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## A first record of *Isistius plutodus* in the north-eastern Atlantic

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One specimen of the largetooth cookiecutter shark *Isistius plutodus* was caught in the north-eastern Atlantic at 43°58' N; 28°32' W. This is the first record of this rare species in the north-eastern Atlantic and the northernmost point of its known distribution. © 2004 The Fisheries Society of the British Isles

Key words: distribution; *Isistius plutodus*; largetooth cookiecutter shark; morphometrics; north-eastern Atlantic.

The genus *Isistius* (Dalatiidae, Squaliformes; Shirai, 1992) consists of two recent species, the cookiecutter shark *Isistius brasiliensis* (Quoy & Gaimard) and the largetooth cookiecutter shark *Isistius plutodus* Garrick & Springer (Compagno, 1984). Bite marks of some 5–7 cm diameter in large fishes and marine mammals are indicators of the presence of *Isistius* spp. *Isistius brasiliensis* is a frequently caught shark in tropical and subtropical regions in all oceans. No fresh 'crater wounds' on potential prey have been found north of 33°50' N (Muñoz-Chapuli *et al.*, 1988). *Isistius plutodus* is very rare and only known from a few localities in the subtropical Atlantic and Pacific Oceans; it was originally described from a single specimen caught off the coast of Alabama, U.S.A. (Garrick & Springer, 1964). Parin (1975) reported a second specimen from off the coast of Okinawa, Japan (25°11' N; 128°30' E) extending the known distribution into the Pacific Ocean. A third specimen was reported by Golovan & Pakhorukov (1986) at 22°52' N off the coast of Western Sahara in the eastern central Atlantic. In 1988, a fourth specimen was reported from off the coast of Brazil (30°30' S; 50°06' W) by Sadowsky *et al.* (1988), thus extending the known distribution of *I. plutodus* to the southern hemisphere. Four more specimens were subsequently received from fisherman in the area (Amorim *et al.*, 1998). McGrouther (2001) gives an account of another specimen in the southern hemisphere and the second

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TABLE I. Morphometric comparison of the *Isistius plutodus*-holotype and specimens from the central and north-eastern Atlantic, north-western and south-western Pacific. Morphological features are given as a per cent of total length

	<i>Isistius plutodus</i> Gulf of Mexico, holotype (data from Garrick & Springer, 1964)	<i>Isistius plutodus</i> North-western Pacific specimen (data from Parin, 1975)	<i>Isistius plutodus</i> Central eastern Atlantic specimen (data from Golovan & Pakhorukov, 1986)	<i>Isistius plutodus</i> South-western Pacific specimen (data from McGrouther, 2001) <sup>†</sup>	<i>Isistius plutodus</i> North-eastern Atlantic specimen (this paper)
$L_T$ (mm)	423.0 Female	335.0 Male	270.0 Female	363.0 Female	417.0 Female
Sex	Female	Male	Female	Female	Female
Specimen number in museum	USNM 188386	n. d.	n. d.	AMS I.28924-001	ZMH 9368
Mass (g)	n. d.	n. d.	n. d.	n. d.	254.38
Trunk at pectoral origin (%):					
Width	9.8	9.1	9.6	n. d.	9.2
Height	9.7	9.0	9.3	10.1	10.1
Tip of the snout to (%):					
Outer corner of nostrils	0.6	0.7	0.7	n. d.	1.2
Eye	2.1	2.4	2.3	n. d.	2.4
Spiracle	7.1	6.9	7.7	n. d.	7.1
Mouth	4.0	4.3	4.2	3.9	4.0
First gill opening	15.1	19.2	15.2	n. d.	15.7
Fifth gill opening	18.7	n. d.	18.8	18.9	20.5
Pectoral origin	19.2	19.5	18.7	n. d.	20.5
Pelvic origin	68.1	67.1	67.4	n. d.	68.8
First dorsal origin	64.6	63.0	63.7	64.2	67.6
Second dorsal origin	75.4	74.6	74.0	n. d.	76.7
Upper caudal origin	86.3	87.0	85.0	n. d.	86.5
Lower caudal origin	86.8	87.5	85.2	n. d.	87.0
Distance between bases (%):					
First and second dorsal	5.7	5.7	5.6	6.2	4.7
Second dorsal and caudal	6.4	8.1	6.1	7.2	7.0

Pectoral and pelvic	45.4	46.0	47.8	n. d.	46.7
Pelvic and caudal	14.7	16.5	15.1	n. d.	14.7
First dorsal fin (%):					
Length base	5.6	4.9	5.6	4.8	4.2
Length posterior margin	3.5	4.0	n. d.	n. d.	4.0
Height	2.8	2.7	3.1	2.9	2.5
Second dorsal fin (%):					
Length base	4.5	5.1	5.2	5.0	5.2
Length posterior margin	2.8	3.6	n. d.	n. d.	3.6
Height	3.7	3.2	3.4	3.6	3.5
Pectoral fin (%):					
Length base	2.5	2.4	n. d.	n. d.	2.5
Length anterior margin	7.3	7.5	n. d.	n. d.	6.6
Width	3.6	4.0	2.7	n. d.	2.8
Pelvic fin (%):					
Overall length	7.0	8.0	n. d.	n. d.	7.0
Length base	3.7	3.6	n. d.	n. d.	4.0
Length claspers	—	7.5	—	—	—
Caudal fin (%):					
Length dorsal lobe	14.4	14.2	14.2	n. d.	12.5
Length ventral lobe	7.1	6.8	7.9	n. d.	8.9
Nostrils (%):					
Distance between inner corners	1.5	1.3	n. d.	n. d.	1.6
Length first gill opening (%)	0.9	0.9	1.0	n. d.	0.5
Length fifth gill opening (%)	0.7	0.6	0.8	n. d.	0.5
Horizontal diameter of eye (%)	3.7	3.4	n. d.	4.1	3.4
Vertical diameter of eye (%)	2.6	2.7	n. d.	n. d.	2.0
No. upper teeth (n)	14 + 1 + 14	10 + 1 + 10	12 + 1 + 12	n. d.	28*
No. lower teeth (n)	9 + 1 + 9	8 + 1 + 8	9 + 1 + 9	9 + 1 + 9	9 + 1 + 9

n. d., no data available or not given in description of specimen.

\* , no odd numbers of upper teeth were observed and a symphyseal tooth was not discernible.

† , mm values converted to per cent of *L*-r.

specimen in the Pacific Ocean caught in 1988 off New South Wales, Australia, c. 33°00' S; 152°00' E. In the present study, a specimen was caught on 3 August 2000 in a pelagic trawl at midnight at a depth of 90–100 m over a water depth of 890–980 m, north of the Azores (43°58' N; 28°32' W). The specimen is located at the Ichthyological Collection of the Zoological Institute of the University of Hamburg (ZMH 9368). The capture expands the present knowledge of the distribution of *I. plutodus* by 21 degrees to the north in the eastern Atlantic, reaching the northern most point of its known distribution at 43°58' N.

The specimen measured 417 mm in total length ( $L_T$ ) and had a fresh mass of 254.4 g. Except for the ventral collar, it showed a uniform brown colour. Morphometric measurements according to Bigelow & Schroeder (1948) were compared with the description of the holotype specimen from Garrick & Springer (1964) and the specimens caught by Parin (1975), Golovan & Pakhorukov (1986) and McGroutier (2001) (Table I). It appears that there is a considerable variability within the species.

*Isistius plutodus* differs from that of *I. brasiliensis* mainly in its dentition and morphometric characters. Compared to *I. brasiliensis*, the lower teeth of *I. plutodus* are reduced in number and much larger, whereas the upper teeth are reduced in number and shorter. According to Garrick & Springer (1964), the dental formula in *I. brasiliensis* is  $\frac{15+1+15}{12+1+12}$  to  $\frac{18+1+18}{15+1+15}$  compared to *I. plutodus* ranging from  $\frac{10+1+10}{8+1+8}$  to  $\frac{14+1+14}{9+1+9}$  (Table I). The dentition of the present specimen refers to the type description in that 9 + 1 + 9 lower teeth were found. Among the 28 upper teeth no symphyseal tooth was discernible. In contrast to the original description that *I. plutodus* has no clearly defined black collar over the branchial region, the present specimen, similar to the description given by Parin (1975), had a ventral colouration (Fig. 1).



FIG. 1. Pronounced lower row of teeth and ventral colouration at the pectorals for the north-east Atlantic specimen of *Isistius plutodus*.

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