

ART. XLVIII.—Notes on New Zealand Fishes.

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[Read before the Philosophical Institute of Canterbury, 1st December, 1909.]

1. *Cephaloscyllium sabella*, Broussonet.

IN acknowledging the receipt of a copy of my paper on the "Scientific Results of the New Zealand Government Trawling Expedition," Mr. J. Douglas Ogilby wrote to me as follows: "I think you will have to change the name *Cephaloscyllium laticeps*, Dumeril, to *C. sabella*, Gmelin or Broussonet, Syst. Nat., p. 1489."

Like Mr. Ogilby, I am unable to consult Broussonet's paper, but the following, translated from Gmelin,* appears to be his diagnosis:—

"Species with an anal fin and spiracles.

"*Squalus sabella*.—First dorsal fin opposite to the ventrals. Brousson. act. Paris, 1780, p. 648, n. 1. Habitat in New Zealand, named from its coloration, spotted with black; entirely white below; 2½ ft. long; depressed in front; allied to *caniculæ*, head greatly depressed, and the shark is distinguished by the position of the first dorsal fin.

"Head short, broad, obtuse; eyes deeply set, pupil oblong, iris bronze-coloured; teeth compressed, short, triangular, acute, with a small basal cusp, disposed in six series; tongue thick, short, very obtuse; spiracle round, of moderate size; dorsal fins subquadrate, the second opposite to the anal; pectorals very large, originating near to the third gill-opening; ventrals separate, pointed behind; lateral line near to and parallel to the back."

This description, applied to a New Zealand shark, can refer only to *Cephaloscyllium*, and, as Dumeril's† name *Scyllium laticeps* was not published until 1853, the earlier one of Broussonet will have to be used, and I have to thank Mr. Ogilby for drawing my attention to the fact.

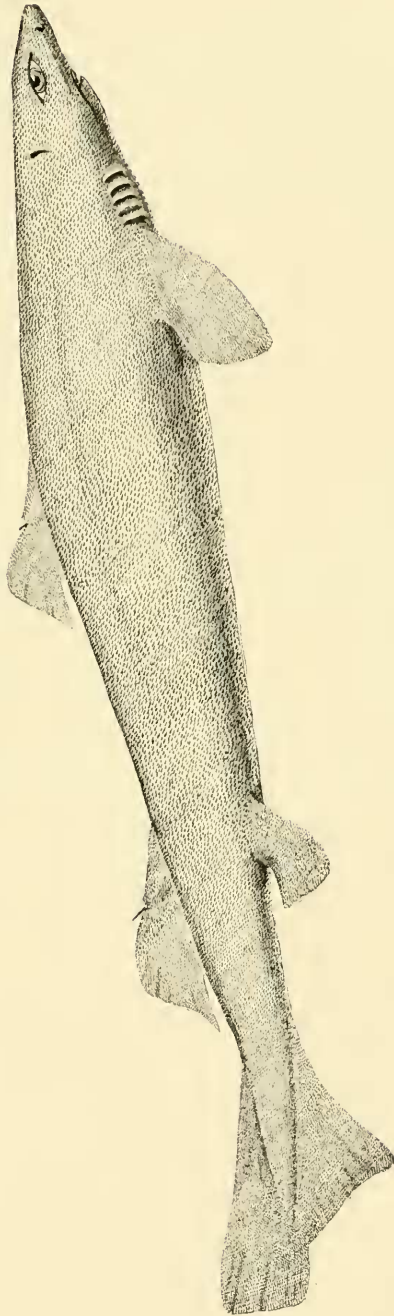
2. *Centrophorus plunketi*, sp. nov. Plate XXXVII.

In August last Messrs. Dennis Brothers, fishmongers, of Christchurch, sent a shark to me for determination, and subsequently presented it to the Canterbury Museum. It was caught by hook and line off Kaikoura, about 100 miles north of Christchurch, by Mr. A. D. Goodall, who has kindly furnished me with the following particulars: "The shark was one of three caught by my mate and me on the 13th August, one mile from shore, off Riley's Islands, in 120 fathoms of water. We have never seen its like before; but two fishermen say they have caught one each in the same locality—one before our lot, and one, 'a very large one,' since. The bottom of the sea in the vicinity of where the specimen was taken is a mud terrace with steep sides, and with rocky cliffs in places. By going a few chains to seaward of where we were anchored you may get 200 to 300 fathoms and more. Although deep fishing is done on other grounds in the neighbourhood, none of these sharks has been caught."

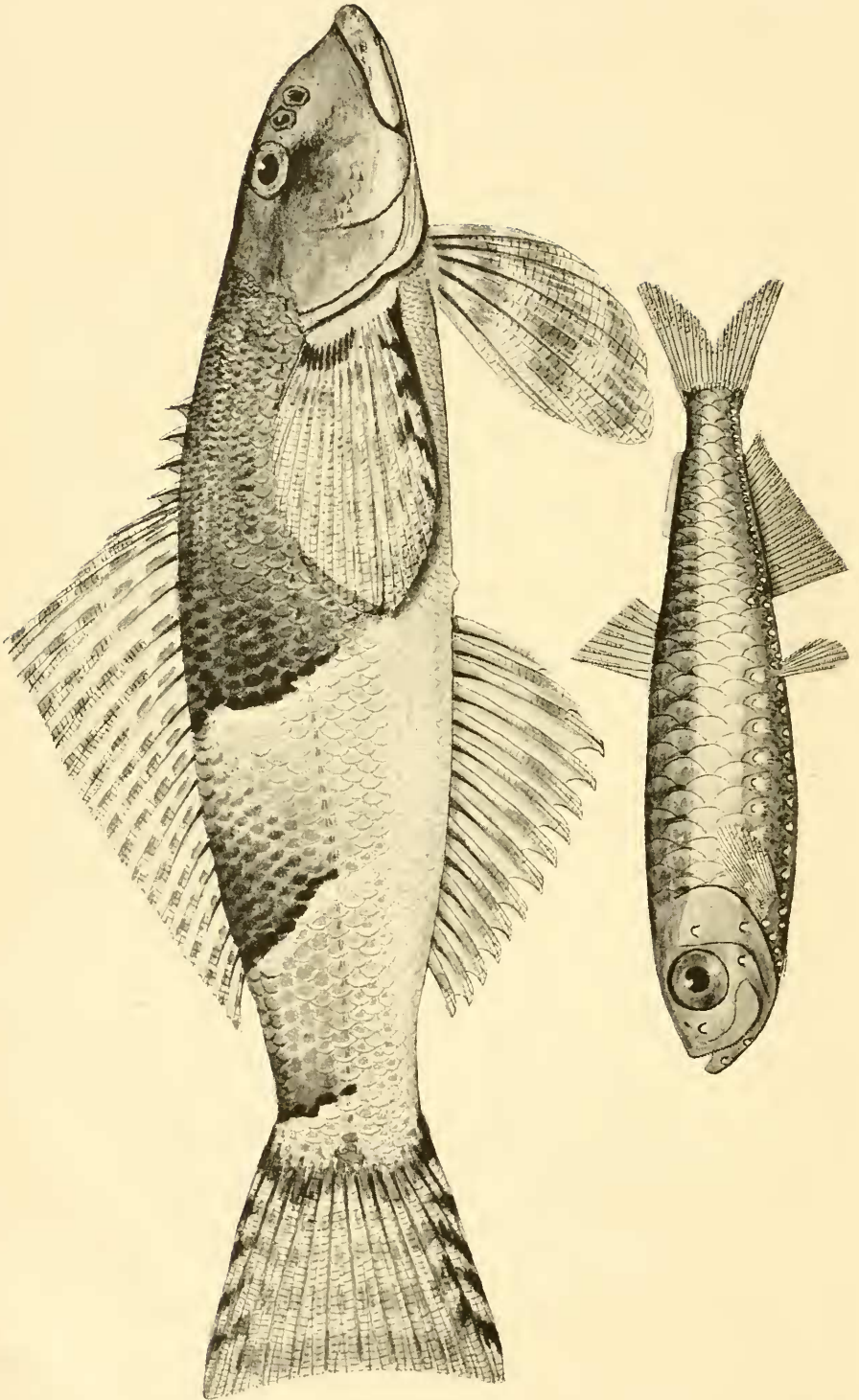
The shark belongs to the genus *Centrophorus*, a genus not hitherto recognised from New Zealand, and is regarded as being new to science. It

* Gmelin, Syst. Nat., ed. xiii, 1789, p. 1489.

† Dumeril, Rev. et Mag. Zool., 1853, p. 84.



NEW ZEALAND FISHES.—WAITE.

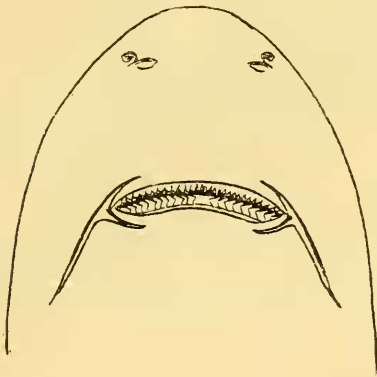


is most nearly allied to *C. foliaceus*, Günther,* from Japan, a fact readily ascertainable by consulting the admirable "Synopsis of the Sharks of the Family Squalidæ," by Regan.† The first character used in diagnosing the species of the genus *Centrophorus* is that of the condition of the posterior or inner angle of the pectoral fin—(1) not, or but slightly, produced; (2) considerably produced and acutely pointed.

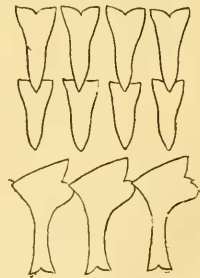
According to the synopsis, *C. foliaceus* and *C. steindachneri*, Pietschmann,‡ are nearly allied, and are placed under the first division. Judging only from descriptions and figures, the association does not seem to be close, for while *C. foliaceus* agrees in having the angle of the pectoral not at all produced, *C. steindachneri* is thus described: "Die innere (Kante der Pectoralen) in eine nach hinten gerichtete Spitze ausgezogen." The figure,§ which appears to have been issued later, and after Mr. Regan's paper was published, also shows a very decided acuteness of the pectoral lobe. Pietschmann himself states that his species is most nearly allied to *C. foliaceus*, but differs, among other characters, in the "form of the pectoral."

Length of head, 4.6; caudal, 4.7 in the length to the base of the caudal; diameter of eye, 5; interorbital space, 2.4; length of snout, 4.5; width of snout, 2.3 in the head; width of spiracle, 2.1 in the eye and 3.5 in the interspiracular space.

Head broad, greatly depressed, and flat above; eye large, the lateral cavity much longer than the eyeball, and recessed before and behind.



Nostrils on lower side of snout, nearer to its tip than to the eye; their distance apart one-fifth greater than the diameter of the eye and 1.86 in the preoral portion of the snout. Mouth wide, its width half the length of the head; it lies nearer the end of the snout than to the first gill-opening. A strong fold across the angle; its length only one-fourth less than the width of the mouth; the preangular portions together occupy more than one-half the width of the upper lip;



the post-angular portion is the longer and reaches to beneath the spiracle; the lower labial fold is shorter than that of the upper lip. Teeth in the upper jaw small, very acute, lying in four rows, and two-rooted, those of the lower jaw with an upper oblique cutting-edge and a laterally directed cusp; there is only a single row, formed of 30 teeth (teeth in centre of mouth lost). Spiracle large, a little nearer the eye than the gill-opening. The latter are subequal and low, being only half the diameter of the eye; the last one is immediately in front of the pectoral fin.

* Günther, Chall. Rep., Zool., "Deep-sea Fishes," xxii. 1887, p. 5, pl. ii, fig. A.

† Regan, Ann. Mag. Nat. Hist. (8), ii, 1908, p. 39.

‡ Pietschmann, Anz. Akad. Wien, xx, 1907, p. 394.

§ *Id.* loc. cit., cxvii 1908, p. 667, pl. i, fig. 1.

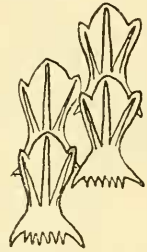
Fins.—Dorsal spines short, not half the height of the fins. The base of the first spine lies midway between the front edge of the eye and the base of the second spine; the length of its base, excluding the spine, is slightly more than one-fifth the distance between the two fins. The second fin is much larger than the first, and its basal length from the front edge of the spine is rather less than the space between its hinder insertion and the base of the caudal. The pectoral is large, its length being equal to the distance from the tip of the snout to the first gill-opening; its inner angle is rounded, and the fin does not reach nearly to below the fleshy part of the first dorsal. The ventral is placed very far back, a third of its base lying posterior to the root of the second dorsal spine. Caudal deep, with a pronounced lower lobe.

Scales.—The scales on the tip of the snout are granular, forming mosaic; those on other parts of the head and the whole of the body and fins are imbricate, strongly tricarinate, and tricuspoid. The lateral ridges and cusps as strong as the median ones, but not quite so long. Each scale has numerous (up to 8) roots.

Colour.—Uniform dark brown.

Length (a female), 1,414 mm.

The anterior position of the eye, the greater relative length of the pectoral (inserted midway between the snout and the first dorsal), the character of the second dorsal being longer than the first, and the backward position of the ventral, are points of difference between this species and *C. foliaceus*. The teeth also appear to be different, the upper series being much larger and more acute and disposed in more rows, and the lower ones with a less horizontal cutting-edge and a single row only, two rows being figured in *C. foliaceus*. The dermal denticles are apparently more strongly keeled, with more pronounced lateral cusps, the latter being not so much smaller than the median one. The character of the roots in *C. foliaceus* has not been described.



With His Excellency's kind permission, I have dedicated this new species to Lord Plunket, Governor of the Dominion, recognising his interest in the Canterbury Museum, and gratefully remembering His Excellency's kindness when, as his guest, I accompanied him on his cruise to the southern islands of New Zealand in 1907.

3. *Triarcus australis*, Hector. Plate XXXVIII, fig. 1.

This species was originally described by Hector* under the genus *Maurolicus*, but Hutton,† noting the presence of scales, removed it to *Gonostoma*. In his Index, however, he‡ appears to have overlooked his previous note, and reverts to *Maurolicus*, under which name I catalogued it. A re-examination of the specimens identified by Hutton, which are preserved in the Canterbury Museum, and were taken in the Province of Canterbury, reveals the remarkable fact that they possess but three gills, instead of the four characteristic of the *Malacopterygii*. The association with the *Gonostomidae* may thus be severed; the peculiarity, coupled with other features, merits at least generic recognition.

* Hector, Trans. N.Z. Inst., vii, 1875, p. 250, pl. xi.

† Hutton, *ib.*, viii, 1876, p. 215.

‡ *Id.*, "Index Faunæ Novæ-Zelandiæ," 1904, p. 50.

TRIARCUS, gen. nov.

Differs from *Gonostoma* in having only three gills, the dorsal fin not behind the ventrals, and the adipose fin low and very long.

The following is a description of the larger of the two examples :—

D. 9 ; A. 26 ; V. 8 ; P. 15 ; C. 22 + 10 ; Sc. circ. 26 ; Sc. tr. 5 + 6.

Length of head, 3·7 ; height of body, 4·3 in the length ; diameter of eye, 2·8 ; length of snout, 3·5 ; and interorbital space, 4·6 in the head.

Head compressed ; mouth small, subvertical ; lower jaw the longer ; the maxilla extends to below the middle of the eye ; teeth in the jaws small and uniform, extending the whole length of the maxilla ; no teeth on the vomer or palatines ; no pseudobranchiæ. Gills, 3 ; gill-rakers long and slender, 29 on the first arch, 22 of which are on the lower limb.

Body compressed. The dorsal fin commences midway between the hinder edge of the eye and the root of the caudal ; the length of its base is equal to the diameter of the eye, and its longest ray (the second) is one-fourth greater. The adipose fin is low, but very long, its base being greater than that of the rayed fin, from which it is separated by a space nearly equal to its own length. The anal is long, more than twice the length of the dorsal, and it lies entirely behind that fin ; its longest rays are of similar height, and those of both fins gradually decrease backwards. The ventral is placed immediately beneath the anterior ray of the dorsal, and extends to the anal when adpressed. The length of the pectoral is equal to the longest dorsal ray. The caudal is forked, and the depth of its peduncle is less than the diameter of the eye.

Scales large, cycloid, and moderately adherent. There are about 25 in the longitudinal, and 5 or 6 in the transverse series.

The dark (steel-blue) colour of the dorsal surface is sharply defined from the silvery sides. The area surrounding the photophores is also very dark in colour.

Adopting the nomenclature applied to the *Myctophidæ*, the distribution of the photophores may be described as below :—Preorbital : 1, midway between the eye and the end of the snout. Suborbital : 1, behind the maxilla. Opercular : 2 on the opercle, and 6 beneath the gill-cover. Mandibular : 2 pairs on the mandible—1 near the symphysis, and the other much further back ; 5 pairs on the isthmus. Thoracic : 5 pairs behind the opercle and parallel to its border, 12 pairs in advance of the ventral ; also a series of 9 on each side, placed much higher and in the same horizontal line as the suborbital and lower opercular pores. Ventral : 6 pairs, the second one being below the level of the others. Anal : 25 pairs, a break between the 17th and 18th, occurring over the last anal ray ; the anterior pore of the anal series is over the first anal ray, and placed high ; the second pore is also higher than the following ones, which form an even and regular line. Caudal : none.

Length, 61 mm.

4. *Centrolophus huttoni*, sp. nov.

Mr. A. D. Goodall, of Kaikoura, recently advised me that he had caught a large sunfish, which was accompanied by a number of "pilots." He sent me two of the latter, and wrote as follows : "Respecting the sunfish, I noticed its back fin just awash with the water, and when it lay over on its side I steamed up and harpooned it. It must have weighed several hundred

pounds, and was about 6 ft. long. I attempted to tow it home, but was compelled by heavy sea and head wind to cut it adrift. It was accompanied by about a dozen small bright-coloured (mauve is as near as I can describe it) fish from 8 in. to 15 in. long, which, for want of a better name, I called 'pilots.'"

I find the fishes to be examples of the genus *Centrolophus*, and they measure 381 mm. and 310 mm. in length respectively. I naturally turned to *C. maoricus* as the probable species, and also examined a large specimen taken at Sumner, near Christchurch, in 1903. This latter is preserved in the Canterbury Museum, and measures 783 mm. in length; it was described by Hutton and referred to *C. britannicus*.

In 1902 Regan reviewed the genus, and admitted three species—namely, *C. britannicus*, *C. niger*, and *C. maoricus*; he had not, however, seen examples of the last-named. Kolombatovic has since named a species *C. coreyrensis*,* but I am not able to consult the description. Leaving this out of the question, therefore, the distinguishing differences appear to be slight, and are expressed by Regan† in his synopsis of the species.

C. britannicus‡ is characterized by a larger number of rays in the dorsal and anal fins, and by the lateral line having a short curve above the pectoral.

C. niger§ and *C. maoricus*|| agree in respect of the fin-rays, also as regards the lateral line; the latter has the posterior half of the dorsal slightly emarginate, and has a somewhat shorter pectoral. It may be found that the two are not distinct.

The Kaikoura specimens substantially agree with *C. niger*, differing only in the smaller number of scales in the lateral line, and with this species I therefore identify them; and this leads me to think that the character of the dorsal rays in *C. maoricus* may have been an individual or accidental feature.

As already pointed out by Hutton,¶ the Sumner example is allied to *C. britannicus*; but for the present I propose to regard it as distinct, characterized by the much greater number of fin-rays, and by the long curve of the lateral line.

B. VII; D. X, 47; A. III, 35; V. 1, 5; P. 19; C. 15 + 8. L. lat. 240; L. tr. 23 + 60.

Length of head, 5·2; height of body, 4·8 in the length; diameter of eye, 4·6; interorbital space equal to the length of the snout and 3·9 in the head: nostrils confluent, without septum, the orifice with a narrow rod-like vertical bar; the cavity is close to the end of the snout, and separated from the eye by a space equal to two-thirds its diameter: the maxilla reaches to the front margin of the eye; teeth small, in a single series, very regularly disposed. Gills 4, a slit behind the fourth; gill-rakers moderate in length, and thick, 5 on the upper and 12 on the lower limb of the first arch. No pseudobranchiæ.

The dorsal fin arises above the root of the pectoral, and the length of its base is 1·2 in the total; the spines are very low, increase regularly in

* Kolombatovic, Glasnik Naravosl., družt. xiii, p. 30 (*vide* Zool. Rec. 1902, Pisces, p. 33).

† Regan, Ann. Mag. Nat. Hist. (7), x, 1902, p. 194.

‡ Günther, Ann. Mag. Nat. Hist. (3), vi, 1860, p. 46.

§ Gmclin, Syst. Nat., ed. xiii, 1789, p. 1321.

|| Ogilby, Rec. Aust. Mus., ii, 1893, p. 64.

¶ Hutton, Trans. N.Z. Inst., xxxvi, 1904, p. 149.

length, and merge into the rays; beyond the middle of the fin the rays decrease in length, and the fin terminates about two eye-diameters in advance of the caudal. The anal arises a little posterior to the middle of the dorsal, and its base is somewhat more than half the basal length of that fin. The ventral is very short (perhaps a character of the adult), being but an eye-diameter in length. The length of the pectoral is half that of the head. Caudal large and deeply forked, the peduncle compressed, its depth less than a third the length of the head.

The scales are cycloid, very small, and rather deciduous, leaving well-marked pits. Opercles scaly, the rest of the head closely beset with pores. All the fins scaly, the greater part of the dorsal and anal being thus covered. The lateral line forms a low arch over the pectoral, and with a less-marked curve joins the straight portion over the origin of the anal.

Colour faded.

Length, 776 mm.

The features of the four forms may, adopting Mr. Regan's synopsis, be expressed as follows:—

- | | | | | | | |
|-----|----------------------------------------|---------------------|------------------------------------------------------|----|------------------------|---------------------|
| a. | Lateral line with a short curve. | D. 45; A. 30 | .. | .. | <i>C. britannicus.</i> | |
| aa. | Lateral line with a rather long curve. | | | | | |
| | b. | D. 37-41; A. 23-25. | | | | |
| | | c. | Dorsal fin rounded | .. | .. | <i>C. niger.</i> |
| | | cc. | Dorsal fin slightly emarginate in its posterior half | .. | .. | <i>C. mauricus.</i> |
| | bb. | D. 57; A. 38 | .. | .. | <i>C. huttoni.</i> | |

5. *Cheimarrichthys fosteri*, Haast. Plate XXXVIII, fig. 2.

Last year Mr. Edgar F. Stead brought to me a small fresh-water fish which, though he is an ardent angler, was unknown to him. I found it to be an example of *Cheimarrichthys fosteri*, described by Dr. Haast in a paper presented to this Institute in 1874. The original specimens were taken in the Otira River, on the western slopes of the dividing-range, "where that alpine torrent leaves its picturesque gorge"; hence the generic name, signifying "torrent-fish." Mr. Stead obtained his example in the Rakaia, an eastern river, and I have since accompanied him to the scene of his capture, for the purpose of obtaining some idea of the habits of the fish.

After arriving near the mouth of the Rakaia River we waded several streams alternating with flax (*Phormium*), cabbage-trees (and toitoi), and reached an arm of the river. By means of a punt and some strenuous pulling we landed on the further side; but another branch had to be crossed, thigh-deep, by wading. The rushing water was, however, safely negotiated, and here, in a veritable torrent, the fishes were said to live.

A small net, used after the manner of a seine and weighted with a length of chain, was the instrument of capture. So strong was the rush of water over the boulders that the net could not be used against the stream, and the opposite course was perforce adopted. At the time of our visit the water was so cloudy that nothing could be seen in it, but on successive hauls of the net several specimens of the fish were obtained.

A notice in the local Press brought me further examples from other eastern rivers—namely, the Ashley and Hurunui; and I was also told that they were known as "shark bullies," in allusion to the inferior position of the mouth, coupled with some resemblance to the gobies, commonly called "bullies."

The general conformation of the fish reminds one of a ground-shark, the under-surface being remarkably flat, apparently to enable the fish to keep

close to the bottom, heading up-stream. The ventral fins are large and muscular, and may, indeed, be used for clasping stones; while the tail, as would naturally be expected in a fish living in rushing waters, is large and powerful. The pectoral, also, has its longest rays in the lower half of the fin.

As above noted, Haast bestowed the name *Cheimarrichthys* in 1874. In the same year Sauvage used the form *Chimarrichthys* for an Indian Siluroid. This latter being of actual later date was superseded by *Euchiloglanis*, given by Regan in 1907.

Neither the original description nor figure of *C. fosteri* appear to be quite accurate: for example, the number of dorsal spines is stated to be 3, whereas 4, the correct number, are shown in the illustration; the pectoral and ventral are shown too far apart; and the very peculiar colour-markings are not hinted at, either in the description or figure. Under these circumstances, the following description and accompanying figure will be useful.

Haast placed the genus *Cheimarrichthys* under the *Trachinidæ* as then constituted, but recently Boulenger* has studied the somewhat heterogeneous assemblage, and has so narrowed the family down that it includes the single genus *Trachinus* only, which differs fundamentally, however, only by having the second suborbital produced in an internal lamina supporting the globe of the eye. *Cheimarrichthys* does not possess this subocular lamina, and Boulenger associates it with *Leptoscopus* and other genera to form the family *Leptoscopidæ*. To the osteological characters already ascertained I may mention that the vertebræ number 33.

CHEIMARRICHTHYS.

Family *Leptoscopidæ*. Scapular foramen wholly in the hypercoracoid; pterygials well developed, separate; no subocular lamina; ventrals jugular; head and body anteriorly depressed; tail compressed; mouth moderate, slightly oblique; the upper jaw overhanging the lower; teeth villiform, in the jaws and on the vomer; eyes supero-lateral; dorsal fin subcontinuous, the spinous portion short and low; head naked; body with ctenoid scales, lateral line nearly straight; gill-membranes free from the isthmus.

Cheimarrichthys fosteri, Haast.

Trans. N.Z. Inst., vi, 1874, p. 103, pl. xviii.

B. VII; D. IV, 20; A. 14; V. I, 5; P. 15; C. 12 + x; L. lat. 50; L. tr. circ. 10-10.

Length of head, 3·7; height of body, 4·3 (or rather less than the width of the head); length of caudal, 4·5 in the total; diameter of eye, 5; length of snout, 2·2; interorbital space, 6·5 in the head.

The head is very broad and markedly depressed, the lower surface flat: the interorbital space is flat, and in profile forms an obtuse angle with the snout; the eyes cut the profile, and are directed as much upwards as laterally; the nostrils, two on each side, are large round openings with fleshy rims, the rim being highest behind on the anterior pore, and highest in front on the posterior one; they lie close together, a short distance in front of the eye, and each pair is separated from its fellow by a space equal to the interorbital; the mouth is moderate, non-protractile, with large

* Boulenger, Ann. Mag. Nat. Hist. (7), viii, 1901, p. 261.

fleshy lips; the maxillary, which can be almost wholly concealed by the premaxillary and suborbital, does not extend to beneath the anterior border of the eye. Gill-openings wide; gills 4, a slit behind the fourth; gill-rakers rather short, 9 in number, on the first arch, 7 being on the lower limb.

The dorsal fin arises behind the insertion of the pectorals; the 4 spines are very low, lengthening slightly backwards, but the last one is only half the diameter of the eye; the rays are long anteriorly, and decrease regularly, the last being equal to the length of the eye; the third ray is the longest, being two-thirds the length of the head. The anal originates beneath the seventh ray of the dorsal, and terminates very slightly in advance of the end of that fin; the rays are thickened, and free at their tips. The pectoral is triangular, its lower edge rounded; counting from above, the twelfth ray is the longest, and is nearly as long as the head; all are divided. The ventral is very large and muscular, with a broad insertion; it does not reach the vent. The caudal is slightly emarginate, its peduncle deep, being 2.2 in the head.

Scales.—The head is naked; the space from the occiput to the anterior dorsal rays down to the origin of the lateral line is covered with extremely small scales; the lower surface of the body backward to the origin of the anal, and including the area around the lower base of the pectoral fin, covered with similar scales; the larger scales, which occupy the rest of the body, are finely ctenoid; the free portion of the individual scale is scallop-shaped, and its inserted edge is rectangular and truncate, the caudal scales being longer than those of the body; the lateral line runs almost straight from the opercle to the middle of the caudal; the tubes are quite horizontal.

Colours.—Greyish-olive above, sides yellowish, lips and under-surface delicate pink (white in preservative). Three dark-grey broad oblique bars descend from the back forward, but do not reach the ventral surface; they are darkest behind, and are evenly graduated, the hinder edge being black and sharply defined; this edge is succeeded by a white line, which gives place to yellow, then to brown, forming the bar described. The hinder edge of the first bar passes from beneath the middle of the dorsal rays in a line towards the vent: that of the second from beneath the last dorsal ray towards the middle of the anal; the hinder edge of the third bar is more nearly vertical, and passes across the upper base of the tail. The markings of all the fins form lines, due to spots on the rays; there are about 4 lines on the dorsal, 5 on the pectoral, and 3 broken rows on the ventral, the inner ray being unspotted. The anal has a single row of dark intramarginal spots; the caudal bears 5 rows, the anterior one being especially characteristic, forming a 3-shaped figure, with the central projection directed forward. The markings on the head are not well defined; but a bar between the eyes and a V-shaped mark below the eye may be traced in some examples.

Length of specimen, 112 mm.

EXPLANATION OF PLATES XXXVII AND XXXVIII.

PLATE XXXVII.

Centrophorus plunketi.

PLATE XXXVIII.

Fig. 1. *Triarctus australis.*

Fig. 2. *Cheimarrichthys fosteri.*