side. Within this basic pattern two types of teeth may be recognised. *T. barbouri*, *T. leucoperiptera*, *T. scyllia* and *T. semifasciata* have the major cusp long and pointed, a feature they share with the "Maimai" specimen. In contrast, *T. maculata* and *T. henlei* have teeth with a very short and blunt major cusp,

approaching the condition seen in the genus *Mustelus* where the teeth are without distinct cusps but have a sinuous edge. *T. venusta* has teeth which are intermediate in character, bearing moderately long major cusps. With regard to teeth number in those species with long major cusps, *T. barbouri* has $\frac{62}{60}$ to $\frac{62}{62}$ (Bigelow and Schroeder, p. 239); *T. scyllia* $\frac{40}{36}$ (Fowler, p. 198), and *T. leucoperiptera* $\frac{15}{34}$ (Fowler, p. 197). I have no information on *T. semifasciata*. The "Maimai" specimen has $\frac{98}{114}$, and is thus clearly separable from the species listed above. The presence of a high tooth number in the "Maimai" specimen and *T. barbouri* suggests a closer relationship between these two species than between them and any of the other species, a postulate borne out by the similarities in denticle and tooth structure, relative fin positions, etc., mentioned above. The dental formula $\frac{18}{34}$ for *T. leucoperiptera* quoted from Fowler (1941, p. 197) appears to be at variance with that occurring in the majority of sharks, where the difference between the number of teeth in the upper and lower jaws is not more than a few per cent. If the formula is correct, then considerable weight needs to be placed on the further statement in Fowler's description 'the remaining rows of teeth (towards angle of lower jaw) smaller than opposing upper teeth.'

The number and site of the lesser cusps on the teeth vary extensively in the different species, and hence offer data for comparison. Both species with short major cusps, *T. maculata* and *T. henlei*, have one lesser cusp on each side of the major cusp, though frequently the medial lesser cusp is missing. The remaining species, and the "Maimai" specimen, have one to several lesser cusps on each side, the teeth at the centre of the mouth usually with fewer lesser cusps than those towards the angles. These latter species may be divided into three groups, depending on whether the number of lesser cusps is uniform on each flank of the major cusp or whether more lesser cusps are present on either the medial or lateral flank. I have been unable to locate full descriptions of the dentition of *T. venusta*, *T. scyllia* and *T. semifasciata*, but the meagre information available suggests that these species have symmetrical teeth with from one to three lesser cusps on each side of the major cusp, the number depending on the position of the tooth in the jaw. *T. leucoperiptera* appears to be alone in having the greater number of lesser cusps on the lateral flank of the major cusp—the teeth towards the angles of the lower jaw bearing up to four lateral lesser cusps and no medial ones (Fowler, p. 197). *T. barbouri* and the "Maimai" specimen agree in having a majority of lesser cusps on the medial flank; but in the former species up to three medial cusps may be present and no lateral cusp, while in the "Maimai" specimen there may be as many as five medial cusps and at least one lateral cusp is always present.

There does not appear to be any correlation between the groupings of the species with regard to colouration, including maculation, and those arrived at using the already described morphological characters. The "Maimai" specimen is plain coloured, as are *T. leucoperiptera* and *T. henlei*. The remaining species are obviously patterned, with the exception of *T. barbouri*, which is generally plain but shows faint maculation in some specimens.

On the basis of the distinctive attenuation of the "Maimai" specimen, and the other afore-mentioned morphological differences between it and the known species of *Triakis*, I propose it as the type of a new species, *T. attenuata*.

TRIAKIS Muller and Henle 1838

Nostrils entirely distinct from mouth, their anterior margins without barbel; teeth compressed, with 2, 3 or 4 pointed cusps, the axial longest; a labial furrow on each jaw at corner of mouth; spiracles moderately large, easily seen.

Triakis attenuata n.sp.

Text-fig. 1, figs A-Q; Text-fig. 2, figs. A-F.

STUDY MATERIAL

Male 932 mm. total length, trawled from 120 fathoms off Kahu Rocks, north-east of Cape Palliser, on December 18, 1953.

DESCRIPTION

Proportional dimensions in per cent. of total length.

Trunk at pectoral origin: breadth 9.9; height 6.4.

Snout length in front of: outer nostrils 6.8, mouth 8.8.

Eye: horizontal diameter 3.9; vertical diameter 1.4.

Mouth: breadth 7.8; length 4.0.

Nostrils: breadth (between inner corners) 3.9.

Labial furrow lengths: upper 1.4; lower 1.4.

Gill-opening lengths: 1st 1.4; 2nd 1.5; 3rd 1.6; 4th 1.6; 5th 1.3.

1st dorsal fin: vertical height 6.9; length of base 13.3.

2nd dorsal fin: vertical height 6.9; length of base 11.6.

Anal fin: vertical height 3.1; length of base 5.8.

Caudal fin: upper margin 20.5; lower anterior margin 6.4

Pectoral fin: anterior margin 10.8; distal margin 9.4; posterior margin 5.4.

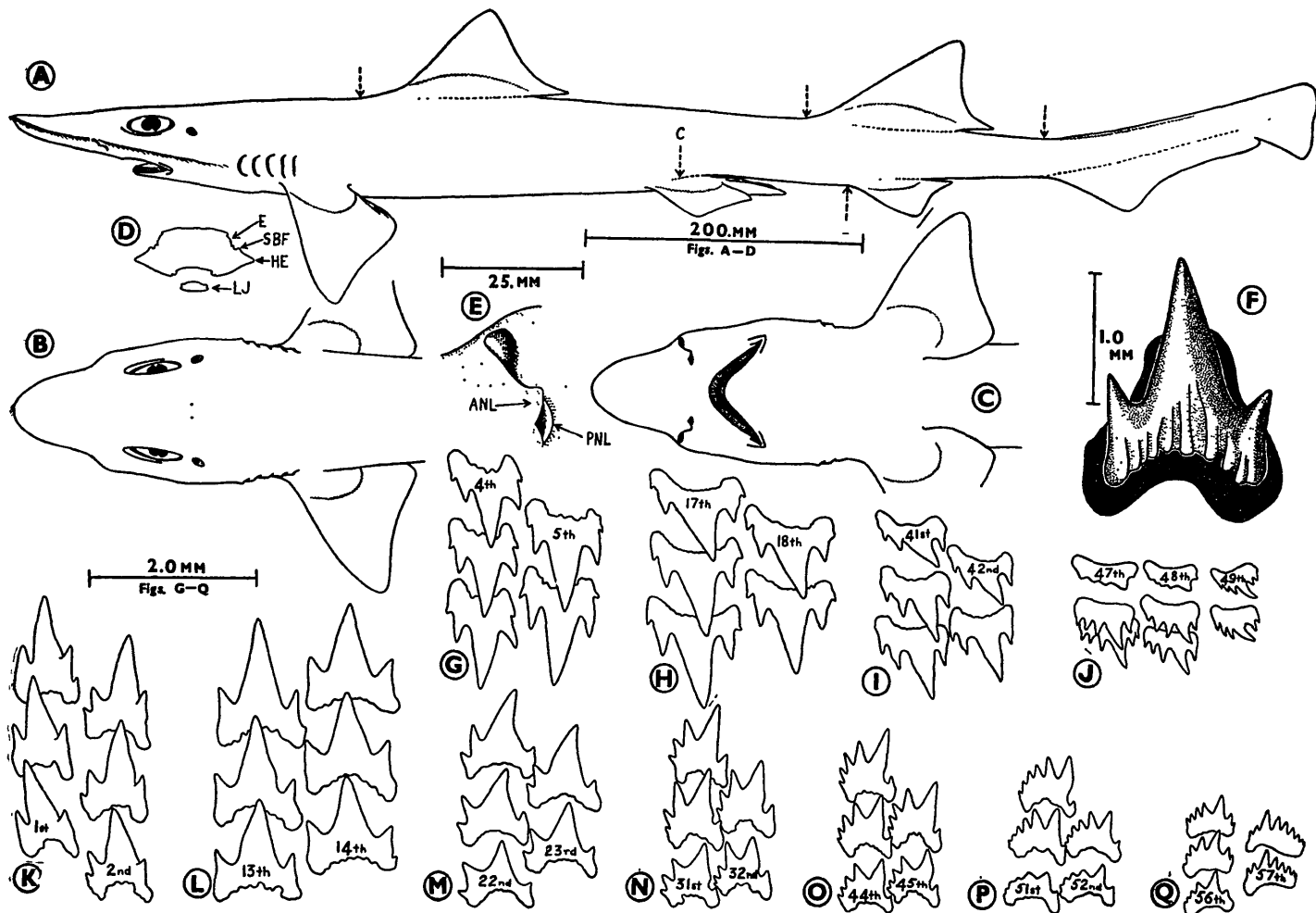
Pelvic fin: anterior margin 4.8; distal margin 4.7; posterior margin 3.2.

Distance from snout to: eye 8.8; 1st gill-opening 17.0; 5th gill-opening 21.3; 1st dorsal 26.7; 2nd dorsal 61.0; upper caudal 79.5; pectoral 20.2; pelvic 47.8; anal 63.3.

Interspace between: 1st and 2nd dorsals 21.7; 2nd dorsal and caudal 7.5; anal and caudal 8.8.

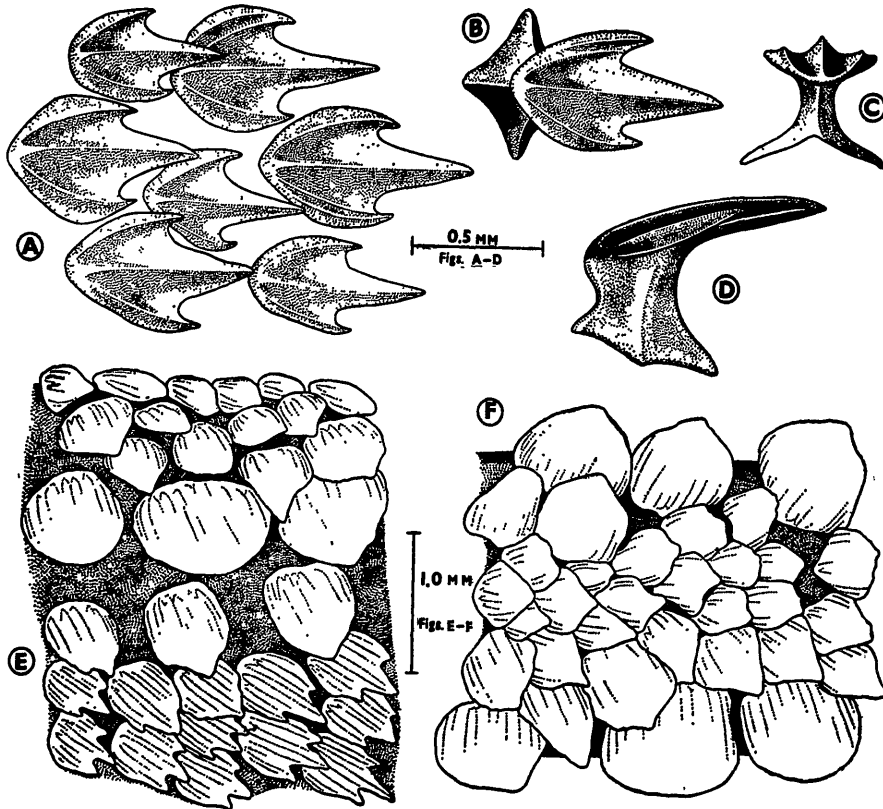
Distance from origin to origin of: pectoral and pelvic 27.5; pelvic and anal 16.2.

Head compact, depressed, large-eyed; trunk attenuate, slender, generally subcircular in section and gently tapered from the pectorals posteriorly. Height of trunk at origin of pectorals 1/12th of its length to origin of caudal. Dorsal and ventral profiles slightly and about equally arched. Length of body, measured to cloaca, 1/15th more than length of tail from same level. Caudal peduncle a little compressed and without keels or precaudal pits. Dermal denticles small, crowded to overlapping, with short pedicles, broad rhomboidal bases, and elongate horizontal blades. The blades tridentate, with sharply pointed teeth, the median tooth very long, the lateral teeth short and tending to point inwards. Each blade of those denticles taken from high on the sides at the level of the 1st dorsal fin bears three strong longitudinal ridges, one median and one lateral on each side, proximally flat-topped or rounded but distally sharp-edged and terminating at the end of the teeth. Denticles from the sides of the tail similar in shape but the blades bear numerous longitudinal ridges. The anterior two-thirds of the dorsal margin of the caudal with four to five irregular longitudinal rows of small



TEXT-FIG. 1.

FIG. A, *Triakis attenuata* n.sp., lateral view. FIGS. B-C, dorsal and ventral views of head. FIG. D, outline of transverse section of head at level of eyes to show flange-like edges of head. FIG. E, left nostril. FIG. F, left lower tooth, 6th row from centre of jaw. FIGS. G-J, left upper teeth; G, 4th and 5th rows; H, 17th and 18th rows; I, 41st and 42nd rows; J, 47th, 48th and 49th rows. FIGS. K-Q, left lower teeth; K, 1st and 2nd rows; L, 13th and 14th rows; M, 22nd and 23rd rows; N, 31st and 32nd rows; O, 44th and 45th rows; P, 51st and 52nd rows; Q, 56th and 57th rows. ANL, anterior nasal lobe; C, level of cloaca; E, eye; HE, edge of head; LJ, lower jaw; PNL, posterior nasal lobe; SBF, suborbital fold.



TEXT-FIG. 2.

FIG. A, *Triakis attenuata* n. sp. dermal denticles from high on side at level of 1st dorsal. FIG. B, dermal denticle showing underlying base. FIGS. C-D, apical and lateral views of dermal denticle. FIGS. E-F, lateral and dorsal views of portion of dorsal margin of caudal fin showing upper rows of small granular denticles overlying a row of large subcircular denticles, the latter forming a prominence over a semi-naked area which ventrally is bounded by multi-ridged tridentate denticles.

granular subrhomboidal denticles, each with an incipient posterior or postero-lateral tooth and numerous low ill-defined ridges. Flanking these denticles on each side of the fin, a single row of large subcircular denticles, semi-erect, without distinct denticulation but weakly ridged, and forming a marked prominence along the edge of the fin. Below the row of large denticles an almost naked area, narrow in extent, with well-spaced bluntly tridentate denticles, and below these the normally shaped tridentate denticles.

Head measured to 1st gill-opening 5.8 in total length and less than interspace between 1st and 2nd dorsals. Head greatly depressed with a distinct, thin, flange-like edge, the latter especially prominent from the level of the nostrils to midway between the spiracle and the first gill-opening. Head broad, the least fleshy interorbital distance 3.2 in length of head. Snout to eye 2.0 in length of head. Contour of snout tip from above broadly ovate, but just anterior to the eye, the edge of the head extends abruptly to form a distinct step in the contour.

Eye elongate and oval, 3 times as long as high, its horizontal diameter 1.5 in the interorbital. A prominent suborbital fold of skin along anterior two-thirds of eye, well separated from the lower lid anteriorly but continuous with it posteriorly. Spiracle* ovoid, large, placed slightly below level of centre of eye and behind it by a distance equal to the spiracular length. Longest diameter of spiracle directed posterolaterally, its length 3.8 in horizontal diameter of eye. Gill-openings small, the anterior three concave, the 4th and 5th almost straight and above the basis of the pectoral. Length of the gill-openings increasing slightly from the 1st to the 4th, the latter being 2.0 in the horizontal diameter of the eye. Fifth gill-opening subequal to the length of the 1st. Interspaces between the gills 1.5 to 2.0 in the length of the gill-openings, that between the 4th and 5th the smallest. Nostrils oblique, widely separated, the distance between their inner corners 1.7 in the distance from snout to tip of nostril and 4.5 in length of head. The anterior margin of each nostril expanded as a subtriangular lobe directed posteriorly, and the inner portion of the posterior margin developed as a small low folded lobe also directed posteriorly. Mouth broad and highly arched, the apex of the arch acute. Width of mouth 2.2 in length of head, and length of mouth, measured along midline from anterior of upper jaw to level of the outer angles 4.3 in the same ratio. Upper and lower labial furrows equal in length, strongly developed but short, their length 2.5 in the horizontal diameter of the eye.

Teeth $\frac{98}{114}$ small, closely crowded so that the successional series overlap. Serial arrangement of teeth primarily anteroposterior, but becoming increasingly oblique towards the angles of the jaws. Both jaws with 5 to 6 series of teeth functional at centre of mouth, 3 to 4 series at the angles. Teeth at angles of mouth considerably different from those at centre, but all comprise essentially a single long pointed erect or slightly oblique major cusp, flanked by one to several small lesser cusps on each side, borne on a stout base carrying numerous well-defined longitudinal basal striae. The greatest number of lesser cusps produced on those teeth towards the angles of the jaws. In the upper jaw, the 1st to 23rd rows counted from the centre towards the angle of the jaw comprise almost symmetrical teeth with a single long pointed major cusp directed slightly obliquely, flanked on each side by two small pointed lesser cusps, the outermost lesser cusp on each side the smaller; the 24th to 44th rows similar to those medially adjacent but with the large major cusp directed more obliquely, and only one lesser cusp on the lateral side; the 45th to 48th rows with markedly asymmetrical teeth, the major cusp placed well on the lateral side of the tooth, and flanked laterally by one small lesser cusp and medially by three small lesser cusps; the 49th row similar to those rows just medial but with the major cusp flanked on its lateral side by two small lesser cusps. The teeth in the lower jaw similar to those in the upper jaw, and showing the same general arrangement with the teeth towards the angle of the jaw carrying more medial lesser cusps than those at the centre. However this pattern of increase in cusp number is not regular, as some of the paramedian rows carry fewer medial lesser cusps than either the medial or lateral rows. The teeth in the 1st row of the lower jaw are symmetrical with the major cusp flanked by one small lesser cusp on each

* A prominent, externally visible aperture of 1.0 mm. diameter is located on the dorso-medial wall of the spiracle, and indicates the origin of a diverticulum extending towards the auditory capsule. Similar diverticula are recorded from other genera (Daniel, p. 153), but usually they are less obvious externally.

side; the 2nd to 6th rows with a single lateral lesser cusp and two medial lesser cusps; the 7th to 18th rows similar to the 1st row with one lesser cusp on each flank; the 19th to 25th rows like the 2nd to 6th rows, with one lateral and two median lesser cusps, but with a shorter and more oblique major cusp; the 26th to 40th rows with one lateral and three medial lesser cusps; the 41st to 48th rows similar to those medially adjacent but with four medial lesser cusps; the 49th to 54th rows the same but with five medial cusps; the 55th and 56th rows with two lateral and four medial lesser cusps; and the 57th row not following the previous pattern, but with the major cusp flanked laterally by five or six lesser cusps and medially by only two.

First dorsal originates by a very shallow angle from the dorsal profile just above the insertion of the pectoral. Base of 1st dorsal 1.4 in the head or equal to the distance between anterior of eye and 5th gill-opening. Height of 1st dorsal 2.0 in its base. Anterior margin almost straight, apex acutely rounded and over posterior third of base, posterior margin concave. Posterior corner sharply pointed, free for a distance 2.3 in height of fin, and terminating anterior to pelvics by a distance equal to length of base of the latter. Second dorsal originates midway between posterior tip of pelvics and origin of anal, its base, height, and margins similar to those of 1st dorsal, but with the apex over the end of the base. Posterior free corner terminates about midway between posterior corner of anal and origin of caudal. Caudal 4.9 in total length, epiural lobe very low, terminal lobe truncate and with a distinct subterminal notch. Anterior hypural lobe narrow with a straight anterior margin, acutely rounded apex and concave posterior margin. Pectorals originate at level of 4th gill-opening, base 3.2 in the head. Anterior margin weakly convex, its length twice that of the base. Distal margin weakly concave, posterior margin convex, anterior and posterior corners acutely rounded. Pelvics small, anterior margin straight and 1.3 in the base, the latter 2.9 in the head. Distal and posterior margins almost straight. anterior free corner moderately rounded and posterior tip acutely pointed. Claspers semicircular in section, sharply pointed posteriorly and projecting beyond the tips of the pelvics by a distance equal to the posterior margin of the latter. Anal originates behind origin of 2nd dorsal, with its free posterior tip terminating below end of base of 2nd dorsal. Height of fin 2.0 in its base, the latter being 2.0 in base of 2nd dorsal. Anterior margin weakly convex, distal margin concave. Apex sharply rounded, posterior corner pointed.

COLOUR: Generally brownish-grey, but lower surface of trunk, pectorals and caudal, and distal portions of the other fins greyish-white.

HOLOTYPE in the Dominion Museum, its catalogue number 1509

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