

**THE FIRST RECORD OF *PHOTOCORYNUS SPINICEPS* REGAN
(TELEOSTEI, LOPHIIFORMES, CERATIOIDEI, LINOPHRYNIDAE)
FROM THE NORTH-EASTERN ATLANTIC, WITH NOTES ON A
COLLECTION OF FEMALE ANGLERFISH FROM OFF MADEIRA**

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With 1 Table and 2 Figures

ABSTRACT. Forty-three female ceratioeid anglerfish, representing 15 species, collected off Madeira in October 1983 during RRS "Challenger" cruise 14/83 are reported. They include a single specimen of *Photocorynus spiniceps*, the first record of this species from the north-eastern Atlantic.

RESUMO. No presente trabalho referem-se quarenta e três fêmeas de peixes ceratioides, pertencentes a 15 espécies, colhidas nas águas da Madeira em Outubro de 1983, no decurso do cruzeiro 14/83 do RRS "Challenger". Entre elas encontra-se um único espécime de *Photocorynus spiniceps*, o que constitui o primeiro assinalamento desta espécie para o Atlântico Nordeste.

Adults of the suborder Ceratioidei inhabit the mesopelagic and bathypelagic zones of the three major oceans. They are the dominant group of deepsea midwater fish; over two thirds of the known bathypelagic fish species are ceratioids (MARSHALL, 1979). However, they are poorly represented in collections. Of the 120-136 species currently recognised (BERTELSEN, 1984; 1986; PIETSCH, 1984) many are known from fewer than a dozen specimens and several are known only from the types. BERTELSEN (1986) notes the occurrence of 36 species in the north-eastern Atlantic, as defined by HUREAU & MONOD (1973) and WHITEHEAD *et al.* (1984-1986) [*ie.* the CLOFNAM/FNAM area], although his listing omits *Linophryne arcturi* (Beebe) also recorded from the south of the CLOFNAM/FNAM area (BERTELSEN, 1982; 1990). BERTELSEN & KREFFT (1988), SWINNEY & PIETSCH (1988) and SWINNEY (in press) record a total of four additional species from within the area. All four species were recorded off Madeira. Those reported by PIETSCH & SWINNEY (1988) and SWINNEY (in press) were caught in October 1983

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by the British research vessel RRS "Challenger" (cruise 14/83). The present paper provides an annotated list of all the female anglerfish collected during this cruise.

TABLE 1 - Female anglerfish collected during RRS "Challenger" cruise 14/83. The data are expressed as number caught in illuminated hauls / number caught in unilluminated hauls (depth range)

	RMT 50	RMT 10
Melanocetidae		
<i>Melanocetus johnsoni</i> Günther	7/2 (270-1400)	2/2 (600-950)
Himantolophidae		
<i>Himantolophus groenlandicus</i> Reinhardt	1/0 (300)	-
Oneirodidae		
<i>Chaenophryne draco</i> Beebe	4/2 (1500-1800)	1/0 (800)
<i>C. longiceps</i> Regan	0/1 (1200)	-
<i>Leptacanthichthys gracilispinis</i> (Regan)	1/0 (1650)	-
<i>Oneirodes clarkei</i> Swinney & Pietsch	1/0 (1500+)	-
<i>O. eschrichtii</i> Lütken	-	2/1 (850-1000)
Thaumatiichthyidae		
<i>Lasiognathus saccostoma</i> Regan	1/2 (270-1800)	-
Ceratiidae		
<i>Cryptosaras couesi</i> Gill	0/1 (1500)	-
Gigantactinidae		
<i>Gigantactis ios</i> Bertelsen, Pietsch & Lavenberg	1/1 (1360-1200)	-
Linophryniidae		
<i>Haplophryne mollis</i> (Brauer)	3/1 (1360-1800)	1/0 (1150)
<i>Linophryne brevibarbata</i> Beebe	1/0 (1650)	-
<i>L. coronata</i> Parr	0/1 (1500)	-
<i>L. racemifera</i> Regan & Trewavas	1/1 (1360-1500)	-
<i>Photocorynus spiniceps</i> Regan	1/0 (1800)	-

A total of 43 adolescent and adult female specimens of anglerfish, representing 15 species, was collected (Table 1) in a series of midwater faunal samples taken in an area south of Madeira, between 32°32'N and 32°21'N and 17°21'W and 16°34'W. The net used was a rectangular mid-water trawl (RMT). At different times during the cruise two different RMTs were used, one with an effective mouth area of 10m² (RMT 10), the other with an effective mouth area of 50m² (RMT 50). For some tows the path of the net

was illuminated by either one or two forward and downwardly directed battery-powered spotlights attached to the upper bar of the net mouth, an arrangement designed to investigate the effects of artificial light on the efficiency of trawls in the deep-sea (CLARKE & PASCOE, 1985; SWINNEY *et al.*, 1986; PASCOE, 1990). Details of the design and method of operation of the nets are given elsewhere (CLARKE & PASCOE, 1985; SWINNEY, 1990). However, it should be noted that the trawls were not fitted with an opening/closing mechanism and for each haul the depths quoted are the maximum reached, as indicated by a recording pressure gauge mounted in the net mouth. Except for a few initial hauls (numbers C83/1-7) taken to test the gear and from which only a subsample of specimens was preserved, the entire catch of each haul was examined.

None of the females have males attached. In the listing which follows fish lengths are quoted as standard length (SL) measured from preserved specimens, using dial calipers, and rounded down to the nearest 0.1mm. Illuminated hauls are indicated by a '+', those which were not illuminated by a '-' sign.

Melanocetus johnsoni

NMSZ 1994.057.1, 25.4mm, RMT-10 C83/5+, 32°28'N 17°18'W, 1150m. NMSZ 1994.057.2, 45.4mm, RMT-10 C83/8+, 32°21'N 17°15'W, 950m. NMSZ 1994.057.3, 10.7mm, RMT-10 C83/13-, 32°25'N 16°58'W, 875m; NMSZ 1994.057.4, 31.5mm, RMT-10 C83/17+, 32°22'N 17°05'W, 600m. NMSZ 1994.057.5, 20.6mm, RMT-10 C83/25-, 32°26'N 16°59'W, 850m.

NMSZ 1994.057.6, 7.8mm, RMT-50 C83/43+, 32°30'N 16°36'W, 270m. NMSZ 1994.057.7, 13.8mm, RMT-50 C83/45+, 32°24'N 16°44'W, 1360m. NMSZ 1994.057.8, 10.0mm, RMT-50 C83/55+, 32°24'N 16°51'W, 1650m. NMSZ 1994.057.9, 54.8mm, RMT-50 C83/65+, 32°23'N 16°53'W, 1300m. NMSZ 1994.057.10, 34.4mm, RMT-50 C83/65+, 32°23'N 16°53'W, 1300m. NMSZ 1994.057.11, 12.2mm, RMT-50 C83/65+, 32°23'N 16°53'W, 1300m. NMSZ 1994.057.12, 42.9mm, RMT-50 C83/70-, 32°23'N 16°53'W, 1400m. NMSZ 1994.057.13, 40.6mm, RMT-50 C83/70-, 32°23'N 16°53'W, 1400m.

Specimens less than 12mm have not yet developed the adult pigmentation and the esca is not fully formed. These small metamorphosing females are only tentatively referred to *M. johnsoni*.

This species would seem to be relatively common off Madeira, having been reported regularly in the area (PIETSCH and VAN DUZER, 1980; BERTELSEN, 1986), and it requires no further comment here.

Himantolophus groenlandicus

NMSZ 1994.057.14, 69.0mm, RMT-50 C83/67+, 32°30'N 16°43'W, 300m.

H. groenlandicus is widely distributed throughout the Atlantic from southwest Greenland to about 36°S, usually at depths of 250-1800m. BERTELSEN & KREFFT (1988) refer to this specimen as RSM 83/67 (RSM = Royal Scottish Museum, one of the institutions which in 1985 became part of the National Museums of Scotland).

Chaenophryne draco

NMSZ 1994.057.15, 16.7mm, RMT-10 C83/33+, 32°22'N 16°35'W, 800m. NMSZ 1994.057.16, 20.5mm, RMT-50 C83/55+, 32°24'N 16°51'W, 1650m. NMSZ 1994.057.17, 19.9mm, RMT-50 C83/60-, 32°24'N 16°50'W, 1500m. NMSZ 1994.057.18, 19.7mm, RMT-50 C83/75+, 32°25'N 16°35'W, 1800m. [NMSZ 1994.057.19, 15.0mm, RMT-50 C83/50-, 32°24'N 16°44'W, 1200m. NMSZ 1994.057.20, 2 specimens 18.4mm and 16.6mm, RMT-50 C83/55+, 32°24'N 16°51'W, 1650m].

This widely distributed species occurs in all three major oceans. However, there is only one published record of a metamorphosed female from the north-eastern Atlantic (36°36'N 26°14'W), although larvae have been collected in the southern part of the area (PIETSCH, 1975; BERTELSEN, 1986). These authors also note a single specimen from the eastern tropical Atlantic, off the Cape Verde Islands. The specimens listed above in square brackets are damaged and are only tentatively assigned to this species.

C. longiceps

NMSZ 1994.057.21, 28.6mm, RMT-10 C83/12-, 32°23'N 17°01'W, 800m.

BERTELSEN (1986) notes three previous records from the north-eastern Atlantic, the most northerly being from off Iceland. Like *C. draco*, *C. longiceps* is a widespread species occurring usually at depths greater than 500m in all three major oceans (PIETSCH, 1975; BERTELSEN, 1990). The present specimen is unusual in having an undivided medial filament on the esca bulb: in most specimens of this size the medial filament is divided (T.W. PIETSCH, pers. comm., 1985).

Leptacanthichthys gracilispinis

NMSZ 1994.057.22, 19.8mm, RMT-50 C83/55+, 32°24'N 16°51'W, 1650m.

The "Challenger" specimen has quadrate and mandibular spines of about equal length. Both are weakly developed and neither protrudes through the skin. The sphenotic spines are also small but damage to the specimen makes it impossible to ascertain whether or not they actually punctured the skin. PIETSCH (1978) describes the sphenotic and mandibular spines as being well developed in *L. gracilispinis*. These differences between the "Challenger" specimen and those previously described may be due to the small size of the present specimen, although PIETSCH (1978) examined specimens as small as

10.5mm. In other respects the "Challenger" specimen agrees well with previously published descriptions of *L. gracilispinis*, having 19 pectoral rays, 6 dorsal and 5 anal rays (PIETSCH, 1974; 1978; BERTELSEN, 1986).

PIETSCH (1978) considers this species, in the Atlantic, to be restricted to the continental shelf of North America, but Bertelsen (1986) reports the capture of a female from approximately 45°N 15°W. Other records are from the northern Pacific. Excluding the present specimen, a total of fifteen specimens, fourteen female and one male, have been reported in the literature (PIETSCH, 1978; BERTELSEN 1986).

Oneirodes clarkei

NMSZ 1986.005.1, (holotype) 119.0mm, RMT-10, C83/2+, 32°24'N 16°51'W, 1500m.

This species is known only from this specimen, the holotype (SWINNEY & PIETSCH, 1988).

O. eschrichtii

NMSZ 1994.057.23, 19.3mm, RMT-10 C83/14+, 32°24'N 16°52'W, 900m.
NMSZ 1994.057.24, 45.7mm, RMT-10 C83/24+, 32°27'N 17°03'W, 1000m. NMSZ 1994.057.25, 15.7mm, RMT-10 C83/25-, 32°26'N 16°59'W, 850m.

This species has an almost cosmopolitan distribution and a relatively large number of specimens have been collected. In the eastern Atlantic it occurs from the Iceland south to about 40°S. Among previous records from the north-eastern Atlantic, PIETSCH (1974) and BERTELSEN (1986) note several from around Madeira.

Lasiognathus saccostoma

NMSZ 1994.057.26, 36.6mm, RMT-50 C83/45+, 32°24'N 16°44'W, 1360m.
NMSZ 1994.057.27, 50.0mm, RMT-50 C83/51-, 32°25'N 16°48'W, 270m. NMSZ 1994.057.28, 34.3mm, RMT-50 C83/64-, 32°24'N 16°36'W, 1800m.

The two of the three specimens are in moderately good condition, the third, NMSZ 1994.057.26, is damaged, but in all three the illicium is intact. They agree closely with *L. ancistrophorus* MAUL in having the hooks of the esca filament orientated dorsally (in two specimens; in NMSZ 1994.057.26 the hook-bearing filament is curled and its orientation cannot be discerned) and a terminal filament which bears small filaments along either side and is branched at its tip (MAUL, 1962). NOLAN & ROSENBLATT (1975) consider *L. ancistrophorus* a junior synonym of *L. saccostoma*. They point out that as the terminal filament of the holotype is missing its structure is unknown, and suggest that the difference in orientation of the hooks is due to torsion in the hook-bearing filament. They

describe and figure a large specimen, 97.5mm SL, from the Pacific with a simple terminal filament without a fringe of lateral projections. NOLAN & ROSENBLATT (1975) believe that such differences in the terminal filament may be ontogenic but it should be noted that, in addition to their specimen, only three specimens of *L. saccostoma* were then known; the holotype and paratype of *L. ancistrophorus* collected off Madeira and the holotype of *L. saccostoma* from the Caribbean (Regan, 1925).

Cryptopsaras couesi

NMSZ 1994.057.29, 9.1mm, RMT-50 C83/60-, 32°24'N 16°50'W, 1500m.

This species has a cosmopolitan distribution in all three major oceans (BERTELSEN, 1951; BERTELSEN & PIETSCH, 1983).

In the north-eastern Atlantic, most large adults (>120mm SL) have been collected off Iceland with individuals occasionally being caught as far south as 48°N (DU BUIT *et al.*, 1986; QUÉRO & VAYNE, 1989). Further south in the area only larvae, males and metamorphosing and small adolescent female specimens have been recorded, several of these having been caught off Madeira (BERTELSEN, 1951; QUÉRO & VAYNE, 1988). The "Challenger" specimen is a small adolescent in the late stages of metamorphosis.

Gigantactis ios

NMSZ 1994.050.1, 50.8mm SL, 32°24'N 16°44'W, RMT-50 C83/45+, 1360m.
NMSZ 1994.050.2, 37.9mm SL, 32°24'N 16°44'W, RMT-50, C83/50-, 1200m.

SWINNEY (in press) provides a detailed discussion of these specimens which are the first records for the north-eastern Atlantic.

Haplophryne mollis

NMSZ 1991.062.14, unmeasured, RMT-10 C83/5+, 32°28'N 17°18'W, 1150m.
NMSZ 1994.057.30, 25.0mm, RMT-50 C83/45+, 32°24'N 16°44'W, 1360m. NMSZ 1994.057.31, 28.4mm, RMT-50 C83/54+, 32°24'N 16°38'W, 1800m. NMSZ 1994.057.32, 29.9mm, RMT-50 C83/70-, 32°23'N 16°53'W, 1400m. NMSZ 1994.057.33, 27.5mm, RMT-50 C83/75+, 32°25'N 16°35'W, 1800m.

BERTELSEN & PIETSCH (1983) note a total of approximately 42 female and free-living males as having been reported in the literature from various scattered localities in the warmer parts of all three major oceans. This total includes four from the north-eastern Atlantic, off Madeira (BERTELSEN, 1986), and a further two from the eastern tropical Atlantic (BERTELSEN, 1990).

NMSZ 1994.057.30 and NMSZ 1994.057.31 differ from typical specimens in having bifid pre-opercular spines (Fig. 1a). Typically the spine has 3-5 cusps (Fig. 1b)

(BERTELSEN, 1951; 1986), although BERTELSEN & PIETSCH (1983) reported one specimen from Australian waters with a bicuspid right spine and a tricuspid left. None of the "Challenger" specimens have the outwardly directed central cusp observed in some specimens previously reported from Madeira (MAUL, 1961). NMSZ 1991.062.14 has been incorporated into an exhibition on fish biology and at present cannot be closely examined or accurately measured: however, it is similar in size and general appearance to the other specimens collected.

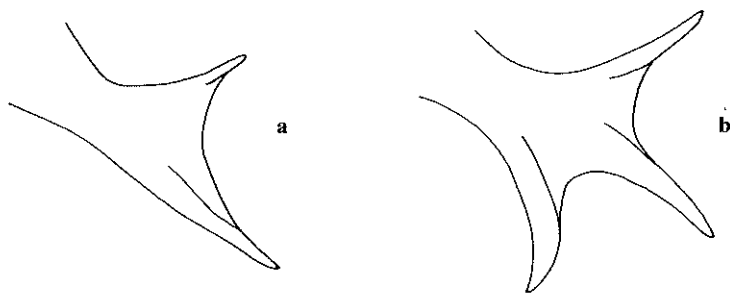


Fig. 1 - Variation in the preopercular spines of *Haplophryne mollis* a) the bicuspid spine of NMSZ 1994.057.31, b) the typical tricuspid spine of a NMSZ 1994.057.33.

Linophryne brevibarbata

NMSZ 1994.051.1, 35.5mm SL, 32°24'N 16°51'W, RMT-50 C83/55+, 1650m.

L. aff. coronata (*sensu* BERTELSEN, 1982)

NMSZ 1994.051.2, 29.5mm SL, 32°24'N 16°50'W, RMT-50 C83/60-, 1500m.

L. racemifera

NMSZ 1994.051.3, 25.5mm SL, 32°24'N 16°44'W, RMT-50 C83/45+, 1360m.

NMSZ 1994.051.4, 27.2mm SL, 32°24'N 16°50'W, RMT-50 C83/60-, 1500m.

These specimens of the genus *Linophryne* are reported in detail elsewhere (SWINNEY, in press) and include the first records of *L. racemifera* for the north-eastern Atlantic.

Photocorynus spiniceps

NMSZ 1994.057.34, 20.5mm, RMT-50 C83/54+, 32°24'N 16°38'W, 1800m.

P. spiniceps, the only species in the genus (BERTELSEN, 1951; PIETSCH, 1976; NELSON, 1984), and is rare in collections. The type specimens, a female with attached male, were caught by the Danish research vessel "Dana" in the Gulf of Panama (REGAN

1925). A further four specimens, two females and two free-living males, all from the Gulf of Panama, were subsequently reported from "Dana" cruises (REGAN, 1926; REGAN & TREWAVAS, 1932; BERTELSEN, 1951). PARIN *et al.* (1973) present a capture record from a Soviet research programme which extend the known range of the species in the eastern Pacific and the species also occurs in the western Pacific (BERTELSEN, 1990). The first report of the species outside the Pacific is based on an illustration in BEEBE & ROSE (1926) of a fish from the western Atlantic which REGAN & TREWAVAS (1932) recognise as *P. spiniceps*. BERTELSEN (1951) re-evaluates this rather stylised illustration and concludes that, as the fish depicted lacks both epiotic and preopercular spines, it is not an *Photocorynus*. Later, however, BERTELSEN (1990) includes three previously unpublished captures of *P. spiniceps* in a checklist of eastern tropical Atlantic species, and notes also its occurrence in the western Atlantic, but gives no further details.

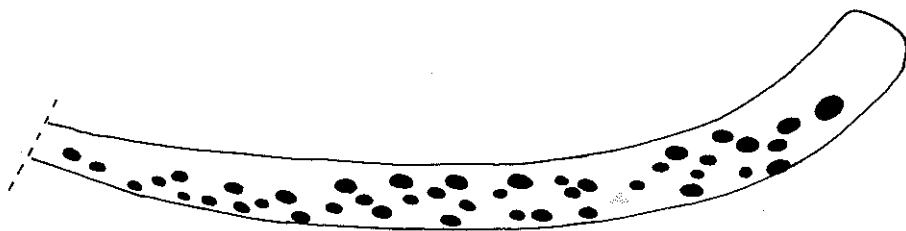


Fig. 2 - Stylized representation of the dorsal view of the anterior portion of the dentary of *Photocorynus spiniceps* (NMSZ 1994.057.34) illustrating the arrangement of teeth.

The "Challenger" specimen agrees well with the previously published descriptions of *P. spiniceps* (REGAN, 1925; REGAN & TREWAVAS, 1932; BERTELSEN, 1951) except in the arrangement of the teeth, which are described as small and uniserial. In the "Challenger" specimen the teeth on the anterior portion of the premaxilla, and those on much of the length of the lower jaw, are arranged in three rows (Fig. 2). In the lower jaw the teeth of the outer series are curved inwards and generally are shorter than those of the inner rows. Only towards the rear of each jaw are the teeth uniserial. JØRGEN NIELSEN has kindly re-examined two of the "Dana" specimens in the Zoological Museum of the University of Copenhagen, including the female type, and informs me that in these specimens the teeth in the anterior portion of the lower jaw in fact are arranged in 2-3 rows (*pers. comm.*, 1994).

The "Challenger" specimen constitutes the first record of *P. spiniceps* from the north-eastern Atlantic and brings the total number of ceratioid species known from the area to forty-two.

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