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Records of deep water chondrichthyan fish caught on long-line in the Rockall Trough

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A number of chondrichthyan fish species were caught on long-line in the Rockall Trough (north-east Atlantic) in 1997, which are first records for this area; *Raja hyperborea*, *Raja kukujevi* and *Raja fullonica*. The occurrence of *R. hyperborea*, usually found in colder boreal waters appears to be temperature related. The presence of the deep water squaliform shark *Centrophorus uyato* in the area was also confirmed and several species were caught at previously undocumented depths.

The Rockall Trough is an extension of the North Atlantic deep environment (Mauchline, 1990). A long-line survey was undertaken in August 1997 on the eastern and southern slopes of the Rockall Trough (Figure 1), fishing gear and procedures are described by Connolly (1997). Identifications were undertaken by means of several texts (Compagno, 1984; Whitehead, et al., 1984; Stehmann, 1997). The specimens described below were lodged in the National Museum of Ireland (NMI) and the Hamburg University Zoological Museum, Germany (ZMH). Depth ranges, positions and catalogue numbers of the specimens described are given in Table 1.

Raja hyperborea Collett, 1879—Arctic skate. Four female arctic skates (0.46, 0.8, 0.81 and 1.09 m TL) were caught. Specimens are characteristically thick set with a short tail and a regular row of 25–32 thorns from the nape to the first dorsal fin, with up to two thorns between the dorsal fins. The upper-side is rough, with many prickles, the underside is smooth (Stehmann & Bürkel, 1984). The species is a by-catch in the fishery for Greenland halibut *Reinhardtius hippoglossoides* (Bullough et al. 1998; Lordan, 1998) at depths greater than 500 m (1.26–7.8°C) in the Faroe–Shetland Channel (Bullough et al., 1998). The maximum depth for which temperature information was measured in the area of capture of these specimens was 1700 m (3.7°C). Gordon et al. (1995) discuss the differing temperature profiles either side of the Wyville–Thompson Ridge. *Raja hyperborea* is normally associated with cold water on the eastern side. Presence in the Rockall Trough at the depth recorded suggests that it is associated with the overflow of cold Norwegian Basin water as described by Mauchline (1990).

Raja kukujevi Dolganov, 1985. The two female *R. kukujevi* (0.73 and 0.82 m TL) caught were first records of the species from an area other than the Mid Atlantic Ridge. Characteristic of this species is that dorsal and ventral surfaces are creamy-white. There is a series of seven thorns on the inner orbital rim and above the spiracles and no interdorsal spines. Clasper structure distinguishes *R. kukujevi* from all other rajids. The interruption of the median row of thorns, absence of spinules, smaller number of thorns, narrower rostral cartilage and more posterior position of the cranial fontanelles distinguishes this species from the closely related *R. bathyphila* and *R. bigelowi* (Dolganov, 1985).

Raja fullonica Linnaeus, 1758—shagreen ray. Three females (0.51–0.59 mTL) of the shagreen ray and one male (0.5 mTL) were taken. The snout is pronounced and the upper surface, entirely spinulose. There are no thorns between the dorsal fins. About eight thorns are present around the inner margin of the eye, a longitudinal row of 3–9 nuchal thorns and several on the scapular region, with a continuous median row along the trunk and tail (Stehmann & Bürkel, 1984). This species normally occurs on upper continental slopes from 30 to 550 m (Stehmann & Bürkel, 1984). The specimens described above are from greater depths than previous records.

Raja circularis Couch, 1838—sandy ray. Five specimens of the sandy ray (two males and three females of 0.62–0.95 m TL) were caught. The snout is short, with a slightly pronounced tip. The upperside is almost entirely spinulose, with a series of eight thorns around each eye, a trianglar series on the nape and two series of parallel rows on the tail (Stehmann & Bürkel, 1984). A benthic species of offshore waters and on upper slopes between 70 and 275 m (Stehmann, 1973), it has previously been recorded in the Rockall Trough by Gordon & Duncan (1989).

Table 1. *Details of the unusual chondrichthyan species caught on long-line in Rockall Trough.*

Species	No. of specimens	Area	Position	Depth (m)	Catalogue numbers
Centrophorus uyato	1	Area 3	55°45.02′N 09°25.05′W	730–820	NMI 12.1998
Bathyraja pallida	1	Area 5	54°15.01′N 12°13.06′W	1869–1924	NMI 13.1998
Bathyraja richardsoni	25	Area 5		1869–2925	NMI 14.1998
Bathyraja richardsoni	4	Area 5		1869–2925	ZMH 9172
Bathyraja richardsoni	1	Area 4	54°48.05′N 10°38.40′W	1120–1317	ZMH 9173
Raja circularis	5	Area 7	53°43.08′N 14°02.04′W	639–738	NMI 15.1998
Raja fullonica	4	Area 4	54°48.05′N 10°38.04′W	1120–1317	NMI 16.1998
Raja hyperborea	4	Area 5		1869–2925	NMI 18.1998
Raja kukujevi	2	Area 2	56°46.02′N 09°17.06′W	1236–1341	NMI 17.1998
Hydrolagus pallidus	1	Area 4		1011–1315	NMI 11.1998

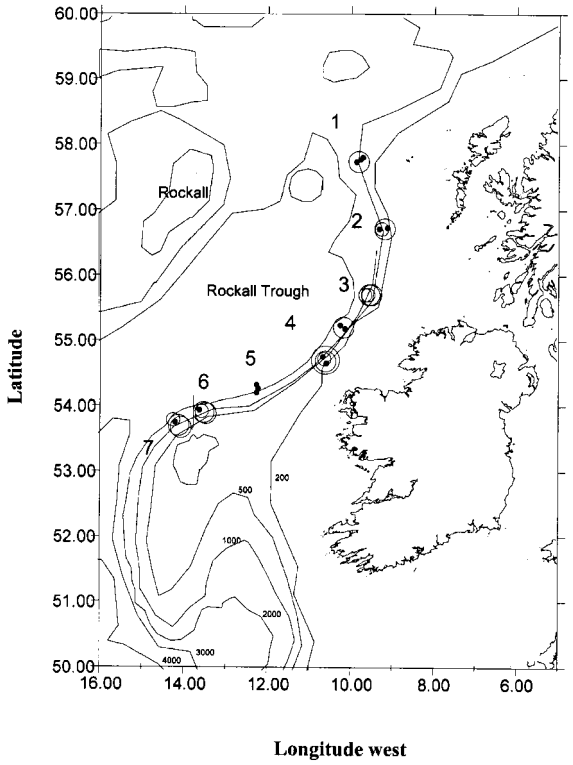

Figure 1. Positions of areas and long-line settings during 1997 deep water survey.

Centrophorus uyato Rafinesque, 1810—Little gulper shark. The single mature male little gulper shark specimen (0.82 m TL) is distinguishable from *C. squamosus* by having sessile crowns on the dermal denticle bases and from *C. granulosus* by the subrhombic dermal denticles, with blunt posterior cusps. Maturity occurs between 81 and 94 cm TL (Compagno, 1984), at relatively smaller size than congeners. Bridger (1978) tentatively assigned some specimens of the genus *Centrophorus* found in the Rockall Trough to this species, the current record of *C. uyato* confirms its presence in the area.

Bathyraja pallida (Forster, 1967)—pale ray. One female pale ray of 1.62 m TL was caught. The tail is quite short, upper surface mostly smooth, unlike that of *B. richardsoni*. The remnant of a spine was present between the dorsal fins. The upperside is whitish, the underside somewhat darker. Two partially encapsulated egg cases were taken from the specimen (Stehmann & Merrett, unpublished data). Two specimens of this species were also taken by trawl (2300–2880 m) from the Rockall Trough (Gordon & Duncan, 1987).

Bathyraja richardsoni (Garrick, 1961)—Richardson's ray. Twenty-nine specimens of both sexes of Richardson's ray, ranging from an immature female to mature males and females up to 1.42 m TL were collected from the same area. A single specimen was caught separately. No thorns are present on the disc, though 15–20 are found medially on the tail. The undersurface is always lighter than the upper (Stehmann & Bürkel, 1984). Three specimens were taken from the Rockall Trough by Gordon & Duncan (1989).

Hydrolagus pallidus Hardy & Stehmann, 1990—ghost shark. A single ghost shark specimen, a female of 0.62 m TL was caught on the Donegal slope. The anal and caudal fins are continuous in this specimen, characteristic of the genus. It is distinguishable from the similar *H. affinis* by it's colour (pale creamy-grey) and (in mature males) by having a straight or only slightly irregular distal edge of the prepelvic tenacula. The subcaudal fin is usually deeper than, or of equal depth to supracaudal fin (Hardy & Stehmann, 1990).

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