© Journal of The Royal Society of New Zealand,
Volume 28, Number 1, March 1998, pp 1–37

The ceratioid anglerfishes (Lophiiformes: Ceratioidei) of New Zealand

A. L. Stewart[1], T. W. Pietsch[2]

Ceratioid anglerfishes collected from New Zealand waters are reviewed on the basis of all known material. Twenty species in nine genera and six families are recognised; nine species represent new records for the region, and one species of *Oneirodes* is described as new to science. Diagnostic and descriptive data are given with notes on geographical distribution. Diagnoses of all ceratioid families are provided, against the possibility of capture within the New Zealand EEZ.

Keywords: taxonomy; anglerfishes; Ceratioidei; New Zealand; new records; *Oneirodes* new species

INTRODUCTION

With the declaration in 1978 of a 200 nautical mile Exclusive Economic Zone (Fig. 1), New Zealand acquired the fourth-largest such zone in the world, of over 4 000 000 km^2 (Blezard 1980). Much of this area encompasses depths greater than 500 m. Subsequent trawling at depths of 800–1200 m for orange roughy, *Hoplostethus atlanticus* Collett, and other deep-water commercial species has resulted in a substantial bathypelagic and mesopelagic by-catch, including ceratioid anglerfishes (order Lophiiformes) representing six families, nine genera and twenty species. This paper summarises information to date, documents new material and geographical distributions, revises keys, and provides diagnoses, descriptions and illustrations of species supported by voucher specimens. Because most of the approximately 136 species of Ceratioidei (Pietsch & Grobecker 1987) have a wide distribution, diagnoses and a key to all families are provided against the possibility that they might occur in New Zealand waters.

METHODS

Methods for taking counts and measurements mostly follow Pietsch (1974) and, for himantolophids, Bertelsen & Krefft (1988). Standard length (SL) is used throughout. Measurements were taken, whenever possible, from the left side to the nearest 0.5 mm. The illicium is defined as the anteriormost first dorsal fin spine bearing a terminal fleshy bait; the esca is the fleshy bait on the tip of the illicium; denticulars are small tooth-bearing ossifications present in the skin on the snout above the symphysis of the premaxillae and at the tip of the lower jaw of male ceratioids (Bertelsen 1951); and caruncles are fleshy club-shaped light-organs situated on the dorsal midline just anterior to the soft dorsal fin of females of the family Ceratiidae. Keys and diagnoses are modified from Bertelsen & Pietsch (1983).

Abbreviations: Institutional abbreviations are as listed in Leviton et al. (1985). Material examined is from the Auckland Institute and Museum (AIM) or the Museum of New Zealand *Te Papa Tongarewa* (NMNZ; formerly the National Museum of New Zealand). Material from other sources mentioned in the synonymies and descriptions, but not examined, is

[1] Museum of New Zealand *Te Papa Tongarewa*, P. O. Box 467, Wellington, New Zealand
[2] School of Fisheries, College of Ocean and Fishery Science, University of Washington, Box 355100, Washington 98195, USA.

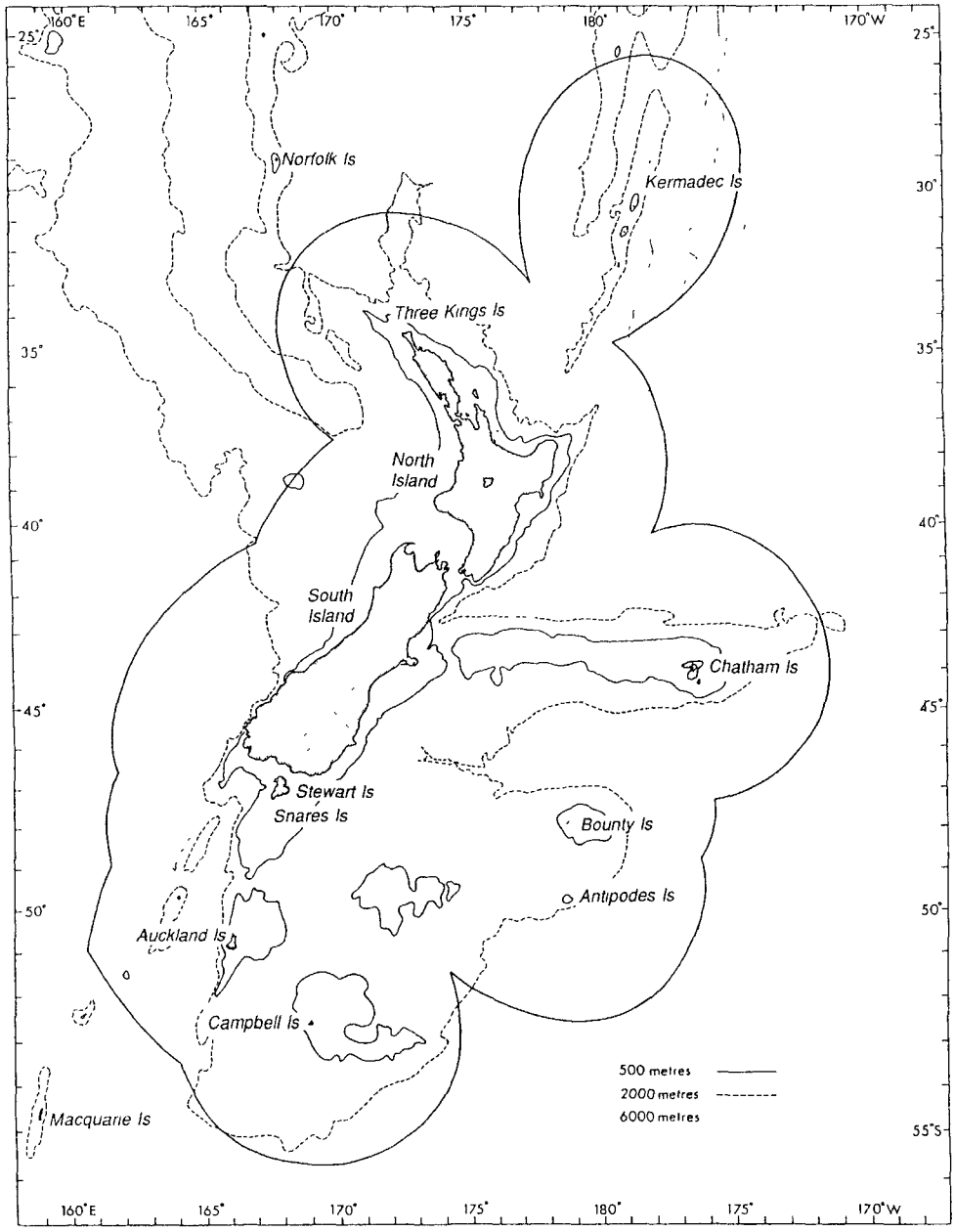

Fig. 1 New Zealand Exclusive Economic Zone, with isobaths for 500, 2000 and 6000 metres.

catalogued in the following institutions: Australian Museum, Sydney (AMS); Natural History Museum, London (BMNH); Institut für Seefischerei, Hamburg, Germany (ISH); Natural History Museum of Los Angeles County (LACM); Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (MCZ); Museu Municipal do Funchal, Funchal, Madeira (MMF); Academy of Sciences, Institute of Oceanology, Moscow, Russian Republic (IOAN); National Museum of Natural History, Washington, D.C. (USNM); Zoological Institute, St Petersburg, Russian Republic (ZIL); Museum für Naturkunde der Humboldt-

Universität, Berlin, Germany (ZMB); Zoologisk Museum, University of Copenhagen, Denmark (ZMUC). Other abbreviations include: FMMWT, fine mesh mid-water trawl; HOBT Mk IV, high-opening bottom trawl, Mark 4; IKMT, Isaacs-Kidd mid-water trawl.

SYSTEMATICS

Order LOPHIIFORMES; Suborder CERATIOIDEI

Diagnosis: Distinguished from other suborders of the Lophiiformes (see Pietsch & Grobecker 1987: 266–274) in being bathypelagic and mesopelagic (*Thaumatichthys* benthic in extremely deep water- see Bertelsen & Struhsaker 1977); lacking pelvic fins (except in larval and newly metamorphosed caulophrynids); extreme sexual dimorphism, males being a fraction of the size of females; nearly all females bearing a single cephalic dorsal fin spine, the illicium, with a terminal escal bulb containing a light organ (illicium absent in *Neoceratias*; escal light organ absent in caulophrynids and *Rhynchactis*; a small, external, second cephalic fin-spine present in juvenile diceratiids and ceratiids); males lacking external illicium and esca; with enlarged eyes (except in centrophrynids and gigantactinids) and large olfactory organs (except in ceratiids); and with pincer-like jaws, the hooked denticular teeth used for attachment to females. In some families and genera, males become parasitic and permanently attached to the female through fusion of male and female tissue.

Key to the families of Ceratioidei

(after Bertelsen & Pietsch 1983)

1A Illicium absent 2
1B Illicium present (females) 3
2A Lateral margin of jaws with long hooked teeth ..... females of Neoceratiidae (p. 28)
2B Lateral margin of jaws toothless (males) 14
3A Illicium without a bulbous terminal light organ 4
3B Illicium with a bulbous terminal light organ 5
4A Longest rays of dorsal and anal fins > 60% SL; body short .... Caulophrynidae (p. 4)
4B Longest rays of dorsal and anal fins << 60% SL; body elongate ..... *Rhynchactis* of Gigantactinidae (p. 26)
5A Dorsal fin rays > 11 ..... Melanocetidae (p. 5)
5B Dorsal fin rays < 11 6
6A Dorsal midline with 2 or 3 caruncles; cleft of mouth vertical to strongly oblique ..... Ceratiidae (p. 21)
6B Dorsal midline without caruncles; cleft of mouth nearly horizontal 7
7A Second cephalic ray present immediately posterior to base of illicium, bearing a distal luminous gland (withdrawn beneath skin in larger specimens, its presence indicated by a small pore) ..... Diceratiidae (p. 10)
7B Second cephalic ray absent 8
8A Upper jaw extending anteriorly far beyond lower jaw; esca bearing 1–3 denticles ... Thaumatichthyidae (p. 21)
8B Jaws equal anteriorly; esca without denticles 9
9A Illicium inserted on tip of snout; length of head < 35% SL; length of caudal peduncle > 20% SL; 5 pectoral radials ..... *Gigantactis* of Gigantactinidae (p. 26)
9B Illicium inserted behind tip of snout; length of head > 35% SL; length of caudal peduncle <20% SL; 3 or 4 pectoral radials 10
10A Skin with dermal spines or plates 11
10B Skin naked (microscopic spinules may be present, but skin appears naked and smooth) 12

11A Skin with large bony plates, each bearing a median spine ..... Himantolophidae >30–40 mm (p. 6)
11B Skin with numerous close-set spines ..... Centrophrynidae (p. 21)
12A Branchiostegal rays 4 or 5; dorsal fin rays 3 (very rarely 2 or 4); anal fin rays 3 (rarely 2 or 4) ..... Linophrynidae (p. 29)
12B Branchiostegal rays 6; dorsal fin rays > 4; anal fin rays 4–7 13
13A Snout and chin more or less pointed ..... Oneirodidae (p. 10)
13B Snout and chin very blunt ..... Himantolophidae <30–40 mm (p.6)
14A Upper denticular teeth absent; anal fin rays > 9 15
14B Upper denticular teeth present; anal fin rays < 9 16
15A Approximately 9 lower denticular teeth; young specimens with pelvic fins; dorsal fin rays 14–22; anal fin rays 13–19 ..... Caulophrynidae[1] (p. 4)
15B Lower denticular trifurcated, each branch bearing a double hook; pelvic fins always absent; dorsal fin rays 11–13; anal fin rays 10–13 ..... Neoceratiidae (p. 28)
16A Olfactory organs small; eyes large, bowl-shaped; dorsal fin rays 3–5; anal fin rays 3–5 ..... Ceratiidae (p. 21)
16B Olfactory organs large; eyes not bowl-shaped 17
17A Dorsal fin rays > 11 ..... Melanocetidae (p. 5)
17B Dorsal fin rays < 11 18
18A Dorsal fin rays < 5 19
18B Dorsal fin rays 5–8 20
19A Eyes large, slightly tubular, directed more or less anteriorly; dorsal fin rays and anal fin rays 3 (rarely 2 or 4) ..... Linophrynidae (p. 29)
19B Eyes spherical, directed laterally; dorsal fin rays 4; anal fin rays 4, rarely 3 ..... *Rhynchactis* of Gigantactinidae (p. 26)
20A Eyes small, diameter 5% SL or less 21
20B Eyes large, diameter > 5% SL 22
21A Hyoid barbel small, digitiform; branchiostegal rays 6 ..... Centrophrynidae (p. 21)
21B Hyoid barbel absent; branchiostegal rays 5 ..... Gigantactinidae (p. 26)
22A Skin completely covered with well developed spines; anterior nostrils opening laterally 23
22B Skin spines absent or small and scattered; anterior nostrils opening anteriorly near tip of snout 24
23A Upper denticular teeth > 10, all fused together at base ..... Himantolophidae (p. 5)
23B Upper denticular teeth 2, separated ..... Diceratiidae (p. 10)
24A Skin of body with small but distinct spines ..... Thaumatichthyidae[2] (p. 21)
24B Skin spines absent or microscopic ..... Oneirodidae[3] (p. 10)

Notes

[1] Males of the caulophrynid genus *Robia* (dorsal fin rays 6, anal fin rays 5 in females) are unknown.

[2] Males of the thaumatichthyid genus *Lasiognathus*, in which females have naked skin, are unknown.

[3] Males of 8 of the 15 recognised oneirodid genera are unknown, including those of *Spiniphryne*, in which females have spinulose skin.

Family Caulophrynidae

Diagnosis: Females distinguished from other ceratioids in having extremely elongate dorsal and anal fin rays; caudal fin rays 8; neuromasts of acoustico-lateralis system located at tips of extremely elongate filaments; pectoral radials 2; escal bulb absent. Males parasitic; free-living stages distinguished from those of other ceratioids by absence of an upper denticular;

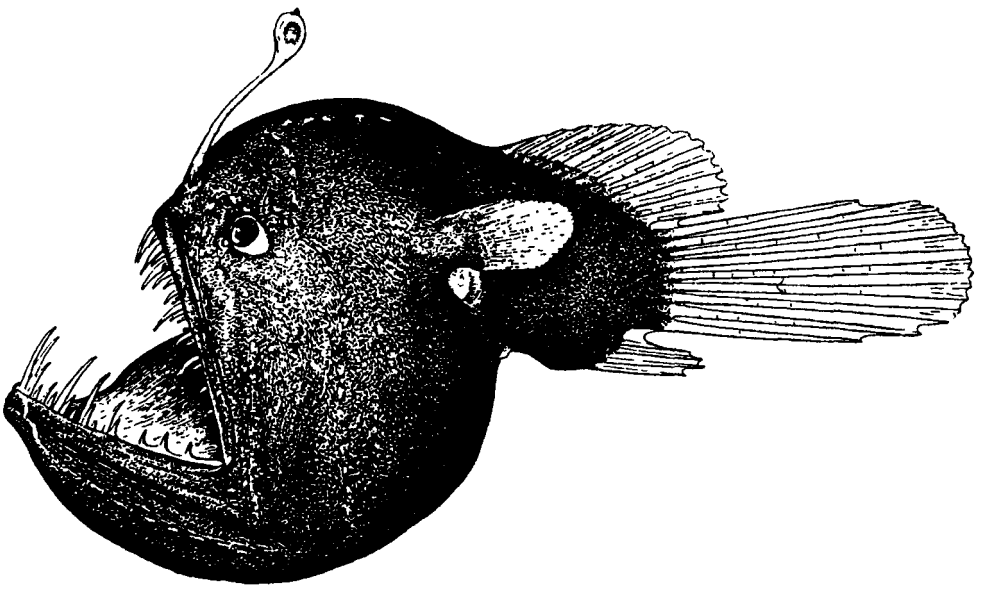

Fig. 2 *Melanocetus johnsoni*, juvenile female, 22 mm SL, Bertelsen (1951).

lower denticular unbranched, bearing approximately 9 teeth; pelvic fins present in younger stages.

Comments: Two genera known, *Caulophryne* and *Robia*, neither of which has been collected in New Zealand waters. A single female specimen of *Caulophryne jordani* Goode & Bean, 1896 reported from New South Wales, Australia (Bertelsen & Pietsch 1983). Two additional caulophrynids known from the Indo-Australian Archipelago: *Robia legula* Pietsch, 1979, represented only by the holotype (LACM 36024–1) collected in the Banda Sea; and *Caulophryne pelagica* (Brauer 1902), a single specimen (LACM 36023–1) from the Halmehera Sea (see Pietsch 1979).

Family Melanocetidae

Diagnosis: Males and females are distinguished from those of other ceratioid families by having dorsal fin rays 12–17; anal fin rays 4 (rarely 3 or 5). Females are further distinguished by the absence of sphenotic spines and skin spines (although microscopic spinules are present, the skin appears naked and smooth). Males are non-parasitic, with skin spinulose or naked; upper denticular teeth with 2 or 3 semicircular series of strong, recurved denticles, fused with a median series of 3–9 enlarged dermal spines that articulate with the pterygiophore of the illicium; lower denticular with 10–23 recurved denticles, fused into a median and 2 lateral groups; eyes and nostrils lateral; nasal area unpigmented, inflated.
Comprises a single genus. Of six known species, one recorded from New Zealand waters. For synonymy, see Pietsch & Van Duzer (1980).

Melanocetus johnsoni Günther, 1864 (Fig. 2)

Melanocetus johnsoni Günther, 1864: 301–303, pl. 25 (holotype BMNH 1864.7.18., 64 mm SL, from Madeira). For full synonymy, see Pietsch & Van Duzer (1980).

Diagnosis: Females with anterior margin of vomer nearly straight; escal bulb with a compressed posterior and (usually) anterior crest; width of escal bulb 3.8–8.6% SL (> 4% in specimens > 50 mm); longest tooth in lower jaw 8.4–25.0% SL; 32–78 teeth in lower jaw.

Material examined: 37 specimens, 15–85 mm SL; see Appendix 1.

Description: Teeth in upper jaw 51–88; dorsal fin rays 13–16; anal fin rays 4; pectoral fin rays 17–20. Anterior margin of vomer straight; escal bulb with compressed posterior and anterior crests.

Comments: *Melanocetus johnsoni* is found world-wide in tropical to temperate waters, between approximately 53°N and 52°S, to a maximum recorded depth of 2100 m (Pietsch & Van Duzer 1980; Bertelsen 1986). On the basis of Australian material (see Bertelsen & Pietsch 1983), the only other species of *Melanocetus* that might be expected to occur in New Zealand waters is *M. murrayi* Günther, 1887. *Melanocetus johnsoni* is distinguished from *M. murrayi* as follows: anterior margin of vomer nearly straight (vs. deeply concave); escal bulb with a compressed posterior and (usually) anterior crest (vs. without crests); and escal bulb width 3.8–8.6% SL (vs. 1.9–5.1% SL) (Pietsch & Van Duzer 1980). *Melanocetus johnsoni* is most frequently taken between 500 m and 1500 m, whereas *M. murrayi* occurs more often from 1000 m to 2500 m. The deeper waters around New Zealand have not yet been sampled extensively, and so *M. murrayi* may occur in the area.

Melanocetus johnsoni is capable of catching and swallowing prey considerably larger than itself, as witness the approximately 240 mm SL specimen of *Chauliodus* sp. in the stomach of a 66 mm SL individual (NMNZ P 14537). The night-time capture of a specimen (NMNZ P 23117) at 30 m indicates that this species may migrate with the scattering layer to the surface at night.

Family Himantolophidae

Diagnosis: Females are distinguished from other ceratioids by the presence of large bony plates embedded in the skin, each bearing a median spine; snout and chin with low, rounded dermal papillae (spines and papillae absent in juveniles approx. < 30 mm); lower jaw stout, projecting slightly beyond upper jaw; escal bulb large, with stout tentacular appendages. Males non-parasitic, with spinose skin; upper and lower denticular teeth in 2 or 3 transverse series fused at base; eyes and nostrils lateral; nasal area pigmented, not inflated. For a full diagnosis and account of the family, see Bertelsen & Krefft (1988). Comprises a single genus of 18 species, three known from New Zealand waters, two of them based on females and one based only on a male.

Key to females of *Himantolophus* recorded from New Zealand waters

1A Distal escal appendage short (0.4–5% SL in specimens 30–75 mm, 1–20% in larger specimens), distinctly shorter than posterior escal appendage (less than half in specimens 30–75 mm, less than two-thirds in larger specimens) ..... *Himantolophus appelii* (p. 6)

1B Distal escal appendage long (8–52% SL in specimens 30–75 mm, 24–82% in larger specimens), nearly as long as posterior escal appendage or longer in specimens 30–75 mm, twice as long in larger specimens ..... *Himantolophus pseudalbinates* (p. 8)

Himantolophus appelii (Clarke, 1878) (Fig. 3)

Aegeonichthys appelii Clarke 1878: 245, pl. 6 (holotype not retained, 287 mm SL New Zealand).

For full synonymy, see Bertelsen & Krefft (1988).

Diagnosis: Females differ from those of other species of the genus in having an anterior series of 2–7 lateral filaments on each of 2 primary filaments of the posterior escal appendages, and in having the following combination of characters: esca with light-guiding distal appendage divided at base; total length 1.3–5% SL, shorter than diameter of escal bulb in most specimens, but longer (approximately 10–20% SL) in some of the largest known specimens

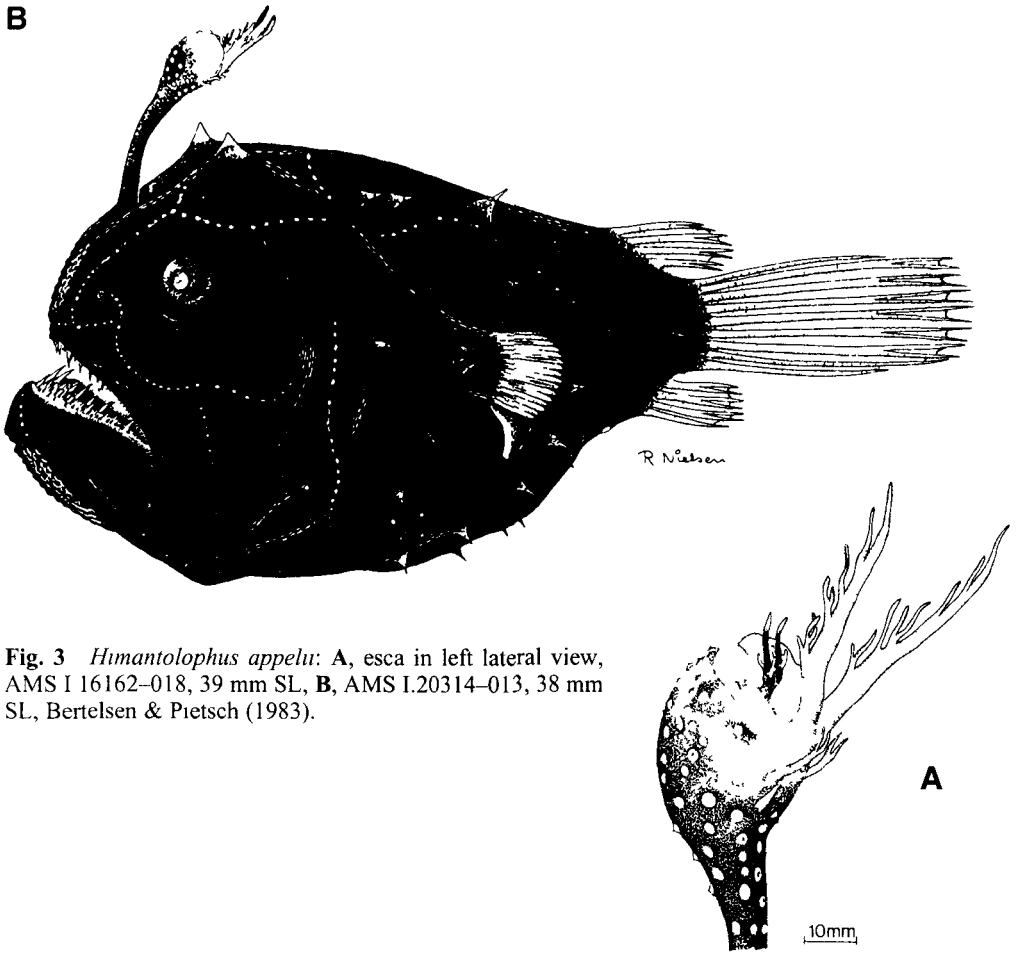

Fig. 3 *Himantolophus appelii*: **A**, esca in left lateral view, AMS I 16162–018, 39 mm SL, **B**, AMS I.20314–013, 38 mm SL, Bertelsen & Pietsch (1983).

(192–300 mm); primary branches each with 1–3 small lateral filaments (usually a pair); distal escal swellings not distinctly divided into lobes; anterior appendage absent; posterior appendage divided at base, approximately 10–45% SL in specimens > 30 mm; 0–5 posterolateral appendages on base of escal bulb, the distal pair emerging less than one-half of diameter of bulb below base of posterior appendage, simple or bifurcated at tip, the longest < 10% SL in specimens < 100 mm, approximately 11–18% in some larger specimens; spines present on illicial stem, escal bulb and appendages in specimens > 30 mm; papillae on snout and chin low and indistinct; no 'white patches' on body; caudal fin rays white or faintly pigmented in specimens < 100 mm approx. Adult males with 11–13 olfactory lamellae; diameter of posterior nostril 5.7–6.7% SL; length of snout 17–18% SL; approximately 20–25 upper and 22–32 lower denticular teeth. Larvae most probably without a dorsal pigment spot in skin (Bertelsen & Krefft 1988).

Material examined: 27 specimens, 92–300 mm SL; see Appendix 1.

Description: Dorsal fin rays 5; anal fin rays 4; pectoral fin rays 16 or 17; caudal fin rays 9.

Comments: *Himantolophus appelii* is found within a latitudinal band between approximately 25° and 45°S, from the east coast of South America east to New Zealand to about 179° west, in a depth range of 338–1300 m. The only other species of *Himantolophus* recorded from

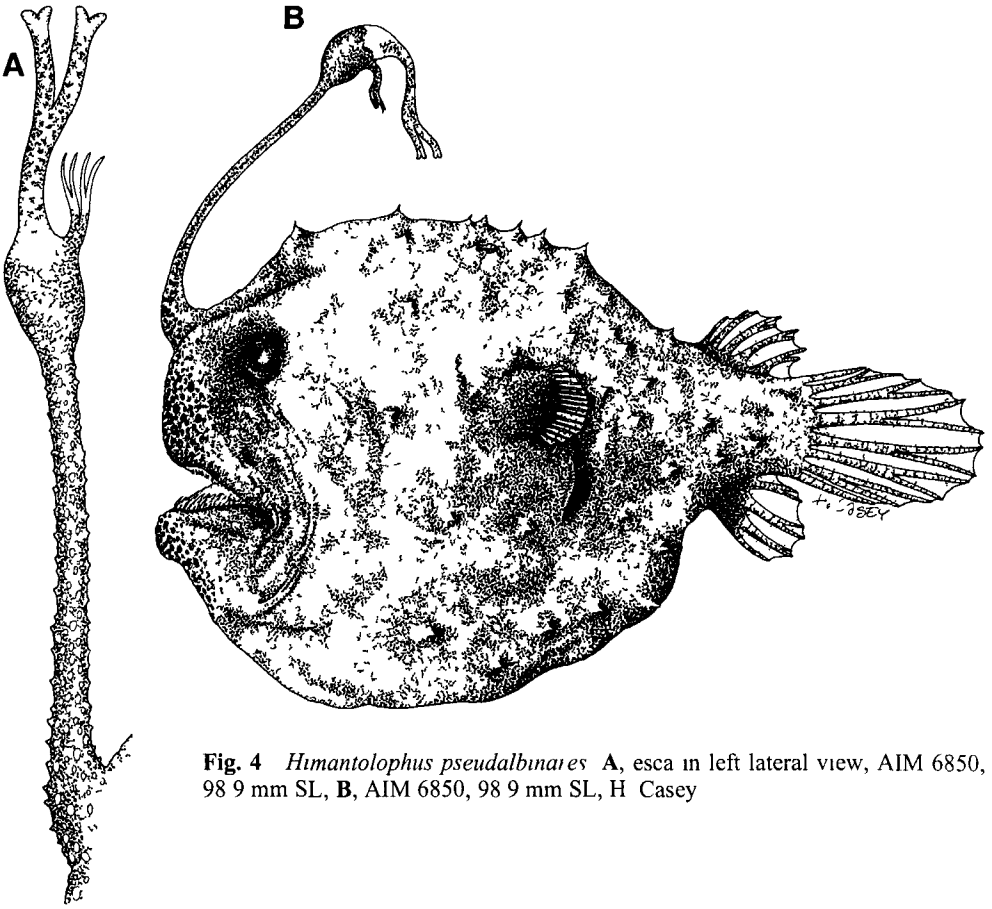

Fig. 4 *Himantolophus pseudalbinares* **A**, esca in left lateral view, AIM 6850, 98 9 mm SL, **B**, AIM 6850, 98 9 mm SL, H Casey

these waters are *H albinares* and *H pseudalbinares*, which are easily distinguished by having the distal escal appendages larger than the posterior appendages (see below) *Himantolophus albinares* is restricted to the Atlantic Ocean *Himantolophus appelii* is regularly taken as part of the by-catch of deep trawls for orange roughy and oreo dories (Oreosomatidae) One significant record of a shallow capture of a large specimen (extreme length, chin to caudal, 410 mm – Waite 1912) taken by hand-line at the head of Wellington Harbour Unfortunately, the specimen was cut up before being given to the Dominion Museum (now Museum of New Zealand) It was subsequently passed on to the Canterbury Museum (Waite 1912) The specimen is now too fragile for detailed examination No males were available from the New Zealand region

***Himantolophus pseudalbinares* Bertelsen & Krefft, 1988 (Fig. 4)**

Himantolophus pseudalbinares Bertelsen & Krefft, 1988 59–60, figs 23, 42 (holotype ZIL 49711, 82 mm SL, 35° 01′S, 24° 36 8′E, 1280–1300 m)

Diagnosis Females are distinguished from other species of the genus by the following combination of characters length of illicium > 52% SL, posterior escal appendages present, length of distal escal appendages 6 7–10% SL, subequal to twice the posterior escal appendages, primary branch of distal appendage bifurcate

Material examined 1 specimen, 98 9 mm SL, see Appendix 1

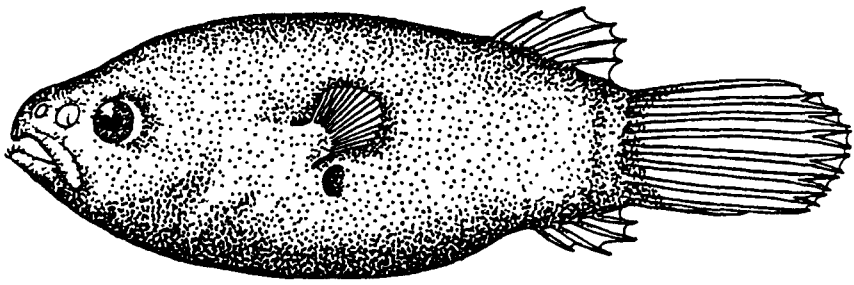

Fig. 5 *Himantolophus brevirostris*, 40 mm SL, Regan (1926)

Description Escal bulb height 13 1% SL, width of base of escal bulb 8 7% SL, length of distal escal appendage 10 0% SL, length of stem of illicium 53 6% SL Four bulbous swellings around base of distal escal appendage Illicium covered with small spines (illicium of holotype naked – see Bertelsen & Krefft 1988 60) Distal appendage dusky, with distal tips white, darker posteriorly and paler anteriorly, posterior appendage dark, with distal tips white Chin and snout papillae well developed and flattened Remaining characters similar to those of holotype

Comments This record represents the second known specimen of this species and the first for New Zealand It appears that *H pseudalbinares* is found within the same water mass as *H appelii* The holotype of *H pseudalbinares* was not examined by us, but our identification of AIM 6850 was kindly confirmed by the late E Bertelsen (ZMUC) The small differences (relatively longer illicium, absence of distinctive illicial filaments and spines on the illicium) are within the range of variation observed in its nearest relative (E Bertelsen, pers comm 1992)

***Himantolophus brevirostris*-group Bertelsen & Krefft, 1988 (Fig. 5)**

Rhynchoceratias brevirostris Regan, 1925 (holotype ZMUM P9263, 30 5 mm SL, 08° 19′N, 44° 35′W) For full synonymy, see Bertelsen & Krefft (1988)

Diagnosis Males of the *H brevirostris*-group differ from those of *H appelii* and the *H rostratus*-group by the following combination of characters olfactory lamellae 10–13, greatest diameter of posterior nostril 3 3–5 5% SL, length of snout 13–17% SL, 16–31 upper and ~20–38 lower denticular teeth (Bertelsen & Krefft 1988)

Material examined 1 specimen, 29 mm SL, see Appendix 1

Description Olfactory lamellae 11, greatest diameter of posterior nostril 4 1% SL, length of snout 13 8% SL, eye diameter 7 4% SL, upper dentary teeth 20, lower dentary teeth 24, head and body covered with small, curved prickles, olfactory lamellae creamy white, head and body dark brown, dorsal, anal and caudal fins creamy white

Comments According to Bertelsen & Krefft (1988), the only metamorphosed or metamorphic himantolophid males that can be identified to species are those of *H appelii* The present specimen differs from *H appelii* in having a smaller posterior nostril (4 1% vs 5 7–6 7%) and a shorter snout length (13 8% vs 17–18%) The other grouping, *H rostratus*, is distinguished primarily by a higher number of nasal lamellae (14–17 vs 10–13) The absence of a dark pigment spot in front of the dorsal fin also serves to distinguish this specimen from the *H rostratus*-group Bertelsen & Krefft (1988) believed that *H brevirostris* represents males of the *H groenlandicus*-group of females The only members of the *H groenlandicus*-group to occur in the Pacific region are *H danae* Regan & Trewavas, 1932 and *H sagamius*

(Tanaka, 1918), which are restricted to the central and northern Pacific. The *H. brevirostris*-group of males have a wide distribution throughout the Atlantic and Indo-Pacific, but are concentrated in the Atlantic (Bertelsen & Krefft, 1988: 79, fig. 45). This is the first record from the *H. brevirostris*-group of males for the New Zealand region.

Family Diceratiidae

Diagnosis: Females are distinguished from those of other ceratioid families by having a second cephalic ray bearing a distal luminous gland appearing as a club-shaped ray immediately behind the illicium in young specimens; and in larger specimens this is withdrawn beneath the skin, its presence indicated by a small pore. They may further be distinguished by the following combination of characters: opercle bifurcate; subopercle with a well developed anterior spine; sphenotic spines present; hyomandibular with a double head; pectoral radials 3; skin covered with numerous microscopic dermal spines; dorsal fin rays 5–7; anal fin rays 4; pectoral fin rays 13–16; Males probably non-parasitic; skin spinulose; 2 denticular teeth on snout and 2 transverse series each of 4 or 5 on lower jaw, all separate; eyes and nostrils lateral (Bertelsen 1983).

Comments: No member of the family Diceratiidae has yet been recorded from New Zealand waters. Two species, however, are known from Indonesian waters: *Diceratias bispinosus* (Günther, 1887) (see Paxton & Lavenberg, 1973), and *Phrynichthys thele* Uwate, 1979. For a full family revision, see Uwate (1979).

Family Oneirodidae

Diagnosis: The numerous and variously specialised genera of the Oneirodidae have few features in common that distinguish them from other ceratioid families. Although not characteristic of all genera, the following features are useful in differentiating New Zealand oneirodids: opercle bifurcate; 3 pectoral radials; hyomandibular with a double head; anterior subopercular spine usually absent (a blunt projection present in males of *Dolopichthys*); skin spines absent (microscopic dermal spines present in at least some species of *Oneirodes*); dorsal fin rays 4–8; anal fin rays 4–7; pectoral fin rays 14–30. Males non-parasitic; skin naked; posterior end of upper denticular remote from anterior end of pterygiophore of illicium; eyes and posterior nostrils lateral; anterior nostrils close together and directed anteriorly; olfactory organs large; nasal area with or without pigment. Comprising 15 genera (see Pietsch 1974, 1978), with three recorded from New Zealand.

Key to females of Oneirodidae recorded from New Zealand waters

1A Sphenotic spines absent; opercle not deeply notched posteriorly; pelvic bones widely expanded distally, occasionally triradiate (*Chaenophryne*) 2

1B Sphenotic spines present; opercle deeply notched posteriorly; pelvic bones rod-shaped, not expanded or only slightly expanded distally 3

2A Esca with a pair of internally pigmented anterior appendages; medial escal appendage or appendages present; pectoral fin rays 17–22, rarely fewer than 18 ..... *Chaenophryne longiceps* (p. 11)

2B Esca with an unpaired, internally pigmented anterior appendage; medial escal appendage(s) absent; pectoral fin rays 16–19, rarely more than 18 ..... *Chaenophryne draco* (p. 11)

3A Caudal fin not covered by black skin except at base; anal fin rays 4, rarely 5; subopercle short and broad, with lower part nearly circular (*Oneirodes*) 4

3B Caudal fin covered by black skin for some distance beyond fin base; anal fin rays 5, rarely 4; subopercle long and narrow, with lower part strongly oval ..... *Dolopichthys pullatus* (p. 13)

4A Esca with 1–3 elongate medial appendages 5
4B Esca without elongate medial appendages 6
5A Esca with a single unpaired medial appendage, approximately as long as escal bulb; anterior escal appendage, including terminal filaments, considerably longer than illicium (Fig. 9a) ..... *Oneirodes haplonema* n. sp. (p. 15)
5B Esca with 2 or 3 medial filaments > 6× length of escal bulb; anterior escal appendage, including terminal filaments, much shorter than illicium (Fig. 10) ..... *Oneirodes kreffti* (p. 17)
6A Anterior escal appendage laterally compressed; posterior escal appendage < half length of escal bulb (Fig. 11a-c) ..... *Oneirodes sebax* (p. 17)
6B Anterior escal appendage cylindrical; posterior escal appendage considerably longer than escal bulb 7
7A Lateral escal appendage present (Fig. 12 a, b) ..... *Oneirodes whitleyi* (p. 17)
7B Lateral escal appendage absent (Fig. 13 a-c) ..... *Oneirodes eschrichtii* (p. 18)

Genus *Chaenophryne* Regan, 1925

For full synonymy, see Pietsch (1975).

Diagnosis: Males and females are distinguished from those of other oneirodid genera in having the subopercle long and narrow, the upper end tapering to a point; posterior margin of opercle only slightly concave; anal fin rays 5, rarely 4. Females are further distinguished by the absence of sphenotic spines (blunt ridges on parietals and post-temporals); dorsal margin of frontal strongly curved; and pigmented skin extending posteriorly well beyond base of caudal fin. Males are further distinguished by having the nasal area pigmented; posterior nostril not contiguous with eye; lower denticular teeth 17–27. Four species, 2 known from New Zealand waters.

***Chaenophryne longiceps* Regan, 1925 (Fig. 6)**

Chaenophryne longiceps Regan, 1925: 564, figs 6, 7 (in part; original description, 14 specimens, lectotype ZMUC P92106, 20 mm SL, 07°30′N, 79°19′W, 3000 m, 11 January 1922). For full synonymy, see Pietsch (1975).

Diagnosis: Esca with a pair of internally pigmented anterior appendages; medial escal appendages present; width of escal bulb 5.3–11.4% SL (in specimens > 20 mm); pectoral fin rays 17–22, rarely fewer than 18.

Material examined: 2 specimens, 90 mm and 155 mm SL; see Appendix 1.

Description: Dorsal fin rays 6; anal fin rays 5; pectoral fin rays 18–20; illicial length 23.2–35.5% SL; escal bulb width 5.5% SL (escal bulb for NMNZ P 25025 dehydrated); 40/57, 42/52 teeth upper jaw/lower jaw (ratios 0.70–0.81).

Comments: *Chaenophryne longiceps* is widely distributed in the Atlantic, Indian and Pacific oceans (Pietsch 1975). This is the first record for New Zealand waters and represents the most southerly record. Counts and measurements agree with those given by Pietsch (1975), but the tooth counts of NMNZ P 25025 are slightly higher for the upper jaw (42 vs. 40 max.). However, the teeth ratios fall within the known limits set – 0.70–0.94 (Pietsch 1975).

***Chaenophryne draco* Beebe, 1932 (Fig. 7)**

Chaenophryne draco Beebe, 1932: 84, fig. 22 (holotype USNM 170943, 16.5 mm SL, 32°12′N, 64°36′W, 1100 m, 15 August 1931).
For full synonymy, see Pietsch (1975).

Diagnosis: Esca with an unpaired, internally pigmented anterior appendage; medial escal

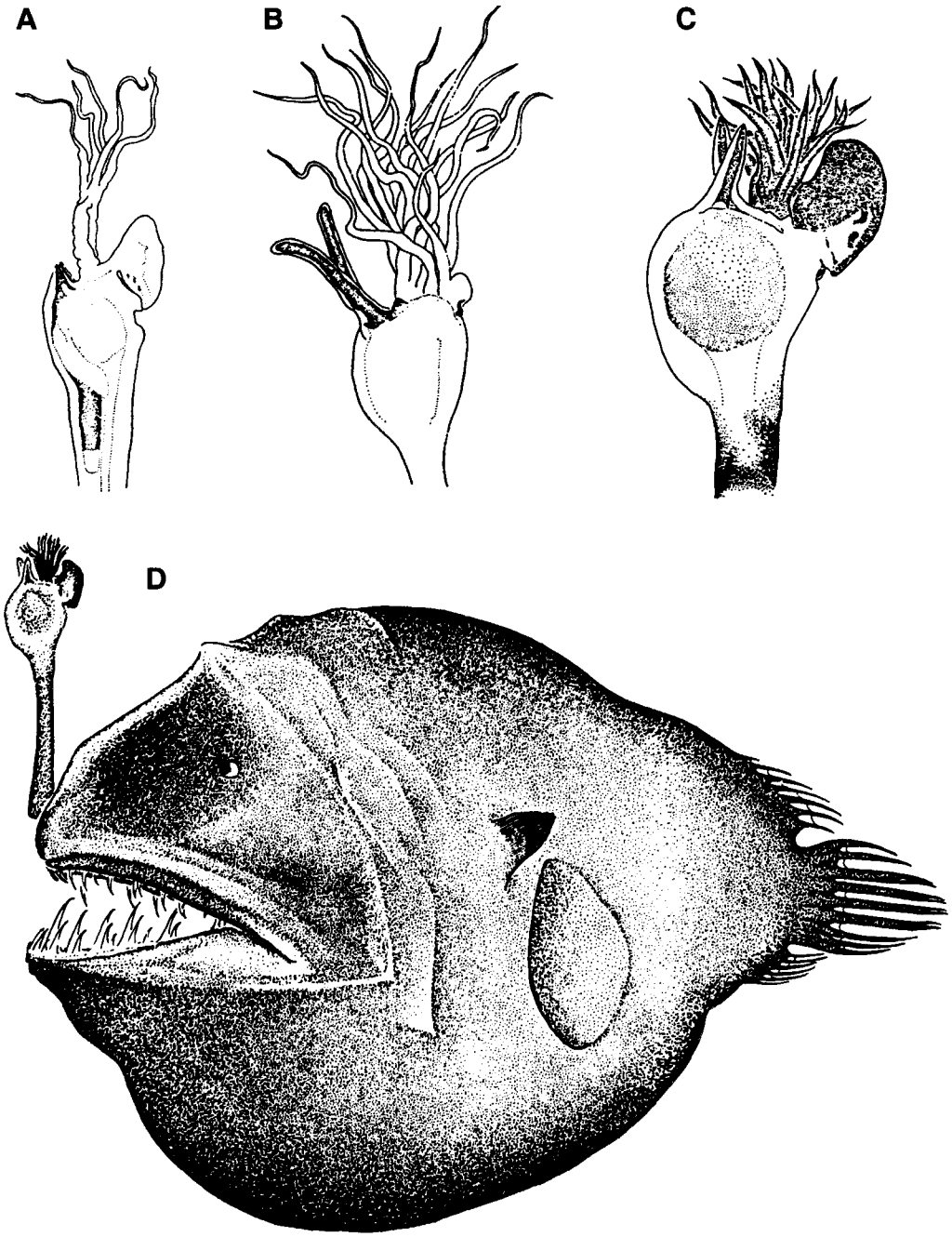

Fig. 6 *Chaenophryne longiceps*: **A-C**, escae in left lateral view – **A,** MCZ 49854, 29 mm SL; **B,** MCZ 49857, 39 mm SL; **C**, ISH 607/73, 103 mm SL; **D,** ISH 237/73, 102 mm SL, Pietsch (1975).

appendages absent; width of escal bulb 2.1–6.6% SL (in specimens > 20 mm); pectoral fin rays 16–19, rarely more than 18.

Material examined: 1 specimen 97 mm SL; see Appendix 1.

Description: Dorsal fin rays 7, anal fin rays 5; pectoral fin rays 17.

Fig. 7 *Chaenophryne draco*: **A**, esca in left lateral view, MCZ 48963, 12.5 mm SL, Pietsch (1975), **B**, 38 mm SL, Munk & Bertelsen (1983).

Comments: *Chaenophryne draco* has a wide distribution, occurring in the Atlantic, Indian and Pacific oceans. Bertelsen & Pietsch (1983) recorded two specimens from off New South Wales, Australia, but the specimen listed here is the first New Zealand record. It compares well in all ways with previously described material of this species.

Genus *Dolopichthys* Garman, 1899

For full synonymy, see Pietsch (1972b).

Diagnosis: Males and females are distinguished from those of other oneirodid genera in having the opercle deeply notched posteriorly; subopercle long and narrow, the upper part tapering to a point; anal fin rays 5, rarely 4. Females are further distinguished by having sphenotic spines; dorsal margin of frontal bones nearly straight; and pigmented skin extending well beyond base of caudal fin. Males are further distinguished by having nasal area pigmented; posterior nostril contiguous with eye; lower denticular teeth 4–10. Six species, 1 from New Zealand waters.

Dolopichthys pullatus Regan & Trewavas, 1932 (Fig. 8)

Dolopichthys pullatus Regan & Trewavas, 1932: 79, fig. 123, pl. 3 fig. 1 (holotype

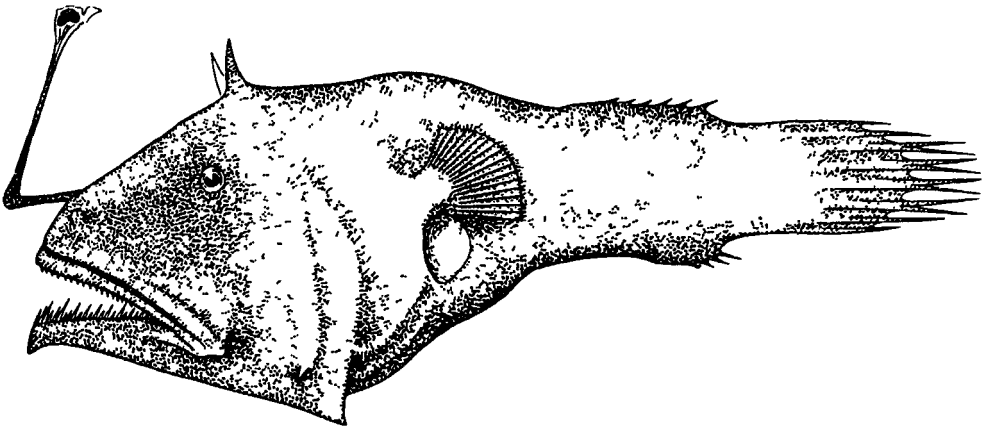

Fig. 8 *Dolopichthys pullatus*, ZMUC P9210, 132 mm SL, Regan & Trewavas (1932)

ZMUC P92101, 34 mm SL, Molucca Sea, 02°22′S, 126°58 5′E, 5000 m wire out, 27 March 1929)

For full synonymy, see Pietsch (1972b)

Diagnosis Illicial length 26–43% SL, teeth in lower jaw > 85 in specimens 18–25 mm SL, > 150 in specimens 25–70 mm SL, > 300 in specimens > 70 mm SL, teeth on vomer 4 or more (usually > 6), dorsal midline of escal bulb with a posteriorly to posterodorsally directed papilla

Material examined 1 specimen, 28 mm SL, see Appendix 1

Description Dorsal fin rays 5, anal fin rays 4, pectoral fin rays 17, caudal fin rays 9 Lower jaw teeth 152, vomer teeth 4 The specimen is small, and partially dehydrated, making measurements difficult

Comments More than 35 individuals of *Dolopichthys pullatus* have been reported from localities in the Atlantic, Pacific and Indian oceans (Pietsch 1972b), including the holotype from the Molucca Sea, a specimen collected from the Banda Sea (Pietsch & Seigel 1980), and four specimens from off New South Wales, Australia (Bertelsen & Pietsch 1983) The closely related species *D longicornis* Parr, 1927 is known from 19 metamorphosed females Two of these were taken adjacent to Australia (see Bertelsen & Pietsch 1983), and the species thus probably occurs in New Zealand waters as well It can be separated from *D pullatus* by having fewer teeth in the lower jaw at all size ranges, and in having the dorsal midline of the escal bulb with a dorsally to anterodorsally directed papilla (Pietsch 1972b)

Genus *Oneirodes* Lütken, 1871

For full synonymy, see Pietsch (1974)

Diagnosis Males and females are distinguished from those of other oneirodid genera in having the subopercle short and broad, with the lower part (and upper part in males) semicircular, anal fin rays 4, very rarely 5 Females are further distinguished by having sphenotic spines, dorsal margin of frontal bone strongly curved, and pigmented skin not extending beyond base of caudal fin Males are further distinguished by having skin between nostrils unpigmented, inner surface of subopercle unpigmented, caudal peduncle without subdermal pigment, 7–13 lower denticular teeth Approximately 35 species, with 5 recorded from New Zealand waters, one of which is described here as new

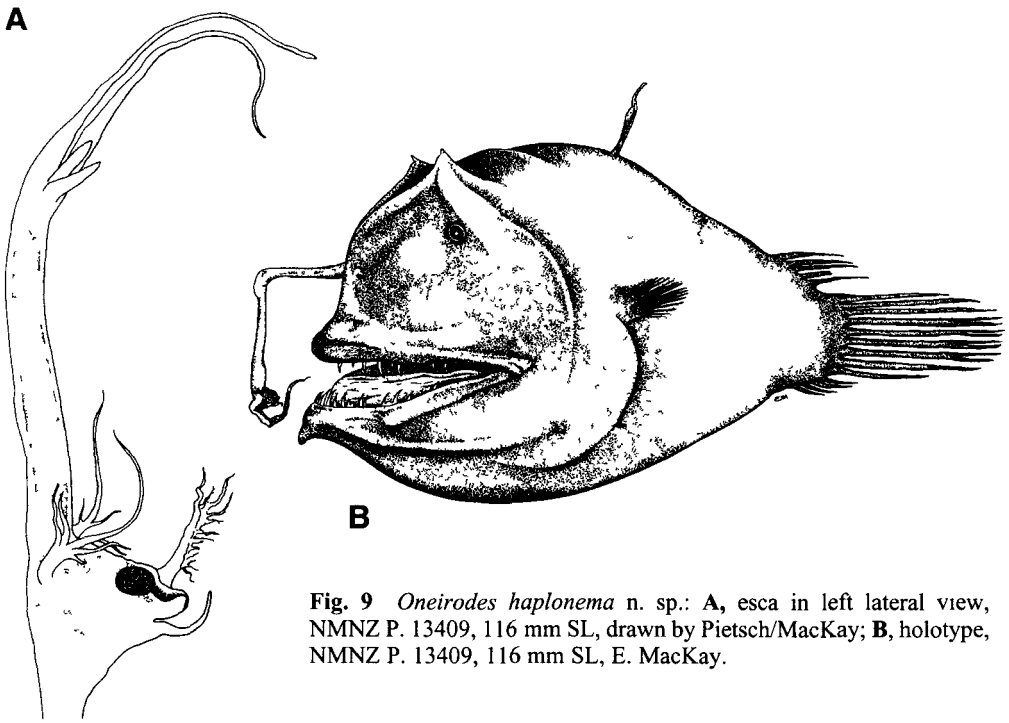

Fig. 9 *Oneirodes haplonema* n. sp.: **A,** esca in left lateral view, NMNZ P. 13409, 116 mm SL, drawn by Pietsch/MacKay; **B**, holotype, NMNZ P. 13409, 116 mm SL, E. MacKay.

***Oneirodes haplonema* n. sp. (Fig. 9)**

Material examined: Holotype, **NMNZ P 13409,** 116 mm SL, northern Challenger Plateau, 37°31.3′S, 169°31.9′E, 1132–1128 m, 23 February 1983.

Diagnosis: *Oneirodes haplonema* differs from all described species of the genus in having the following combination of escal characters: a large, internally pigmented anterior appendage, its width nearly equal to that of illicium, its length including terminal filaments > 22% SL; an unpaired, highly filamentous medial appendage arising from base of terminal escal papilla; a short, cylindrical posterior appendage (Fig. 9a).

Description: Escal appendage pattern B (see Pietsch 1974, fig. 60); a large, cylindrical, internally pigmented anterior appendage, its width nearly equal to that of illicium, its length, including terminal filaments, 22.4% SL; terminus of anterior escal appendage bearing a pair of compressed, blade-like extensions and 2 elongate, tapering filaments, each measuring approximately 9.2% SL. An unpaired, highly filamentous medial escal appendage emerging from anterior margin of base of terminal escal papilla. An elongate, posteriorly directed terminal esca bearing a single distal streak of black pigment. A small, cylindrical posterior escal appendage, without secondary filaments, its length considerably less than that of medial escal appendage. A highly branched, anterolateral escal appendage arising from either side at base of anterior escal appendage, its longest filament about one-third as long as anterior escal appendage. Lateral escal appendages absent. Anterior escal appendage with distal tip of internal tube bearing a distinct, translucent 'eye-spot' (Fig. 9a). Subopercle with posterodorsal margin convex, not indented. Opercle with lower fork of length 27.6% SL, upper fork length 12.5% SL. Epibranchial teeth absent; second pharyngobranchial well toothed; vomerine teeth 3–3; upper jaw teeth 34; lower jaw teeth 42; dorsal fin rays 5; anal fin rays 4; pectoral fin rays 16 or 17. Measurements (as % SL): head length 41.4; head depth 44.0; head width

Fig. 10 *Oneirodes kreffti*, esca in **A,** anterolateral view, **B,** posterolateral view, Pietsch (1974).

31.0; lower jaw length 45.6; premaxillary length 34.4; illicium length 16.4. Length of anterior escal appendage, excluding terminal filaments 13.2; total length 22.4. Other characters as for genus (see Pietsch 1974).

Distribution: *Oneirodes haplonema* is known only from New Zealand waters.

Etymology: The specific name *haplonema* (Greek *haplos*, 'single' or 'simple', and *nema*,

'thread' or 'appendage') alludes to the single unpaired medial escal appendage characteristic of this species.

Discussion: *Oneirodes haplonema* is one of four species of the genus sharing a single, unpaired, medial escal appendage. The other three are *O. macronema* Regan & Trewavas, 1932 (three female specimens from the Caribbean Sea, Azores, and Hawaiian Islands); *O. clarkei* Swinney & Pietsch, 1988 (one female from the eastern North Atlantic); and *O. pithales* Orr, 1991 (one female from the western North Atlantic). *Oneirodes haplonema* differs from *O. macronema* and *O. clarkei* in having a much larger anterior escal appendage, considerably longer than its illicial length (137%) but much shorter than the escal bulb in the other two species. It differs further from *O. macronema* and also from *O. epithales* in having an anterolateral escal appendage, and from *O. clarkei* and *O. epithales* in having a simple, unbranched posterior escal appendage.

Oneirodes kreffti Pietsch, 1974 (Fig. 10)

Oneirodes kreffti Pietsch, 1974: 57, figs 60B, 75, 76, 107, tables 1, 12 (holotype ISH 1536/71, 50 mm SL, 30°04′S, 05°22′E, 0–500 m, 31 March 1971).

Diagnosis: A well developed pair of lateral escal appendages, and a pair of stout medial appendages; lower jaw 39–50 % SL.

Material examined: 4 specimens, 65–111 mm SL; see Appendix 1.

Description: Dorsal fin rays 5 or 6; anal fin rays 4; pectoral fin rays 16–18; teeth in upper jaw 34–48; teeth in lower jaw 33–42; vomerine teeth 6–8. Lower jaw 36.6–45.7% SL.

Comments: The pectoral fin ray, tooth counts and lower jaw length are slightly outside those given in the original description (Pietsch 1974), but as the present account doubles the known number of specimens, greater variation is to be expected. The escal appendage agrees with the pattern given in the original description. This account also increases the maximum known size, from 53.5 mm to 111 mm, and represents the first records of the species from New Zealand waters.

Oneirodes sebax Pietsch & Seigel, 1980 (Fig. 11)

Oneirodes sebax Pietsch & Seigel, 1980: 387, figs 9,10, table 3 (holotype LACM 36116–3, 46 mm SL, Banda Sea, 05°04.5′S, 130°12′E, 0–1500 m, 28 April 1975).

Diagnosis: Esca with a compressed, unpigmented anterior appendage; medial appendage present; posterior appendage cylindrical and unbranched.

Material examined: 3 specimens, 52–135 mm SL; see Appendix 1.

Description: Dorsal fin rays 5 or 6; anal fin rays 4; pectoral fin rays 14–17: jaw teeth (upper/lower) 32–43/36–47; vomerine teeth 4–9.

Comments: The original description was based on 14 metamorphosed females collected from South-east Asia and eastern Australia (Pietsch & Seigel 1980).

Oneirodes whitleyi Bertelsen & Pietsch, 1983 (Fig. 12)

Oneirodes whitleyi Bertelsen & Pietsch, 1983: 85–86, fig. 7, table 1 (holotype AMS 1.20066–003, 30 mm SL, east of Brush Island, New South Wales, 35°36′S, 150°55′E, 0–650 m, 27 October 1977).

Diagnosis: Anterior escal appendage cylindrical, with internal tube darkly pigmented and a conical distal tip bearing 3–5 short lateral filaments (Fig. 12a, b); a pair of highly branched medial appendages; posterior appendage cylindrical, unpigmented, and approximately 1.5× length of escal bulb; a cylindrical lateral appendage on either side, bifurcated distally and bearing a small lateral filament or none.

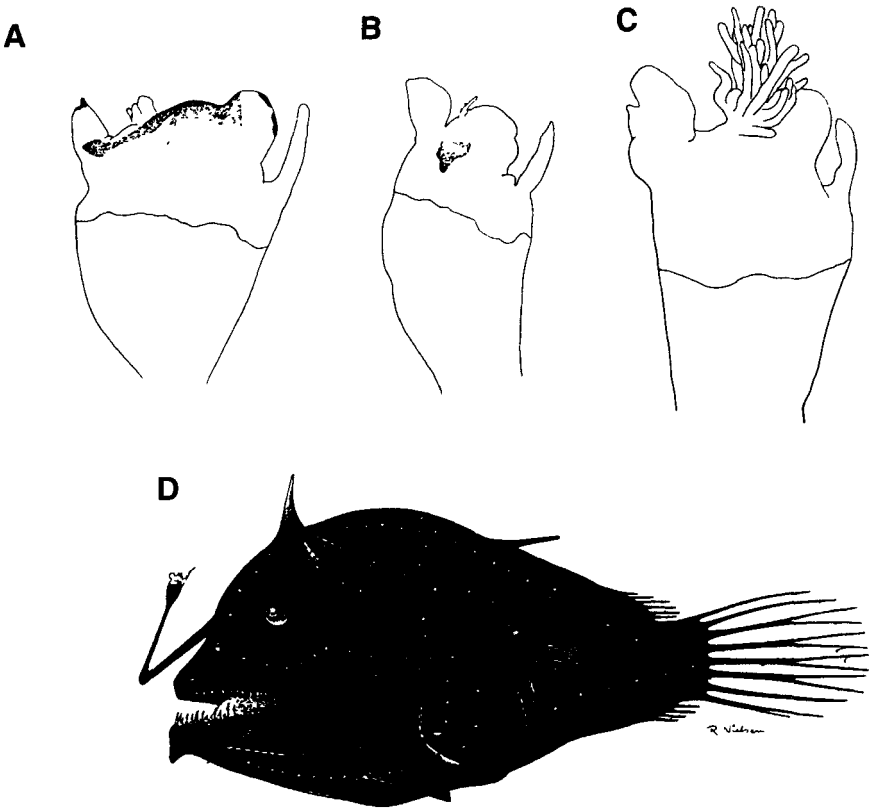

Fig. 11 *Oneirodes sebax*: **A-C,** escae in left lateral view — **A,** paratype, 17 mm SL LACM 36089–4, **B,** paratype, 26.5 mm SL, LACM 36087–4, **C,** holotype, 46 mm SL, LACM 36116–3, all Pietsch & Seigel (1980); **D,** paratype, 39 mm SL, AMS I.20314–016, Bertelsen & Pietsch (1983).

Material examined: 11 specimens, 13–62 mm SL; see Appendix 1.

Description: Dorsal fin rays 6; anal fin rays 4; pectoral fin rays 15–17; teeth on upper/lower jaws 20–33/27–33; teeth on the vomer 4–6.

Comments: This account substantially increases the number of specimens of *O. whitleyi* known since the original description, and increases the maximum known size to 62 mm. Counts differ only slightly from the original description, but this is to be expected with the increased number of specimens available for examination. The escal pattern agrees well with that described by Bertelsen & Pietsch (1983). First recorded from New Zealand waters by Roberts (1991).

Oneirodes eschrichtii Lütken, 1871 (Fig. 13)

Oneirodes eschrichtii Lütken, 1871: 56–74, pl. 2, figs 1 & 2 (holotype ZMUC 64, 160 mm SL, off west coast of Greenland). For full synonymy, see Pietsch (1974).

Diagnosis: Esca with anterior appendage bearing papillae and a few short filaments at distal tip; posterior appendage never branched.

Material examined: 1 specimen, 12 mm SL; see Appendix 1.

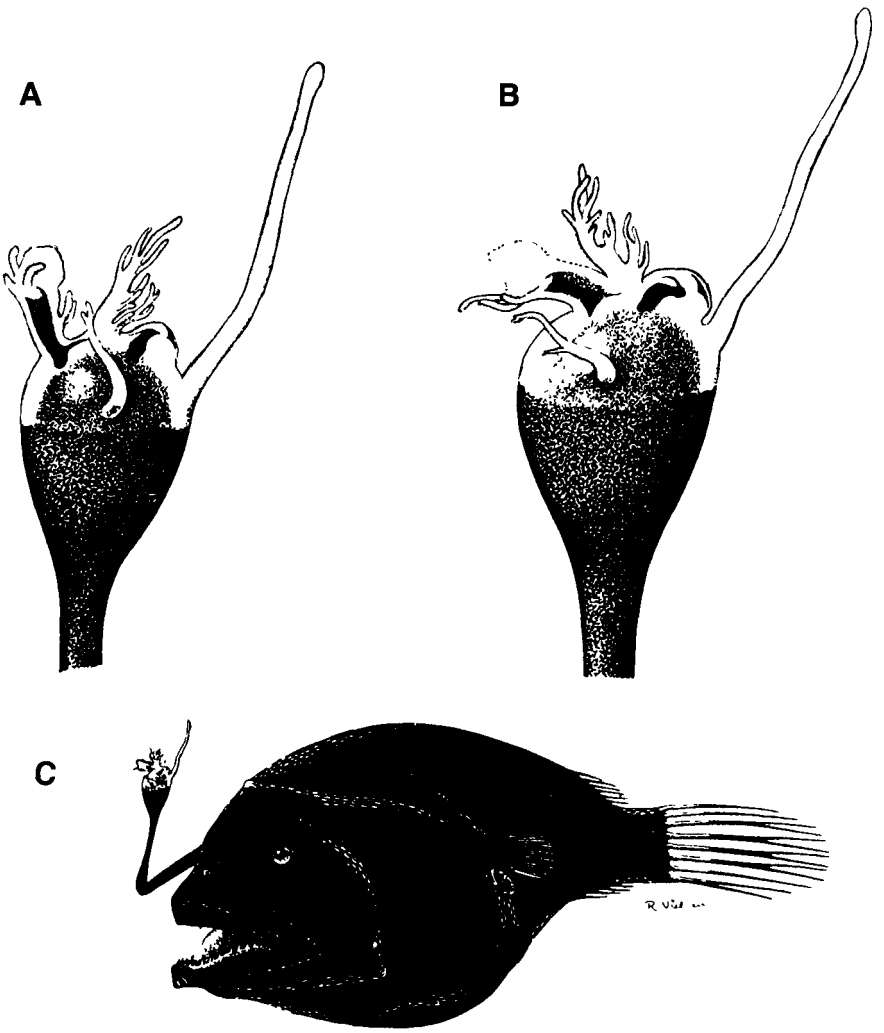

Fig. 12 *Oneirodes whitleyi*: **A, B,** escae in left lateral view — **A,** paratype, 22 mm SL, AMS I.20066–070, **B,** holotype, 30 mm SL, AMS I.20066–003; **C,** holotype, 30 mm SL, AMS I.20066–003, Bertelsen & Pietsch (1983).

Description: Dorsal fin rays 5; anal fin rays 4; pectoral fin rays damaged, not counted; caudal rays 9.

Comments: *Oneirodes eschrichtii* has a cosmopolitan but patchy distribution, and appears to be absent from Antarctic waters. Although taken on the northern margin of the 200 mile EEZ, the specimen examined here is included as we consider its occurrence in northern waters to be highly probable. The specimen is very small and the gut region is disintegrating. The illicium and esca are in good condition and fall well within the variation known for the species. This is the type species of *Oneirodes*.

***Oneirodes* sp. indet.**

Material examined: 6 specimens, 11–187 mm SL; see Appendix 1.

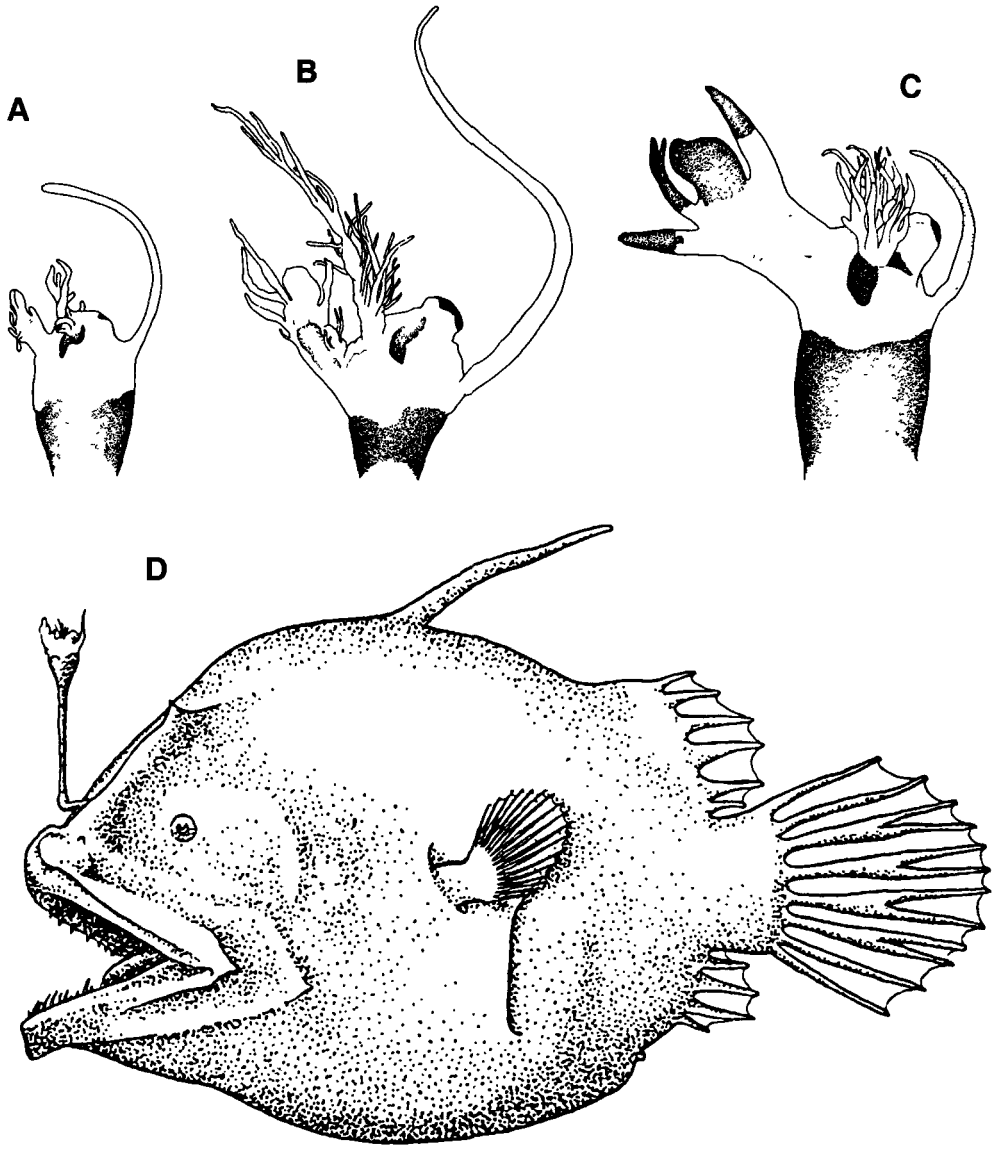

Fig. 13 *Oneirodes eschrichtii*: **A-C,** escae in left lateral view — **A,** BMNH 1939.5.24.1921, 14.5 mm SL, **B,** MMF 14015, 57 mm SL, **C,** ISH 3048/71, 118 mm SL, all after Pietsch (1974); **D,** 160 mm SL, after Regan (1926).

Comments: The illicium and/or esca of these specimens is either lost or so damaged that identification beyond genus cannot be made.

A number of other *Oneirodes* species have been collected from South-east Asian waters, any or all of which might be expected to occur off New Zealand (see Pietsch 1974; Pietsch & Seigel 1980; Bertelsen & Pietsch 1983):

O. alius Seigel & Pietsch, 1978

O. carlsbergi (Regan & Trewavas, 1932)

O. cristatus (Regan & Trewavas, 1932)
O. flagellifer (Regan & Trewavas, 1932)
O. melanocauda Bertelsen ,1951
O. micronema Grobecker, 1978
O. plagionema Pietsch & Seigel, 1980
O. pterurus Pietsch & Seigel, 1980
O. schistonema Pietsch & Seigel, 1980
O. schmidti (Regan & Trewavas, 1932)
O. thysanemus Pietsch & Seigel, 1980

Several other oneirodid genera have been collected from South-east Asia, any or all of which might be expected to occur off New Zealand (see Pietsch 1974; Pietsch & Seigel 1980; Bertelsen & Pietsch 1983):

Danaphryne nigrifilis Regan & Trewavas, 1932
Microlopichthys microlophus Regan, 1925
Chirophryne xenolophus Regan & Trewavas, 1932
Pentherichthys spp.
Lophodolos indicus Lloyd, 1909

Family Thaumatichthyidae

Diagnosis: Females are distinguished from those of other ceratioid families by having the upper jaw extending anteriorly far beyond the lower jaw and anteriorly separated, the only connection an elastic membrane; long, hooked premaxillary teeth; and 1– 3 hooked denticles on esca.

Males of *Thaumatichthys* are distinct from males of other families in having 4 separate, hooked denticles arranged in a quadrate pattern on tip of snout; 7 denticles arranged in 2 transverse series on tip of lower jaw; and dermal spines present on body.

Comments: No member of this family has yet been recorded from New Zealand. The holotype of *Thaumatichthys pagidostomus* Smith & Radcliffe, 1912 (USNM 72952) was collected off Sulawesi. For a full review of genus *Thaumatichthys*, see Bertelsen & Struhsaker (1977); for *Lasiognathus*, see Bertelsen & Pietsch (1996).

Family Centrophrynidae

Diagnosis: Females are distinguished from those of other ceratioid families by the following combination of characters: opercle bifurcate; subopercle with an anterior spine (reduced in large specimens); pectoral radials 4 (fusing to 3 in specimens > 150 mm); hyomandibular with head double; teeth present on epibranchial I and ceratobranchials I-IV; esca with a laterally compressed, fan-shaped appendage; escal filaments absent. Larvae, males, and juvenile females with a short, simple hyoid barbel. Males probably non-parasitic; upper denticular with 3 teeth, lower denticular 4 teeth; eyes lateral, diameter < 50% SL; nostrils opening anteriorly; skin naked.

Comments: No specimens of this monotypic family have been recorded from New Zealand waters. The lectotype of *Centrophryne spinulosa* (ZMUC P92122) was captured off northern New Guinea (Regan & Trewavas 1932). For a full review, see Pietsch (1972a).

Family Ceratiidae

Diagnosis: Females are distinguished from those of other ceratioid families by having 2 or 3 fleshy caruncles on the dorsal midline just anterior to the dorsal fin origin, each bearing a bioluminescent gland (Bertelsen 1951: 16). Other diagnostic features are: posterior end of illicial pterygiophore emerging on dorsal midline just anterior to caruncles; sphenotic spines absent; mouth strongly oblique to vertical; body densely covered by close-set dermal spines;

dorsal fin rays 3–5 (usually 4); anal fin rays 4 (usually) or 5; caudal fin rays 8 or 9 (8 in *Cryptopsaras*; the 9th or lowermost ray reduced to a small remnant in *Ceratias*). Adult males parasitic; free-living stages with a pair of large denticular teeth on snout, fused at base and articulating with pterygiophore of illicium; lower jaw with 2 pairs of denticular teeth on tip; eyes large; olfactory glands minute.
Comprising 2 genera with 4 species (Pietsch 1986).

Key to females of Ceratiidae

1A Illicium short, nearly completely enveloped by tissue of escal bulb; trunk with 3 caruncles on dorsal midline just anterior to origin of soft dorsal fin; subopercle with an anterior spine ..... *Cryptopsaras couesi* (p. 25)
1B Illicium long, considerably longer than escal bulb; trunk with 2 caruncles on dorsal midline just anterior to origin of soft dorsal fin; subopercle without an anterior spine (*Ceratias*) 2
2A Esca with a pair of distal appendages (Fig. 14); vomerine teeth present ..... *Ceratias tentaculatus* (p. 22)
2B Esca with not more than a single distal appendage; vomerine teeth present or absent 3
3A Esca with a single distal appendage (Fig. 15A-C); illicium length 15.1–37.8% SL (Fig. 15D); vomerine teeth nearly always present in metamorphosed specimens < 80 mm SL approx., only occasionally present in larger individuals ..... *Ceratias holboelli* (p. 23)
3B Esca without distal appendages; illicium length 14.0–28.8% SL; vomerine teeth absent ..... *Ceratias uranoscopus*

Key to males of Ceratiidae

1A Body without subdermal pigment ..... *Ceratias* spp.
1B Body with subdermal pigment on gill cover, dorsal surface of trunk, and caudal peduncle ..... *Cryptopsaras couesi* (p. 25)

For a key to larvae, see Bertelsen (1951).

Genus *Ceratias* Kröyer, 1845

For full synonymy, see Pietsch (1986).

Diagnosis: Females distinguished from those of *Cryptopsaras* in having 2 club-like caruncles on dorsal midline of trunk just anterior to soft dorsal fin (minute in specimens > 400 mm SL); illicium long, 19–28.8% SL; subopercle without a spine on anterodorsal margin; caudal fin rays 9, the last reduced to a small remnant. Males distinguished by having 2 pairs of lower denticular teeth of nearly equal size. Larvae, males and juvenile females without subdermal pigment.

Comments: *Ceratias* contains the largest known ceratioids, females of *C. holboelli* reaching 770 mm SL. Three species are recognised, of which two are recorded from New Zealand. On the basis of Australian material (see Pietsch 1986), the third, *C. uranoscopus* Murray in Thomson, 1877 is expected to occur here.

Ceratias tentaculatus (Norman, 1930) (Fig. 14)

Mancalias tentaculatus Norman, 1930: 355, fig. 45 (holotype BMNH 1930.1.12.1100, 80 mm SL, 52°25′S, 09°50′E, 0–700 m, 12 November 1926).
For full synonymy, see Pietsch (1986).

Diagnosis: Escal bulb with 2 distal appendages, either simple or divided into 2–8 filaments; illicial length 19.1–28.2 % SL; vomerine teeth present in all size classes (Pietsch 1986).

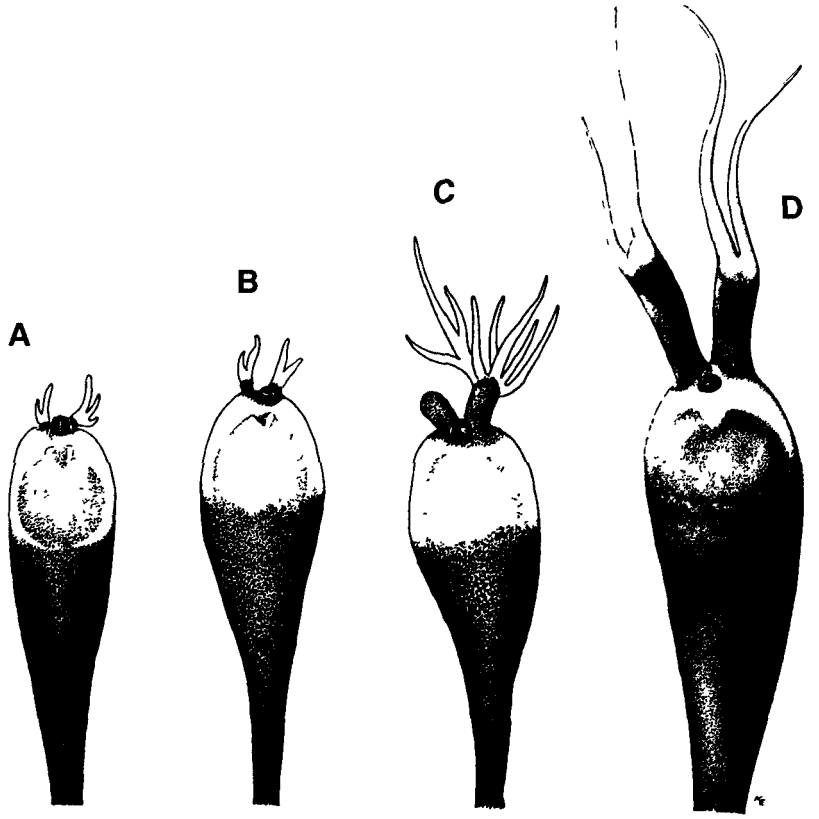

Fig. 14 *Ceratias tentaculatus*, escae in left lateral view — **A,** ISH 435/71, 90 mm SL, **B,** ISH 386/76, 123 mm SL, **C,** ISH 512/76, 265 mm SL, **D,** ISH 230/71, 365 mm SL, all after Pietsch (1986)

Material examined: 8 specimens, 60–510 mm SL; see Appendix 1.

Description: Dorsal fin rays 4 or 5; anal fin rays 4; pectoral fin rays 17 or 18; caudal fin rays 9.

Comments: This species is circum-Antarctic, restricted in the Southern Ocean to between approximately 35° and 68° S, and has been taken at depths between 100 and 2900 m (Pietsch 1986).

***Ceratias holboelli* Kröyer, 1845 (Fig. 15)**

Ceratias holboelli Kröyer, 1845: 639 (holotype ZMUC 62, 680 mm SL, southern Greenland, 0–340 m)

For full synonymy, see Pietsch (1986).

Diagnosis: Escal bulb with a single simple or branched appendage; illicial length 14.5–37.8% SL; vomerine teeth (1–3 on either side) nearly always present in metamorphosed specimens < 80 mm SL approx., but rarely present in larger specimens (Pietsch 1986).

Material examined: 4 specimens, 55–173 mm SL; see Appendix 1.

Description: Dorsal fin rays 4 or 5; anal fin rays 4; pectoral fin rays 17 or 18; caudal fin rays 9.

Comments: *Ceratias holboelli* is found in the Atlantic, Pacific and Indian oceans, between

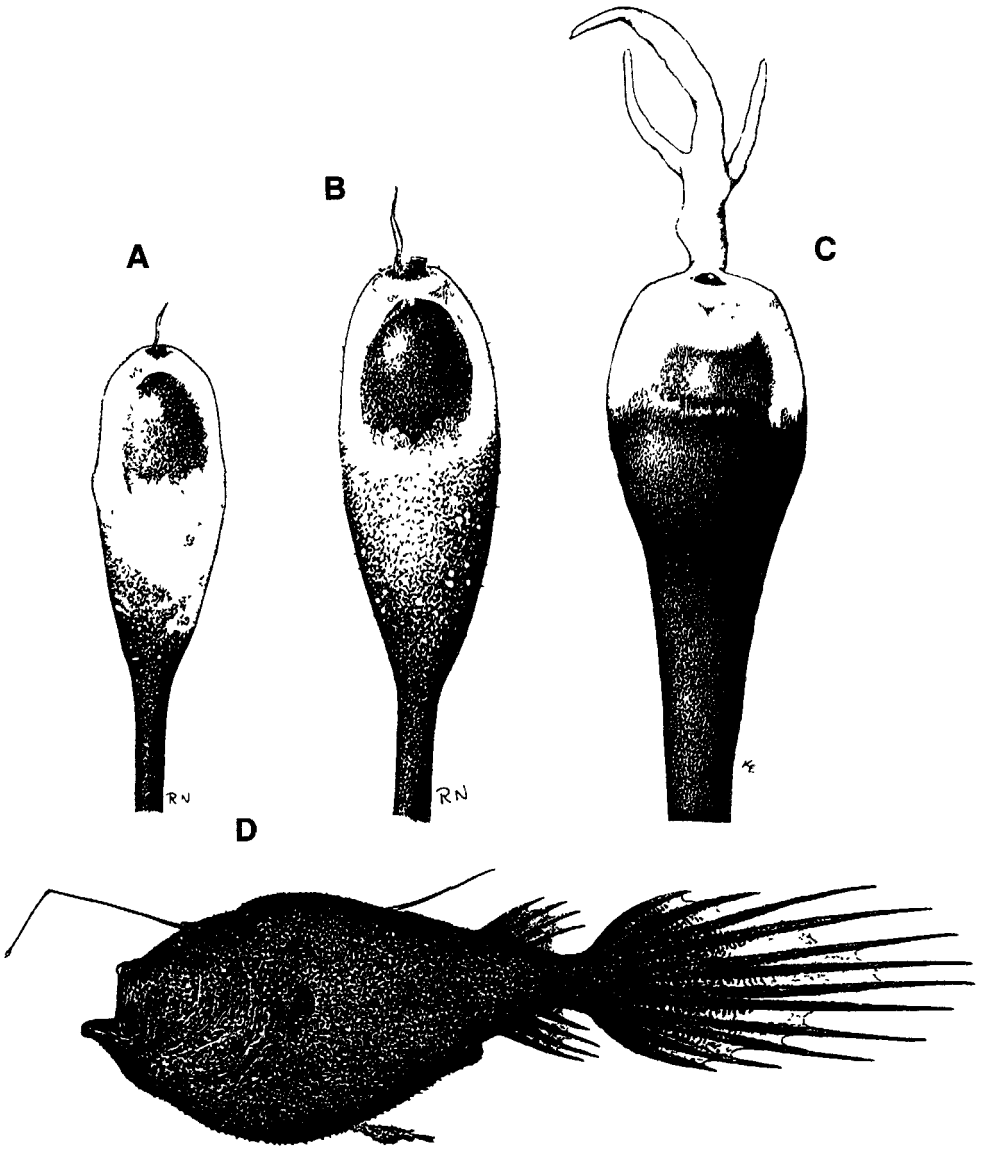

Fig. 15 *Ceratias holboelli*: **A-C,** escae in left lateral view — **A,** ISH 3312/79, 32 mm SL, **B,** ISH 3313/79, 66.5 mm SL, **C,** ZMUC P922184, 590 mm SL, all after Pietsch (1986); **D,** adult female approx. 650 mm SL with parasitic male approx. 80 mm SL, Bertelsen (1951).

66°N and 43°S. The present account indicates sympatry with its congener *C. tentaculatus*, although *C. holboelli* appears to be a more northern species in New Zealand waters. The two are taken over a similar depth range.

***Ceratias* sp.**

Additional specimens of this genus taken in New Zealand waters, have lost the illicium and/or esca, and are therefore unidentifiable to species.

Material examined: 12 specimens, 64– ~500 mm SL; see Appendix 1.

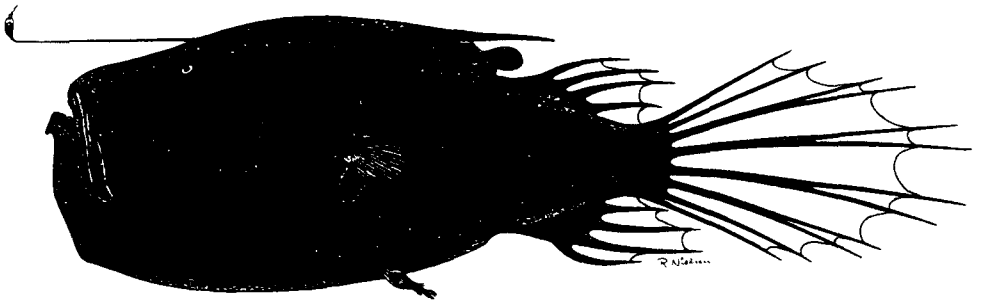

Fig. 16 *Cryptopsaras couesi*, female, 290 mm SL, with parasitic male, redrawn from Tanaka (1911); reproduced after Bertelsen & Pietsch (1983).

Comments: Most of these specimens fall within the geographical range of the two species in New Zealand waters.

Genus *Cryptopsaras* Gill, 1883

For synonymy, see Pietsch (1986).

Diagnosis: Females distinguished from those of *Ceratias* by having 3 fleshy, club-shaped caruncles on dorsal midline of trunk just anterior to origin of soft dorsal fin, the central one largest. Illicium reduced to a small remnant nearly fully enveloped by tissue of esca; spine present on anterodorsal margin of subopercle; caudal fin rays 8. Males distinguished by anterior pair of lower denticular teeth being considerably larger than posterior pair. Larvae, males and juvenile females have subdermal pigment on gill cover, dorsal surface of trunk and caudal peduncle (Pietsch 1986). A single species.

Cryptopsaras couesi Gill, 1883 (Fig. 16)

Cryptopsaras couesi Gill, 1883: 284 (holotype USNM 33558, 30 mm SL, western north Atlantic, 38°18′N, 68°24′W, 0–3086 m).
For full synonymy, see Pietsch (1986).

Diagnosis: as for genus.

Material examined: 73 specimens, 10–320 mm SL; see Appendix 1.

Description: Dorsal fin rays 4 or 5; anal fin rays 4; pectoral fin rays 18; caudal fin rays 8. Three prominent caruncles on dorsal midline just before dorsal fin origin, the central one being the largest.

Comments: *Cryptopsaras couesi* is the most commonly encountered ceratioid in the New Zealand EEZ. It has a wide distribution between 63°N and 54°S, although it appears to be absent from the western South Atlantic ocean. Pietsch (1986) reported capture of *C. couesi* between 75 m and 4000 m, although we report one specimen taken at the surface (NMNZ P 16627) as well as 25 specimens from less than 75 m, perhaps indicating vertical migration with the scattering layer. Very few of our specimens were parasitised by males: NMNZ P 17798, 230 mm SL, male 11 mm SL, attached ventrolaterally on right side anterior to opercular opening; NMNZ P 23797, 255 mm SL, male 11 mm SL, ventrolaterally on left side anterior to opercular opening; NMNZ P 24933, 300 mm SL, male 31 mm SL, anteroventrally anterior to opercular opening; NMNZ P 25942, 320 mm SL, male 26 mm SL, laterally on right side below opercular opening. NMNZ P 23888, 210 mm SL, has what appear to be remnants of a parasitic male on left side of caudal peduncle. Males attached to NMNZ P

17798 and NMNZ P 23797 were thin and flaccid, possibly degenerating. No free-living males from the study region were available for examination.

Family Gigantactinidae

Diagnosis: Females are distinguished from those of other ceratioid families by having an elongate body, with head < 35% SL, and caudal peduncle > 20% SL; sphenotic spines absent; caudal fin rays 9, but ventralmost ray reduced and embedded, giving the appearance of only 8; pectoral radials 5; and skin spinulose. Males non-parasitic, with eyes minute and olfactory organs large; anterior nostrils close together and opening anteriorly; denticular teeth all or nearly all mutually free; upper denticular teeth 3–6 (rarely 2), not connected to pterygiophore of illicium; lower denticular teeth 4–7 (rarely 3). Represented by 2 genera, *Gigantactis* and *Rhynchactis*, only the former recorded from New Zealand waters.

Genus *Gigantactis* Brauer, 1902

For synonymy, see Bertelsen et al. (1981).

Diagnosis: Females distinguished from those of *Rhynchactis* in having the lower jaw teeth well developed in several series; dorsal fin rays 5–9 (rarely 4 or 10) vs. 3 or 4, rarely 5; anal fin rays 4–7 (rarely 8) vs. 3 or 4; escal bulb present vs. absent. Males distinguished from those of *Rhynchactis* in having upper denticular teeth 3 vs. 4–6, and lower denticular teeth 4 vs. 6 or 7; dorsal fin rays 5–9 (rarely 4 or 10) vs. 4; anal fin rays 4–7 (rarely 8) vs. 3 or 4; skin spinulose in some species. Seventeen species, at least 3 recorded from New Zealand waters.

Key to females of *Gigantactis* recorded from New Zealand waters

1A Head with a cluster of white filaments on dorsal surface just behind base of illicium 2

1B Head without a cluster of white filaments on dorsal surface just behind base of illicium ..... *Gigantactis* spp. (p. 28)

2A Illicium 160–200% SL; esca without filaments at base, gradually tapering, its length 12–28% SL (Fig. 17); dentary teeth in posterior part of jaw in 3 or 4 longitudinal series ..... *Gigantactis paxtoni* (p. 26)

2B Illicium 70–120% SL; esca with filaments at base; distal prolongation of esca constricted at base, more than twice as long as wide (Fig. 18); dentary teeth in posterior part of jaw in 5 or 6 longitudinal series ..... *Gigantactis meadi* (p.27)

***Gigantactis paxtoni* Bertelsen, Pietsch & Lavenberg, 1981 (Fig. 17)**

Gigantactis paxtoni Bertelsen, Pietsch & Lavenberg, 1981: 39–41, figs 36–38, 64, tables 1, 2, 9 (holotype AMS I.20314–018, 237 mm SL, 100 km east of Broken Bay, New South Wales, 33°28′S, 152°33′E, 0–900 m, 14 December 1977).

For full synonymy, see Bertelsen et al. (1981) and Bertelsen & Pietsch (1983).

Diagnosis: Distinguished from all other species in the genus (except *G. meadi*) by the presence of filaments on the dorsal surface of the head just behind the base of the illicium. Further distinguished by the illicial length of 168–198% SL; the escal bulb gradually tapering into a conical, spinulose, darkly pigmented distal prolongation 12–28% SL; the escal bulb and distal prolongation bearing short unpigmented papillae and short filaments present on the distal prolongation. Longest dentary tooth 3.4–7.1% SL; longitudinal tooth rows 3 or 4; caudal fin rays 27.5–35 % SL.

Material examined: 4 specimens, 197–295 mm SL; see Appendix 1.

Description: Dorsal fin rays 6 or 7; anal fin rays 5 or 6; pectoral fin rays 18–21; caudal fin rays 9. Longest dentary tooth (where intact) 4.7–4.8% SL. Tooth rows 3 or 4. A prominent

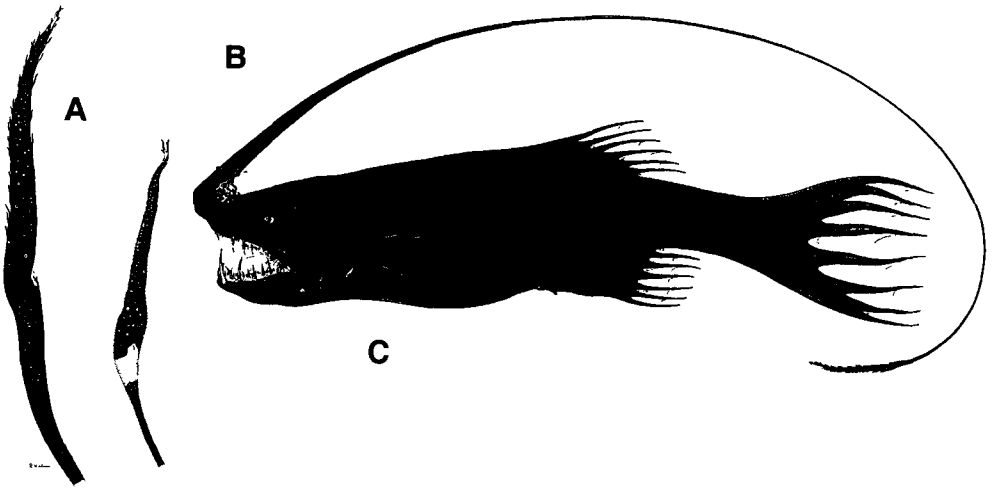

Fig. 17 *Gigantactis paxtoni*: **A, B** escae in left lateral view— **A,** holotype, AMS I.20314–018, 237 mm SL; **B,** paratype, IOAN uncatalogued, 50 mm SL; **C,** holotype, AMS I.20314–018, 237 mm SL; Bertelsen et al. (1981).

cluster of white filaments on dorsal surface at base of illicium. Caudal filaments mostly broken or damaged.

Comments: *Gigantactis paxtoni* was originally described on the basis of eight females, six collected from the south-east coast of Australia, one from the north-west coast of New Guinea, and one from the south-western Indian Ocean. Bertelsen & Pietsch (1983) recorded one additional female from off Newcastle, New South Wales. First recorded from the New Zealand region by Paulin (1984). The four specimens listed here fit well within the known range of variation for the species.

Gigantactis meadi Bertelsen, Pietsch & Lavenberg, 1981 (Fig. 18)

Gigantactis meadi Bertelsen, Pietsch & Lavenberg, 1981: 33–36, figs 32, 33, 64, tables 1, 2, 6 (holotype MCZ 52572, 306 mm, 34°14′S, 64°56′E, depth and date of capture unknown).

For full synonymy, see Bertelsen et al. (1981).

Diagnosis: Distinguished from all other species in the genus (except *G. paxtoni*) by the presence of filaments on the dorsal surface of the head just behind the base of the illicium. Further distinguished by the illicium length < 120% SL; short filaments present along entire posterior margin of illicium; escal bulb with an elongate, spinose black distal prolongation, slightly constricted at the base; escal bulb and distal prolongation with distally flattened papillae; short distal and slender proximal escal filaments present. Longest dentary tooth 2.9–3.8 % SL, longitudinal tooth rows 5 or 6; caudal fin rays < 30% SL.

Material examined: 1 specimen, 288 mm SL; see Appendix 1.

Description: Dorsal fin rays 6; anal fin rays 6; pectoral fin rays 21; caudal fin rays 9. Longest dentary tooth broken. Tooth rows 5. Longest caudal ray 28.6% SL. A cluster of white filaments on the dorsal surface at the base of the illicium.

Comments: *Gigantactis meadi* is circumglobal in the Southern Ocean in and about the subtropical convergence, where it appears to be a rather deep-dwelling form (see Bertelsen et al. 1981). The specimen reported here is the first from New Zealand waters.

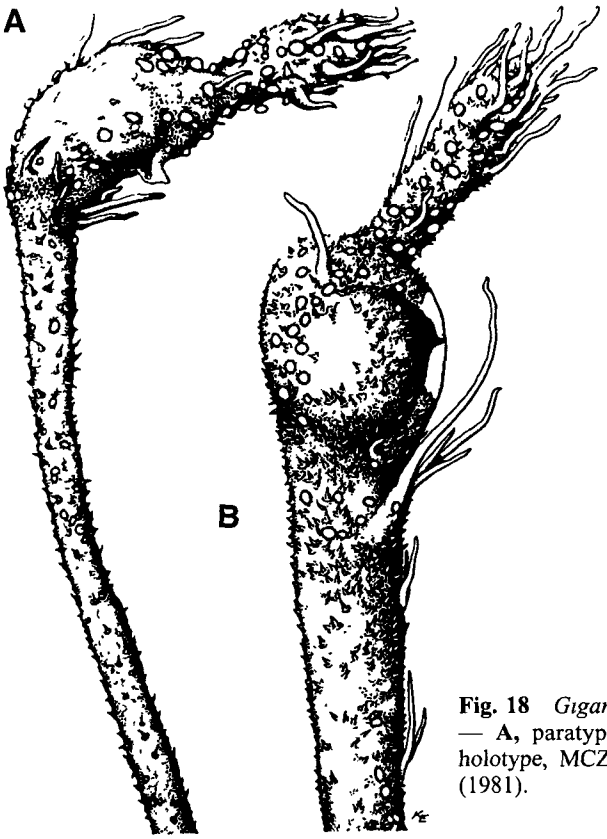

Fig. 18 *Gigantactis meadi*, escae in left lateral view — **A,** paratype, USNM 208032, 35.5 mm SL; **B,** holotype, MCZ 52572, 306 mm SL, Bertelsen et al. (1981).

***Gigantactis* spp. indet.**

Material examined: 3 specimens, 31.5–285 mm SL; see Appendix 1.

Comments: These three females have lost the esca and the distal part of the illicium, preventing specific identification. What remains of the illicium of the smallest (NMZN P 16700) measures 81 mm, or 257% SL; its longest caudal rays are 34.9% SL. These two characters indicate its membership within the *Gigantactis macronema*-group, an assemblage of four species, none of which has been taken near the Indo-Australian/New Zealand region (see Bertelsen et al. 1981, fig. 67). The largest (NMNZ P 25763) while superficially similar, apparently represents a different species. This specimen has a distinct cluster of white filaments on the dorsal surface of the head just behind the base of the illicium, a feature found only in *G. paxtoni* and *G. meadi*. What remains of the illicium measures about 110% of SL; the dentary teeth are somewhat damaged but appear to form no more than four longitudinal series. This is probably *G. paxtoni*. The third specimen (NMNZ P 21371) lacks filaments behind the base of the illicium and thus cannot represent *G. paxtoni* or *G. meadi*. It therefore appears that at least four species of *Gigantactis* inhabit New Zealand waters.

Family Neoceratiidae

Diagnosis: Females are distinguished from those of other ceratioid families by absence of the illicium and esca; body elongate, with head < 30% SL; a large nasal papilla on either side of snout; long hooked teeth situated outside of mouth, movably attached to conical, bony outgrowths of jaws; caudal fin broad, fan-shaped; skin naked; dorsal fin rays 11–13, and anal

fin rays 10–13. Males parasitic with no upper denticular; lower denticular with 3 projections each ending in a double hook (Bertelsen 1951: 161, fig. 105G); eyes and olfactory organs degenerate; skin naked. Free-living stages unknown. A single genus and species, *Neoceratias spinifer* Pappenheim, 1914.

Comments: Not known from New Zealand waters, but the capture of a specimen from off Cape York Peninsula, Queensland (Bertelsen & Pietsch 1983: 93) suggests that it may be present.

Family Linophrynidae

Diagnosis: Females are distinguished from those of other ceratioid families by dorsal fin and anal fin rays 2–4 (usually 3); skin naked; anus sinistrally reflected; and 5 branchiostegal rays. Males parasitic; free-living stages with eyes large, somewhat tubular, and directed more or less anteriorly.

Key to females of Linophrynidae recorded from New Zealand waters

1A Skin darkly pigmented, opaque; hyoid barbel present; teeth few, strong ..... *Linophryne* (p. 29)

1B Skin unpigmented, translucent; hyoid barbel absent; teeth numerous, small ..... *Haplophryne* (p. 29)

Key to males of Linophrynidae recorded from New Zealand waters

1A Skin pigmented; denticular teeth strong; premaxillae and larval teeth degenerating with growth ..... *Linophryne* (p. 29)

1B Skin unpigmented; denticular teeth weak; premaxillae and larval teeth retained with growth ..... *Haplophryne* (p. 29)

Genus *Linophryne* Collett, 1886

For full synonymy, see Bertelsen (1982).

Diagnosis: Females distinguished from other linophrynid genera in having a well developed hyoid barbel bearing small, globular photophores; gape of mouth large, with few teeth, some of them extremely long; sphenotic spines well developed; preopercular spine simple; skin darkly pigmented. Free-living males with skin darkly pigmented; subdermal pigment present; premaxillae degenerate; jaw teeth few to absent; upper and lower denticular teeth well developed.

Material examined: 2 specimens, 16.7 and 42 mm SL; see Appendix 1.

Comments: Twenty-one species of *Linophryne* are recognised (Bertelsen 1982). *Linophryne* was originally recorded for the New Zealand region by Whitley (1956, 1968) as *L. arborifera* Regan, 1925, but without comment or reference to material. This record was subsequently picked up by other authors (Ayling & Cox 1982; Paulin & Stewart 1985; Paulin et al. 1989), but all on the basis of badly damaged and misidentified oneirodids in the NMNZ collection. In revising *Linophryne*, Bertelsen (1980) recorded the distribution of *L. arborifera* as being restricted to the central and North Atlantic. On the basis of material examined by us and in the lack of any other supporting evidence for its presence, we hereby delete *L. arborifera* from the faunal list for New Zealand. The specimens examined above were captured outside the 200 mile EEZ, one was a male and the female has lost the hyoid barbel, precluding identification beyond genus. *Linophryne densiramus* Imai, 1941 has been recorded from nearby Australian waters (Bertelsen & Pietsch 1983), and so may be expected to occur here.

Genus *Haplophryne* Regan, 1912

For full synonymy, see Bertelsen (1951) and Munk & Bertelsen (1983).

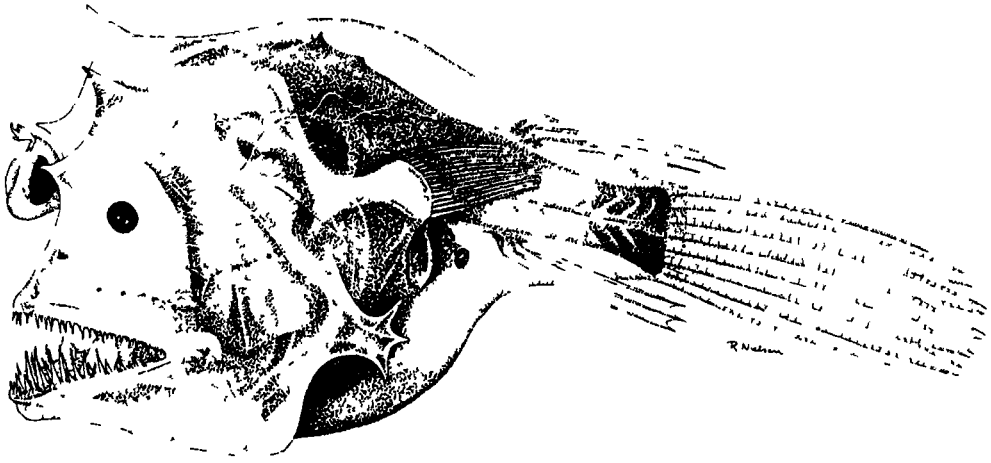

Fig. 19 *Haplophryne mollis*, AMS I 20314–014, 29 mm SL, Bertelsen & Pietsch (1983)

Diagnosis Females distinguished from other linophrynid genera by absence of a hyoid barbel, teeth small and numerous, arranged in 3 or 4 rows, large frontal spines present, esca reduced and sessile on snout, preopercle with a large, compressed spine bearing 2–5 radiating cusps, skin naked, unpigmented Males parasitic, free-living stages with well developed jaw teeth, denticular teeth feeble, skin unpigmented Comprising 1 species

***Haplophryne mollis* (Brauer, 1902) (Fig. 19)**

Aceratias mollis Brauer, 1902, figs 17,18 (holotype ZMB 17713, Indian Ocean)
For full synonymy, see Bertelsen (1951) and Bertelsen & Pietsch (1983)

Diagnosis as for genus

Material examined 6 specimens, 48–159 mm SL, see Appendix 1

Description Dorsal fin rays 3 or 4, anal fin rays 3, pectoral fin rays 16 or 17, caudal fin rays 8 Skin unpigmented, naked Escal bulb decreases from 9 4% SL to 3 1% SL with increasing standard length

Comments *Haplophryne mollis* is reported as being widely distributed in warmer latitudes of all major oceans (Bertelsen & Pietsch 1983) The southernmost record from New Zealand is 43°S Our material substantially increases the maximum known size of this species, from 61 mm SL (Bertelsen & Pietsch 1983) to 159 mm SL More so than other ceratioids, this species is commonly and heavily parasitised by males The smallest (NMNZ P 25554) has no males, NMNZ P 26070 has six, NMNZ P 24927 has two, NMNZ P 24164 has one, and NMNZ P 21248 has two The radiating cusps on the preopercular spines vary considerably in shape and number on either side in a single specimen NMNZ P 24164 has five cusps on the left and four on the right, this being reversed in NMNZ P 25554

ACKNOWLEDGEMENTS

We thank H Casey and E MacKay for the illustrations used in Figs 4 and 9B, and acknowledge the late E Bertelsen for his examination of and comments on the AIM specimen of *Himantolophus pseudalbinares* We also thank staff of MAF Fisheries, and MAF Fisheries Observers, Greta Point, Wellington, for their continuing interest in collecting and returning material over the years, A B Stevenson for the loan of material in his care, and C D Roberts and C D Paulin for helpful comments on the

manuscript Thanks to R M McDowall and T Iwamoto for the care they took in refereeing The work was supported in part by Biosystematics of N Z EEZ Fishes Project, N Z Foundation for Research, Science and Technology contract MNZ603 (C D Roberts, Programme Leader), and by U S National Science Foundation Grants GB–40700, DEB 76–82279 and DEB 78–26540 (T W Pietsch, Principal Investigator)

REFERENCES

Ayling, T , Cox, G J 1982 Collins guide to the sea fishes of New Zealand Collins, Auckland, 343 pp

Beebe, W 1932 Nineteen new species and four post-larval deep-sea fish *Zoologica, New York*, 13 47–107

Bertelsen, E 1951 The ceratioid fishes Ontogeny, taxonomy, distribution, and biology *Dana Oceanographic Report 39* 276 pp

Bertelsen, E 1980 Notes on Linophrynidae V A revision of the deepsea anglerfishes of the *Linophryne arborifer* group (Pisces, Ceratioidei) *Steenstrupia 6 (6)* 29–70

Bertelsen, E 1982 Notes on Linophrynidae VIII A review of the genus *Linophryne*, with new records and descriptions of two new species *Steenstrupia 8 (3)* 49–104

Bertelsen, E 1983 First records of metamorphosed males of the families Diceratiidae and Centrophrynidae (Pisces, Ceratioidei) *Steenstrupia 8 (16)* 309–315

Bertelsen, E 1986 Melanocetidae pp 1376–1377 *In* Fishes of the North-eastern Atlantic and Mediterranean, Vol 3, United Nations Educational, Scientific and Cultural Organisation

Bertelsen, E , Krefft, G 1988 The ceratioid family Himantolophidae (Pisces, Lophiiformes) *Steenstrupia 14 (2)* 9–89

Bertelsen, E , Pietsch, T W 1983 The ceratioid anglerfishes of Australia *Records of the Australian Museum 35* 77–99

Bertelsen, E , Pietsch, T W 1996 Revision of the ceratioid anglerfish genus *Lasiognathus* (Lophiiformes Thaumatichthyidae), with the description of a new species *Copeia 1996* 401–409

Bertelsen, E , Struhsaker, P J 1977 The ceratioid fishes of the genus *Thaumatichthys* osteology, relationships, distribution, and biology *Galathea report 14* 7–40

Bertelsen, E , Pietsch, T W , Lavenberg, R J 1981 Ceratioid anglerfishes of the family Gigantactinidae morphology, systematics and distribution *Contributions in science, Natural History Museum of Los Angeles County 332* 74 pp

Blezard, R H 1980 Calculated sea area of the New Zealand 200 nautical mile Exclusive Economic Zone *New Zealand journal of marine and freshwater research 14(2)* 137–138

Brauer, A 1902 Diagnosen von neues Tiefseefischen, welche von der Valdivia-Expedition gesammelt sind *Zoologische anzeiger 25 668 (4)* 277–298

Clarke, F E 1878 On two new fishes *Transactions of the New Zealand Institute 10* 243–246

Collett, R 1886 On a pediculate fish from off Madeira *Proceedings of the Zoological Society of London 1886* 138–143

Garman, S 1899 Reports on an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, by the United States Fisheries Commission "Albatross" during 1891, Lieut-Commander Z L Tanner, U S N , Commanding XXVI The Fishes *Memoirs of the Museum of Comparative Zoology at Harvard College Vol 24* 431 pp

Gill, T N 1883 *Cryptopsaras couesi* Forest and stream, 8 Nov , 1883 284

Goode, G B , Bean, T H 1896 Oceanic Ichthyology, a treatise on the deep-sea and pelagic fishes of the world, based chiefly upon the collections made by the steamers Blake, Albatross, and Fish Hawk in the northwestern Atlantic with an atlas containing 417 figures *United States National Museum special bulletin 2* 1 553

Grobecker, D B 1978 A new species of the anglerfish genus *Oneirodes* (Oneirodidae), from the Banda Sea *Copeia 1978* 567–568

Gunther, A 1864 On a new species of pediculate fish from the sea of Madeira *Proceedings of the Zoological Society of London 1864* 301–303

Gunther, A 1887 Report on the deep-sea fishes collected by H M S *Challenger* during the years 1873–1876 *Report on the scientific results of the exploring voyage of H M S Challenger 1873–76 Zoology vol 22* 1 335

Imai, S 1941 Seven new deep-sea fishes obtained in Sagami Sea and Suruga Bay *Japanese journal of zoology vol 9 (2)* 233 250

Kröyer, H. 1845: Ichthyologiske bidrag 10. *Ceratias holboelli. Naturhistorisk tidsskrift 1(2)*: 639–649.
Leviton, A. E.; Gibbs, R Jr, H.; Heal, E.; Dawson, C. E. 1985: Standards in herpetology and ichthyology: Part 1. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia 1985*: 802–832.
Lloyd, R. E. 1909: A description of the deep-sea fish caught by the R.I.M.S. ship "Investigator" since the year 1900, with supposed evidence of mutation in *Malthopsis. Memoirs of the Indian Museum, Calcutta, 2(3)*: 139–180.
Lütken, C. F. 1871: *Oneirodes eschrichtii* Ltk. en ny Grønlandsk tudsefisk. *Oversigt over det kongelige Danske videnskabernes selskabs forhandlinger 1871*: 56–74.
Munk, O.; Bertelsen, E. 1983: Histology of the attachment between the parasitic male and the female in the deep-sea anglerfish *Haplophryne mollis* (Brauer, 1902) (Pisces, Ceratioidei). *Meddelelser fra Dansk naturhistorisk forening 144*: 49–74.
Norman, J. R. 1930: Oceanic fishes and flatfishes collected in 1925–1927. *Discovery report. 2*: 261–370.
Orr, J. W. 1991: A new species of the ceratioid anglerfish genus *Oneirodes* (Oneirodidae) from the western north Atlantic, with a revised key to the genus. *Copeia 1991*: 1024–1031.
Pappenheim, P. 1914: Die fische der deutschen Südpolar-Expedition 1901–1903. II. Die tiefseefische. *Deutsche Südpolar-Expedition 15(7)*: 161–200.
Parr, A. E. 1927: Scientific results of the third oceanographic expedition of the 'Pawnee' 1927. *Bulletin of the Bingham Oceanographic Collection 3 (1)*: 1–34.
Paulin, C.D. 1984: Six families of fishes new to the New Zealand fauna. *New Zealand journal of zoology. 11*: 63–70.
Paulin, C. D.; Stewart, A. L. 1985: A list of New Zealand teleost fishes held in the National Museum of New Zealand. *National Museum of New Zealand miscellaneous series No. 12.* 63 pp.
Paulin, C .D.; Stewart, A. L.; Roberts, C. D.; McMillan, P. J. 1989: New Zealand fish, a complete guide. *National Museum of New Zealand miscellaneous series No. 19.* 279 pp.
Paxton, J. R.; Lavenberg, R. J. 1973: Feeding mortality in a deep sea angler fish (*Diceratias bispinosus*) due to a macrourid fish (*Ventrifossa* sp.). *Australian zoologist 18(1)*: 47–51.
Pietsch, T. W. 1972a: A review of the monotypic deep-sea anglerfish family Centrophrynidae: taxonomy, distribution and osteology. *Copeia 1972*: 17–47.
Pietsch, T. W. 1972b: Systematics and distribution of ceratioid anglerfishes of the genus *Dolopichthys* (family Oneirodidae), with the description of a new species. *Archiv für fischereiwissenschaft 23(1)*: 1–28.
Pietsch, T. W. 1974: Systematics and distribution of ceratioid anglerfishes of the family Oneirodidae, with a review of the genus *Oneirodes* Lütken. *Natural History Museum of Los Angeles County, science bulletin 18*: 113 pp.
Pietsch, T. W. 1975: Systematics and distribution of ceratioid anglerfishes of the genus *Chaenophryne* (family Oneirodidae). *Bulletin of Museum of Comparative Zoology 147(2)*: 75–100.
Pietsch, T. W. 1978: A new genus and species of deepsea anglerfish from the eastern North Pacific Ocean, with a review of the allied genera *Leptacanthichthys*, *Chirophryne*, and *Ctenochirichthys* (family Oneirodidae). *Contributions in science, Natural History Museum of Los Angeles County 297*: 1–25.
Pietsch, T. W. 1979: Systematics and distribution of ceratioid anglerfishes of the family Caulophrynidae with the description of a new genus and species from the Banda Sea. *Contributions in science, Natural History Museum of Los Angeles County. 310*:1–25.
Pietsch, T. W. 1986: Systematics and distribution of bathypelagic anglerfishes of the family Ceratiidae (Order: Lophiiformes). *Copeia 1986*: 479–493.
Pietsch, T. W.; Grobecker, D. B. 1987: Frogfishes of the world: systematics, zoogeography and behavioural ecology. Stanford University Press, California. 420 pp.
Pietsch, T. W.; Seigel, J. A. 1980: Ceratioid anglerfishes of the Philippine Archipelago, with descriptions of five new species. *United States Department of Commerce, fishery bulletin 78(2)*: 379–399.
Pietsch, T. W.; Van Duzer, J. P. 1980: Systematics and distribution of ceratioid anglerfishes of the family Melanocetidae with description of a new species from the eastern North Pacific Ocean. *United States Department of Commerce, fishery bulletin 78(1)*: 59–87.
Regan, C. T. 1912: The classification of the teleostean fishes of the order Pediculati. *Annals and magazine of natural history series 8, 9(28)*: 277–289.
Regan, C. T. 1925: New ceratioid fishes from the north Atlantic, the Caribbean Sea, and the Gulf of Panama, collected by the "Dana". *Annals and magazine of natural history, series 9, vol. 9*· 561–567.

Regan, C. T. 1926: The pediculate fishes of the suborder Ceratioidea. *Dana oceanographic report 2*: 1–45.

Regan, C. T.; Trewavas, E. 1932: Deep sea anglerfish (Ceratioidea). *Dana report* 2: 1–113.

Reinhardt, J. 1837: Ichthyologiske bidrag til den gronlandske fauna. *Det kongelige Danske videnskabernes selskabs afhandlinger 4(7)*: 83–196.

Roberts, C. D. 1991: Fishes of the Chatham Islands, New Zealand: a trawl survey and summary of the ichthyofauna. *New Zealand journal of marine and freshwater research 25*: 1–19.

Seigel, J. A.; Pietsch, T. W. 1978: A new species of the ceratioid anglerfish genus *Oneirodes* (Pisces: Lophiiformes) from the Indo-west Pacific. *Copeia 1978*: 11–13.

Smith, H. M.; Radcliffe, L. 1912: Description of a new family of pediculate fishes from Celebes. *Proceedings of the United States National Museum 42*: 579–581.

Swinney G. N.; Pietsch T. W. 1988: A new species of the ceratioid anglerfish genus *Oneirodes* (Pisces: Lophiiformes) from the eastern North Atlantic off Madeira. *Copeia 1988*: 1054–1056.

Tanaka, S. 1911: *Paraceratias mitsukurii* (Tanaka). (Ceratiidae.). *Figures and descriptions of the fishes of Japan, including Riukiu Islands, Bonin Islands, Formosa, Kurile Islands, Korea, and southern Sakhalin. Tokyo Printing Company 2(16)*: 30–32.

Tanaka, S. 1918: *Corynolophus sagamius*, n. sp. (Ceratiidae.). *Figures and descriptions of the fishes of Japan including Riukiu Islands, Bonin Islands, Formosa, Kurile Islands, Korea and southern Sakhalin. Tokyo Printing Company 27*: 491–494.

Thomson, C. W. 1877: The Voyage of the "Challenger". The Atlantic. A preliminary account of the general results of the exploring voyage of H.M.S. "Challenger" during the year 1873 and the early part of the year 1876. London, Vol. 2, 14 + 396 pp.

Uwate, K. R. 1979: Revision of the anglerfish family Diceratiidae, with descriptions of two new species. *Copeia 1979*: 129–144.

Waite, E. R. 1912: Notes on New Zealand fishes: No. 2. *Transactions of the New Zealand Institute 44*: 194–202.

Whitley, G. P. 1956: Name-list of New Zealand fishes pp. 397–414, *in* Graham, D. H.: A treasury of New Zealand fishes (2nd edition), Reed, Wellington, 424 pp.

Whitley, G. P. 1968: A checklist of the fishes recorded from the New Zealand region. *Australian zoologist 15(1)*: 1–102.

Received 26 July 1996; accepted 17 July 1997

APPENDIX 1: MATERIAL EXAMINED

Latitude and longitude have been rounded to the nearest whole minute. All specimens are metamorphosed females, unless otherwise stated.

Melanocetus johnsoni Günther

AIM 1794 (2) 16, 17 mm SL, off East Cape, 37°28′S, 178°28′E, 339 m over 1350 m, 14 Dec 1975; **AIM 6421** (1) 44 mm SL, Challenger Plateau, 39°40′S, 167°35′E, 800–900 m, 25 Oct 1985; **AIM 7095** (1) 85 mm SL, east of Honeycomb Rock, Wairarapa Coast, 41°25′S, 167°19′E, 1171 m, 14 Jan 1988; **NMNZ P 6520** (1) 55 mm SL, Puysegur Bank, 46°23′S, 165°31′E, 323 m, 16 Jan 1976; **NMNZ P 7398** (1) 15 mm SL, east of Great Barrier I., 35°15′S, 176°15′E, IKMT 731–823 m, 22 Jul 1962; **NMNZ P 11867** (1) 15.5 mm SL, north-east Hinemoa Seamount, 33°48′S, 175°04′W, 37 m, 16 Dec 1976; **NMNZ P 11868** (1) 22.5 mm SL, north-east Hinemoa Seamount, 33°53′S, 175°04′W, 277 m, 16 Dec 1976; **NMNZ P 11869** (1) 23.5 mm SL, Hikurangi Trough off Castlepoint, Nov 1970; **NMNZ P 11870** (1) 24 mm SL, Hikurangi Trough off Castlepoint, Nov 1970 ; **NMNZ P 14537** (1) 66 mm SL, Challenger Plateau, 39°48′S, 167°51′E, 1035–1051 m, 1 Sep 1983; **NMNZ P 16731** (1) 36 mm SL, Southern Canterbury Bight, 44°33′S, 172°25′E, 121 m, 16 Feb 1981; **NMNZ P 16762** (1) 48 mm SL, Kermadec Trench, 33°42′S, 175°04′W, 675 m over 5000+ m, 16 Dec 1976; **NMNZ P 17650** (1) 80 mm SL, E of Cape Brett, 34°50′S, 174°46′E, 1030–1060 m, 9 Jun 1985; **NMNZ P 18667** (3) 35–50 mm SL, off West Coast, South I., 43° 54′S, 168° 21′E, FMMWT 500 m over 1,720 m, 27 Aug 1985; **NMNZ P 19305** (1) 19 mm SL, east of Kermadec Trench, 30°58′S, 175°12′W, 971 m, 5 Dec 1976; **NMNZ P 20015** (2) 29, 32 mm SL, Hikurangi Trough, 41°14′S, 176°15′E, ex *Gigantactis* sp., 1000–1147 m, 31 Jul 1985; **NMNZ P 20240** (1) 30 mm SL, Hikurangi Trough, 40°20′S, 178°33′E, 1,125 m over 3090 m, 21 Aug 1986; **NMNZ P 20686** (1) 65 mm SL, southern slope Chatham Rise, 44°11′S, 178°58′E, HOBT Mk IV 934–937 m, 18 Feb 1983; **NMNZ P 21245** (1) 75 mm SL, 'North Hill' Hikurangi Trough, 39°19′S, 178°26′E, 871–905 m over 1200 m; **NMNZ P 21373** (1) 135 mm SL, Challenger Plateau, Oct

1983; **NMNZ P 21447** (1) 100 mm SL, south Canterbury Bight, 44°35′S, 173°59′E, 882–893 m, 6 Nov 1987; **NMNZ P 22296** (1) 24 mm SL, Tasman Basin, 40°05′S, 160°16′E, FMMWT 45–35 m over 4700+ m, 16 Oct 1985; **NMNZ P 23117** (1) 30 mm SL, inner Fiordland Trough, 45°10′S, 165°18′E, FMMWT 30 m, 15 Dec 1987; **NMNZ P 24755** (1) 28 mm SL, Hikurangi Trough, 38°32′S, 178°50′E, 868–768 m, 25 Sep 1989; **NMNZ P 24821** (1) 55 mm SL, Hikurangi Trough, 41°20′S, 176°12′E, 830–710 m, 12 Sep 1989; **NMNZ P 25090** (1) 23 mm SL, east of the Chatham Ids., 42°57′S, 175°36′W, 842–850 m, 9 May 1989; **NMNZ P 25908** (1) 70 mm SL, north-west Chatham Rise, 42°37′S, 177°36′E, 1391–1405 m, 19 Jun 1990; **NMNZ P 25992** (1) 57 mm SL, Campbell Plateau, 51°45′S, 174°05′E, 779–789 m, 17 Aug 1990; **NMNZ P 27140** (1) 84 mm SL, Lord Howe Rise ~ 350 miles west of Auckland, 100–1100 m, 10 May 1991; **NMNZ P 27177** (2) 30, 36 mm SL, north-east Chatham Rise, 43°01′S, 175°17′W, prawn trawl Mk2 853–855 m, 7 May 1989.

Himantolophus appelii (Clarke)

AIM 6424 (1) 130 mm SL, Challenger Plateau, 39°40′S, 167°35′E, 800–900 m, 25 Oct 1985; **AIM 6687** (1) 148 mm SL, Wairarapa Coast, ~40°55′S, 176°45′E, 900–1000 m, 18 Oct 1986; **NMNZ P 8643** (2) 93, 110 mm SL, off Greymouth, 42°11′S, 170°17′E, bottom trawl 637–667 m, 24 Aug 1979; **NMNZ P 9535** (1) 113 mm SL, Kermadec Trench, 35°00′S, 179°29′W, 338 m over 3000 m, 4 Dec 1976; **NMNZ P 14527** (1) 300 mm SL, Challenger Plateau, 40°05′S, 169°08′E, 793–805 m, 1983; **NMNZ P 15027** (1) 135 mm SL, off Hokitika, 42° 55′S, 168° 59′E, 975–986 m, 12 Dec 1983; **NMNZ P 15110** (1) 180 mm SL, off Castle Point, ~40°54′S, ~176°13′E, 600–800 m, Jan 1984; **NMNZ P 17648** (1) 110 mm SL, east of Cape Brett, 34°50′S, 174°46′E, 1030–1060 m, 9 Jun 1985; **NMNZ P 17654** (1) 140 mm SL, off the Waikato River mouth, 37°39′S, 173°50′E, 900–910 m 7 May 1985; **NMNZ P 18209** (1) 180 mm SL, off White I., 37°31′S, 177°12′E, 971 m, 3 Oct 1985; **NMNZ P 18491** (1) 164 mm SL, off Bare I., 39°50′S, 177°02′E, 400 m, 30 Nov 1984; **NMNZ P 20121** (1) 92 mm SL, Challenger Plateau, 42°19′S, 170°04′E, HOBT 840–866 m, 10 Feb 1986; **NMNZ P 21375** (1) 110 mm SL, Challenger Plateau, Oct 1983; **NMNZ P 21385** (1) 215 mm SL, east Challenger Plateau, 39°40′S, 167°52′E, 908–927 m, 31 Sep 1987; **NMNZ P 21476** (1) 170 Challenger Plateau, 39°49′S, 167°07′E, 1003–1079 m, 1 Dec 1987; **NMNZ P 22080** (1) 200 mm SL, New Zealand region, 1987; **NMNZ P 23631** (2) 126, 138 mm SL, Challenger Plateau, 41°11′S, 170°31′E, 580 m over 630 m, 5 Jul 1988; **NMNZ P 23785** (1) 220 mm SL, Challenger Plateau, 40°01′S, 167°54′E, 916 m over 921 m; **NMNZ P 24235** (1) 198 mm SL, Hokitika Canyon, 42°11′S, 170°12′E, 720–770 m; **NMNZ P 24427** (1), 144 mm SL, Hokitika Canyon, 42°29′S, 169°56′E, 400 m over 825 m, 5 Aug 1989; **NMNZ P 24514** (1) 180 mm SL, Challenger Plateau, 39°58′S, 168°09′E, 864–859 m, 18 Jul 1988; **NMNZ P 24897** (1) 190 mm SL, Hikurangi Trough, 1300 m; **NMNZ P 24926** (1), part rotted, not measured, Hokitika Canyon, 42°28′S, 170°04′E, 582–829 m over 593–918 m, 25 Jul 1989; **NMNZ P 25547** (1), 180 mm SL, Chatham Rise, 44°10′S, 177°29′E, 940–952 m, 30 Nov 1986; **NMNZ P 27205** (1) 118 mm SL, off Banks Peninsula, 44°46′S, 172°51′E, 1002–1038 m, 28 Nov 1990

Himantolophus pseudalbinares Bertelsen & Krefft

AIM 6850 (1) 98.9 mm SL, Ritchie Banks, off Mahia Peninsula, Hawke Bay, 39°20′S, 178°29′E, 1138–823 m, 12 Jun 1987.

Himantolophus 'brevirostris' (Regan)

NMNZ P 20724 (1, male) 29 mm SL, west of the Kermadec Trench, 28°13′–16′S, 174°56′W, 1064 m over 5000+ m, 14 Dec 1976.

Chaenophryne longiceps Regan

NMNZ P 13410 (1) 90 mm SL, western Challenger Plateau, 40°40′S, 168°56′E, HOBT Mk4, 915 m, 20 Feb 1983; **NMNZ P 25025** (1) 155 mm SL, Hikurangi Trough, 41°16′S, 176°15′E, 1000–1175 m, 30 Sep 1989.

Chaenophryne draco Beebe

AIM 6609 (1) 97 mm SL, Challenger Plateau, 39°15′S, 171°30′E, 940 m, 3 Jun 1986.

Dolopichthys pullatus Regan & Trewavas

NMNZ P 8048 (1) 28 mm SL, south Fiji Basin, 33°09′S, 176°06′E, IKMT 713–866 m over 3507 m, 23 Jul 1962.

Oneirodes kreffti Pietsch

NMNZ P 17599 (1) 78 mm SL, north of Jackson Head, 42°59′S, 168°26′E, 1126–1113 m. 14 Oct 1983; **NMNZ P 18064** (1) 65 mm SL, Challenger Plateau, 39°52′S, 167°56′E , 974–980 m, 15 Nov 1984; **NMNZ P 23808** (1) 111 mm SL, Uriti Depression, Hikurangi Trough, 41°10′S, 176°44′E, 1148–1170 m, 24 Oct 1988; **NMNZ P 25212** (1) 66 mm SL, Challenger Plateau, 43°05′S, 168°56′E, 938–939 m, 30 Jun 1989.

Oneirodes sebax Pietsch & Seigel

NMNZ P 14525 (1) 135 mm SL, Challenger Plateau, 39°17′S, 179°18′E, 905–,099 m, 12 Sep 1983; **NMNZ P 17227** (1) 75 mm SL, Challenger Plateau, 40°17′S, 168°17′E, 954 m, 7 Jul 1983; **NMNZ P 25555** (1), 52 mm SL, off Mernoo Bank, 42°50′S, 175°04′E, prawn Trawl Mk2, 905–883 m, 1 May 1990.

Oneirodes whitleyi Bertelsen & Pietsch

NMNZ P 14023 (1) 13 mm SL, south Fiji Basin, north-east of Great Barrier Island, ~35°15′S, 176°15′E, IKMT, 731–823 m over 1,240 m, 22 Jul 1962; **NMNZ P 20215** (3) 31–62 mm SL, Hikurangi Trough, 40°21′S, 178°18′E, 1000 m over 2900 m, 21 Aug 1986; **NMNZ P 20238** (1) 20 mm SL, Hikurangi Trough, 39°53′S, 177°35′E, 819 m, 23 Aug 1986; **NMNZ P 23386** (2) 40, 50 mm SL, north-east Chatham Rise, 42°54′S, 176°34′W, 752–770 m, 11 Sep 1988; **NMNZ P 25018** (1) 50 mm SL, east of the Chatham Islands, 43°07′S, 175°07′W, 853–840 m, 8 May 1989; **NMNZ P 25228** (1) 42 mm SL, off the Chatham Islands, 42°52′S, 176°23′W, 840–881 m, 2 May 1989; **NMNZ P 25553** (1) 28 mm SL, east of the Chatham Rise, 43°16′S, 175°16′W, prawn trawl Mk2 825–840 m, 6 May 1990; **NMNZ P 27178** (1) 23 mm SL, east Chatham Rise, 43°01′S, 175°17′W, prawn trawl Mk2 853–855 m, 7 May 1989.

Oneirodes eschrichtii Lütken

NMNZ P 7396 (1) 12 mm SL, off the Three Kings Ridge, ~30°58′S, 169°43′E, 800 m, 13 Jul 1962.

Oneirodes sp. indet.

NMMZ P. 7394 (1) 11 mm SL, east of the Three Kings Rise, 32°27′S, 174°11′E, 1317 m, 5 Jul 1962; **NMNZ P. 13813** (1) 187 mm SL, south Fiji Basin, 30°32′S, 178°23′E, 97 m, 5 Dec 1976; **NMNZ P. 16777** (1) 41 mm SL, Hikurangi Trough, 42°58′S, 174°35′E, 836–841 m, 14 Mar 1979; **NMNZ P 20245** (1) 30 mm SL, Hikurangi Trough, 39°40′S, 178°09′E, 742 m, 19 Aug 1986; **NMNZ P 20663** (1) 105 mm SL, Challenger Plateau, 43°15′S, 168°27′E, 1027–1041 m, 13 Dec 1983.

Ceratias tentaculatus (Norman)

NMNZ P 13115 (1) 510 mm SL, north-west slope of Mernoo Bank, 42°39′S, 175°08′E, 1280–1463 m, Oct 1982; **NMNZ P 20757** (1) 60 mm SL, off Kaipara Harbour, 36°02′S, 173°05′E, 897–905 m, 18 Aug 1985; **NMNZ P 21447** (1) 100 mm SL, off Urry Bank, 44°35′S, 173°59′E, 882–893 m, 6 Nov 1987; **NMNZ P 23865** (2) ~112 mm? SL, (truncated specimens) northern central Chatham Rise, 42°42′S, 179°00′W, 1046–1050 m, 17 Sep 1988; **NMNZ P 24343** (1) 115 mm SL, south Chatham Rise, 44°14′S, 179°12′E, 956 m, 15 Nov 1988; **NMNZ P 24921** (1) 106 mm SL, south west of Mernoo Bank, 44°57′S, 174°29′E, 1053–1056 m, 1 May 1989; **NMNZ P 27117** (1) 213 mm SL, off Urry Bank, 45°01′S, 174°02′E, 1180–1190 m, 3 Nov 1990.

Ceratias holboelli Kröyer

AIM 6423 (1) 173 mm SL, Challenger Plateau, 39°40′S, 167°10′E, 1000 m, 30 Jan 1986; **NMNZ P 20700** (1) 60 mm SL, Hikurangi Trough, 39°50′S, 177°38′E, FMMWT 550 m over 752 m, 20 Aug 1986; **NMNZ P 24807** (1) 55 mm SL, west Chatham Rise, 42 49′S, 174°48′E, 1056–1964 m, 6 Jul 1989; **NMNZ P 24818** (1) 138 mm SL, Hikurangi Trough, 41°20′S, 176°13′E, 830–710 m, 12 Sep 1989.

Ceratias spp. undetermined

NMNZ P1709 (1), 64 mm SL, Cook Strait, ~41°30′S, ~174°30′E, ex *Polyprion* sp., 110 m, 26 Nov 1944; **NMNZ P 13398** (1) 240 mm SL, central Challenger Plateau, 40°27′S, 168°00′E, HOBT MkIV 1011–1004 m, 19 Feb 1983; **NMNZ P 16763** (1) 150 mm SL, east Foveaux Strait, 46°59′S, 169°36′E, 340–350 m, 5 Oct 1979; **NMNZ P 18894** (1) 98 mm SL, off Oamaru, 45°28′S, 171°39′E, 105–480 m

over 122–1,300 m, 11 Aug 1985; **NMNZ P 21378** (1) ~500 mm SL, (head only) east of Canterbury Bight, 44°49′S, 173°03′E, 1127 m, 6 Oct 1987; **NMNZ P 21467** (1) 400 mm SL, east of Cape Kidnappers, 5 Jan 1988; **NMNZ P 22643** (1) 101 mm SL, Chatham Rise, 44°03′S, 177°53′E, 908–970 m, 8 Dec 1985; **NMNZ P 22976** (1) 104 mm SL, off the Canterbury Bight, 44°48′S, 173°39′E, 900 m, 2 Dec 1983; **NMNZ P 24287** (1) 98 mm SL, Chatham Rise, 44°29′S, 179°53′W, 1122–1129 m, 10 Aug 1989; **NMNZ P 24314** (1) 130 mm SL, Chatham Rise, 44°38′S, 175°51′E, 976–1030 m, 5 Nov 1986; **NMNZ P 25538** (1) 161 mm SL, Chatham Rise, 44°55′S, 175°05′E, 1025–1052 m, 30 Sep 1989; **NMNZ P 25992** (1) 133 mm SL, Campbell Plateau, 51°45′S, 174°05′E, 779–789 m, 17 Aug 1990.

Cryptopsaras couesi Gill

AIM 6725 (2) 93, 167 mm SL, off Castlepoint, Wairarapa Coast, ~41°05′S, 176°10′E, 770 m 10 Jan 1984; **AIM 7113** (1), 92 mm SL, off Te Awaiti, Cook Strait, ~41°13′S, 174°24′E, 30 m, 30 May 1987; **AIM 7207** (1) 45 mm SL, off Castlepoint, Wairarapa Coast, 40°55′S, 177°32′E, 25 m, 5 Jun 1987; **AIM 7217** (1), 51 mm SL, Hawke Bay, off Mahia Peninsula, 39°05′S, 179°15′E, 30 m, 3 Jun 1987; **NMNZ P 799** (1) 135 mm SL, Cook Strait, ~41°30′S, 174°30′E, 2 Feb 1941; **NMNZ P 1588** (1) 128 mm SL, Cook Strait, ~41°30′S, 174°30′E, ex *Polyprion* sp., 183 m, 1 Oct 1954; **NMNZ P 1641** (1) 110 mm SL, off Cape Palliser, ~41°37′S, 175°16′E, ex *Genypterus blacodes*, 4 Feb 1955; **NMNZ P 3129** (1) 160 mm SL, off Foxton, trawled, 55 m, 11 Aug 1961; **NMNZ P 6914** (1) 36 mm SL, near White I., 37°27′S, 177°15′E, FMMWT 71 m over 397 m, 9 May 1975; **NMNZ P 8046** (1) 44 mm SL, south Fiji Basin, 35°15′S, 176°15′E, IKMT 548–580 m over 1084 m, 22 Jul 1962; **NMNZ P 8047** (1) 60 mm SL, south Fiji Basin, 33°09′S, 176°06′E, IKMT 731–866 m over 3507 m, 23 Jul 1962; **NMNZ P 8049** (1) 10 mm SL, south Fiji Basin, 35°15′S, 176°15′E, IKMT 548–586 m over 1084 m, 22 Jul 1962; **NMNZ P 8141** (1) 250 mm SL, south-west Campbell Plateau, 53°48′S, 168°35′E, 870–880 m, 12 May 1979; **NMNZ P 8142** (1) 185 mm SL, Chatham Rise, 43°13′S, 174°58′W, 860–838 m, 17 Apr 1979; **NMNZ P 10021** (1) ? mm SL (poor condition) Bay of Plenty, 37°29′S, 177°19′E, FMMWT 450 m, 3 Aug 1976; **NMNZ P 11307** (1) 150 mm SL, south of Cape Kidnappers, 39 41′S, 178°00′E, bottom trawl 1160–1240 m, 24 Nov 1981; **NMNZ P 11831** (1) 280 mm SL, north-west of Urry Bank, 44°45′S, 173°08′E, bottom trawl 952–967 m, 8 Feb 1982; **NMNZ P 12954** (1) 210 mm SL, north Chatham Rise, 42°45′S, 177°04′E, BT 890–900 m, 26 Aug 1982; **NMNZ P 13781** (1) 54 mm SL, south of East Cape, 38° 22′S, 179° 16′E, FMMWT 30 m over 1700 m, 5 Jun 1981; **NMNZ P 13796** (1) 107 mm SL, between the Kermadec Trench & Louisville Ridge, 36°05′S, 175°21′W, 46 m, 17 Dec 1976; **NMNZ P 15028** (1) 250 mm SL, off the Haast River mouth, 43°24′S, 168°50′E, 888–908 m, 15 Dec 1983; **NMNZ P 16428** (2) 40, 60 mm SL, Kermadec Ridge, 27°50′S, 178°40′W, FMMWT 45 m over 1700 m, 18 Jun 1976; **NMNZ P 16627** (1) 37 mm SL, East Cape Ridge, 37°22′S, 178°46′E, plankton net 0 m over 1380 m, 20 Nov 1976; **NMNZ P 17413** (1) 110 mm SL, Challenger Plateau, ~900 m, 1983; **NMNZ P 17621** (1) 100 mm SL, Challenger Plateau, 37°54′S, 167°23′E, 833–854 m 25 Jan 1981; **NMNZ P 17798** (1) 230 mm SL, off Hawke Bay, 39°49′S, 178°05′E, 1030–1071 m, 14 Dec 1985; **NMNZ P 17934** (1) 77 mm SL, off White I., 37°31′S, 177° 09′E, 306–320 m over 1298–1372 m, 14 Dec 1975; **NMNZ P 18585** (1) 60 mm SL, off White I., 37°31′S, 177° 08′E, 360 m, 3 Aug 1976; **NMNZ P 18588** (1) 46 mm SL, 32°10′S, 167°54′E, FMMWT 75 m over 1630–1255 m, 24 Oct 1985; **NMNZ P 18589** (1) 61 mm SL, off Mahia Peninsula, 38° 04′S, 178 18′E, 100 m over 788–703 m, 12 Jul 1979; **NMNZ P 18836** (1) 56 mm SL, Reinga Ridge, 33°10′S, 170°44′E, FMMWT 25 m over 1959–1907 m, 24 Oct 1985; **NMNZ P 19098** (1) 56 mm SL, East Cape, 37°51′S, 178°35′E, 20 Apr 1980; **NMNZ P 19166** (1) 26 mm SL, Kermadec Ridge, 27°50′S, 178°55′W, FMMWT 360 m, 18 Jun 1976; **NMNZ P 19533** (1) 91 mm SL, off north Fiordland, 44°15′S, 167°30′E, FMMWT 500 m over 3500 m, 26 Jul 1985; **NMNZ P 20113** (2) 40, 145 mm SL, Challenger Plateau, 39°54′S, 168°20′E, 812–817 m, 17 Jul 1984; **NMNZ P 21108** (1) 57 mm SL, east of Gannet I., 37°50′S, 173°49′E, FMMWT 500 m over 880 m, 19 Jul 1985; **NMNZ P 21247** (1) 180 mm SL, Ritchie Bank, 39°30′S, 178°24′E, 873–935 m over 1049–1139 m, 7 Jul 1987; **NMNZ P 21374** (1) 230 mm SL, Challenger Plateau, Oct 1983; **NMNZ P 21386** (1) 222 mm SL, east Challenger Plateau, 39°36′S, 167° 03′E, 870 m, 6 Sep 1987; **NMNZ P 21446** (1) 200 mm SL, south Canterbury Bight, 44°49′S, 173°05′E, 1074–1190 m, 4 Nov 1987; **NMNZ P 21457** (1) 300 mm SL, outer Canterbury Bight, 44°51′S, 173°47′E, 100–1088 m, 5 Nov 1987; **NMNZ P 23101** (1) 108 mm SL, Hokitika Canyon, 42°03′S, 170°32′E, FMMWT 30 m, 17 Dec 1987; **NMNZ P 23174** (1) 66 mm SL, Hikurangi Trough, 40°55′S, 176°56′E, FMMWT 30 m, 9 Dec 1987; **NMNZ P 23243** (6) 48–50 mm SL, Hikurangi Trough east of Mahia Peninsula, 39°05′S, 178°59′E, FMMWT 30 m, 3 Jun 1987; **NMNZ P 23298** (1) 200 mm SL, north-east Chatham Rise, 42°53′S, 176°55′W, 758–762 m, 30 Jul 1988; **NMNZ P 23570** (2) 53, 140 mm SL, Hikurangi Trough, 39°15′S, 178°34′E, 30 m, 13 Sep 1987; **NMNZ P 23576** (2) 60, 82 mm

SL, Hikurangi Trough, 39°15'S, 178°33'E, 30 m, 13 Sep 1987, **NMNZ P 23598** (1) 48 mm SL, Hikurangi Trough, 39°11'S, 179°36'E, 35 m, 31 May 1987, **NMNZ P 23600** (2) 74, 76 mm SL, between Banks Peninsula & Mernoo Bank, 44°46'S, 174°22'E, 30 m over 1008–938 m, 22 Sep 1987, **NMNZ P 23620** (1) 39°15'S, 178°34'E, 30 m, 13 Sep 1987, **NMNZ P 23797** (1) 255 mm SL, off Castlepoint, 1100 m, 21 Nov 1988, **NMNZ P 23888** (1) 210 mm SL, east Chatham Rise, 43°34'S, 174°36'W, 764–773 m, 20 Sep 1988, **NMNZ P 24315** (1) 228 mm SL, Chatham Rise, 42° 5'S, 179°55'W, 1033–1048 m, 15 Aug 1989, **NMNZ P 24316** (1) 260 mm SL, Chatham Rise, 44°33'S, 178°28'W, 1014–1099 m, 7 Aug 1989, **NMNZ P 24420** (1) 255 mm SL, Hokitika Canyon, 42°33'S, 170°04'E, 500 m over 575 m, 22 Jul 1989, **NMNZ P 24933** (1) 300 mm SL, north-east of the Kaikoura Peninsula, 42°16'S, 174°06'E, 400–450 m, 4 Jul 1989, **NMNZ P 25850** (1) 244 mm SL, north-east Chatham Rise, 42°46'S, 177°02'W, 1073–1069 m, 9 Jul 1990, **NMNZ P 25942** (1) 320 mm SL, Challenger Plateau, 39°51'S, 168°00'E, 864–873 m, 13 Jul 1990, **NMNZ P 26038** (1) 80 mm SL, Three Kings Rise, 33°55'S, 171°54'E, 983–1003 m, 23 Apr 1981, **NMNZ P 26042** (1) 75 mm SL, off the north-east North I, 34°52'S, 174°41'E, 844–946 m, 21 Apr 1981, **NMNZ P 27180** (1) 45 mm SL, Hikurangi Trough east of Mahia Peninsula, 38°21'S, 179°14'E, 100 m over 1700+ m, 5 Jun 1981, **NMNZ P 27183** (1) 120 mm SL, Challenger Plateau, 39°01'S, 172°05'E, 1045–1055 m, 3 Jun 1986

Gigantactis paxtoni Bertelsen, Pietsch & Lavenberg

NMNZ P 13627 (1) 197 mm SL, Challenger Plateau, 41°12'S, 168°59'E, HOBT Mk IV 934–937 m, 18 Feb 1983, **NMNZ P 20209** (1) 295 mm SL, Hikurangi Trough, 40°21'S, 178°33'E, 1125 m over 3090 m, 21 Aug 1986, **NMNZ P 24978** (1) 200 mm SL, Ritchie Bank, 38°40'S, 178°46'E, 1000–1200 m, 11 Oct 1989, **NMNZ P 25866** (1) 225 mm SL, north-east Chatham Rise, 42°47''S, 176°15'–11'W, 1208–1229 m, 19 Jul 1990

Gigantactis meadi Bertelsen, Pietsch & Lavenberg

NMNZ P 14803 (1) 288 mm SL, off Cape Foulwind, 41°58 0'S, 168°42'E, bottom trawl 1222–1213 m, 16 Oct 1983

Gigantactis spp undetermined

NMNZ P 16700 (1) 31 5 mm SL, northern Kermadec Trench, 28°15'S, 174°56'W, 1064 m over 5000+ m, 14 Dec 1976, **NMNZ P 21371** (1) 268 mm SL, Challenger Plateau, Oct 1983, **NMNZ P 25736** (1) 285 mm SL, Challenger Plateau, 37°18'S, 167°51'E, 1020–1025 m, 13 Jul 1990

Linophryne sp undetermined

NMNZ P 19214 (1) 42 mm SL, Tonga Trench, 22°43'S, 175°02'W, 944 m over 3000+ m, 12 Dec 1976, **NMNZ P 18801** (1, male) 16 7 mm SL, New Caledonian Basin, 30°22'S, 166°56'E, FMMWT 210 m over 2900 m, 21 Oct 1985

Haplophryne mollis (Brauer)

AIM 6512 (1) 63 mm SL, Challenger Plateau, 37°30'S, 167°35'E, 1095 m, 11 May 1986, **NMNZ P 21248** (1) 159 mm SL, 'North Hill' Hikurangi Trough, 39°19'S, 178°27'E, 900–1000 m over 1180–1238 m, 11 Jul 1987, **NMNZ P 24164** (1) 60 mm SL, off the Wairarapa Coast, 41°21'S, 176°14'E, 860–960 m, 27 Oct 1988, **NMNZ P 24927** (1) 58 mm SL, Hikurangi Trough, 39°52'S, 177°36'E, 1095–915 m, 15 Sep 1989, **NMNZ P 25554** (1) 48 mm SL, off Mernoo Bank, 42°50'S, 175°04'E, prawn trawl Mk 2 905–883 m, 1 May 1990, **NMNZ P 26070** (1) 54 mm SL, east Chatham Rise 42°55'S, 175°38'W, 882–898 m, 6 May 1989