FIRST RECORDS OF THE FALSE CATSHARK, *PSEUDOTRIAKIS MICRODON* CAPELLO, 1868, FROM THE WATERS OF EASTERN AUSTRALIA AND INDONESIA

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A new specimen of a rare deepwater chondrichthyan, the false catshark *Pseudotriakis microdon* Capello, 1868 is documented from the Coral Sea. This represents the first record of the species from off the east coast of Australia and only the second from Australian waters. The specimen, a 277cm total length (TL) mature male, was captured by exploratory deepwater dropline at a depth of 350m on 03/02/2004. Morphometrics are presented and compared to other published accounts. A further individual, a 287cm TL mature female captured by bottom longline operating at depths of 100–150m around Sawu, Dana and Raijua Islands, southeastern Indonesia, is documented from fish landing sites in Lombok, Indonesia. This individual was not retained and only its sex, maturity and TL were recorded. It represents the first record of *P. microdon* for Indonesia and for the northeast Indian Ocean. These specimens increase the known range of this rare, sporadically recorded, but widely distributed chondrichthyan. □ *Carcharhiniformes, Pseudotriakidae, Queensland waters, Indonesia.*

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The false catshark *Pseudotriakis microdon* Capello, 1868 (Carcharhiniformes: Pseudotriakidae) is a possibly cosmopolitan deepwater elasmobranch, however, it is sporadically recorded and its complete distribution remains unclear. The false catshark is benthic, primarily on the continental and insular slopes at depths of 200-1,900m, but can occasionally occur on the continental shelf (Bigelow & Schroeder, 1948; Compagno, 1984; Baranes, 2003). Most records are from the Northern Hemisphere, and the species appears to be rarer, or more rarely encountered, in the Southern Hemisphere. It has previously been recorded from the northwest Atlantic, off Canada (Gilhen & Coad, 1999) and New York to New Jersey (Bigelow & Schroeder, 1948); northeast and eastern central Atlantic from the Atlantic slope off Iceland, France, Portugal, Madeira, Azores to Senegal and the Cape Verde Islands (see Compagno, 1984; 1988); western Indian, Aldabra Island, Cosmoledo Island and Geyser Reef (Forster et al., 1970) and the Amirantes Islands, Seychelles (Baranes, 2003); eastern Indian, off Cape Leeuwin, Western Australia (Allen & Cowan, 1995); central Pacific, Hawaiian Islands (Crow et al., 1996); northwest Pacific, various localities off Japan from Honshu to Okinawa Islands (Jordan & Snyder, 1904; Taniuchi et al., 1984; Yano, 1992) and Taiwan (see Chen, 1963); and, southwest Pacific, Three Kings Ridge, Challenger Plateau and Hikurangi Trough (east of Mahia Peninsula) New Zealand (Stewart & Clark, 1988; Yano, 1992; Stewart, 2000). The species has not been recorded from either the southern Atlantic or the eastern Pacific, and it is most likely that it is more widely distributed than presently documented.

Pseudotriakis Capello, 1868 is a monospecific genus, characterised by its large adult size, soft-body, cat-like eyes and nictitating eyelids, large spiracles, wide angular mouth extending posterior to the eye, two large spineless dorsal fins, the first low, extended and keel-like, an anal fin, numerous extremely small cuspidate teeth (≥200 rows in each jaw), no precaudal pits, and an asymmetrical caudal fin (Compagno, 1984; 1988). Jordan & Snyder (1904) recognised *Pseudotriakis acrales* (from the Atlantic) as distinct from *P. microdon* (from the Pacific) however numerous authors (see Compagno, 1988 for an account) could not find any characters to reliably separate the two species and

FIG. 1. *Pseudotriakis microdon* QM I.34963. Lateral view of whole specimen. The first dorsal fin is not visible in the photograph. (Photo: Jeff Wright).

tentatively placed *P. acrales* in synonymy with *P. microdon*. Yano & Musick (1992) confirmed this synonymy with morphometric analysis, concluding that characters used to separate the species change allometrically as suggested by Compagno (1988). The Pseudotriakidae also includes *Gollum* Compagno, 1973; the two genera being readily distinguished by the height of the first dorsal fin. In *Gollum* the first dorsal fin is about the same size as, and is roughly equal in height to, the second dorsal fin (Compagno, 1973), whilst in *Pseudotriakis* the low, keel-like first dorsal fin is much lower than the second dorsal fin. *Gollum attenuatus* (Garrick, 1954), the sole member of the genus, is endemic to New Zealand (Compagno, 1988).

Here we present the first record of *P. microdon* from the east coast of Australia and the second known specimen from Australian waters, together with the first record from Indonesia and the northeast Indian Ocean.

METHODS

The Australian specimen was frozen and transported to the Queensland Museum where it was examined prior to being fixed in formalin. Eighty-five morphometrics were recorded for the new specimen, including the 56 measurements presented in Yano & Musick (1992). Abbreviations and methods for measurements follow Compagno (2001), except those for the first dorsal fin length (D1L) and first dorsal fin base length (D1B) which follow that of Yano & Musick (1992). Morphometrics were compared with those given in Yano & Musick (1992). The following abbreviations are used for institutions: QM, Queensland Museum, Brisbane; WAM, Western Australian Museum, Perth.

The Indonesian individual was observed during surveys of the chondrichthyan catches at the fish landing site of Tanjung Luar on the eastern side of the island of Lombok in southeastern Indonesia. Sex, maturity and TL were recorded, but no morphometric measurements were taken and the specimen was not retained due to the remote location of the find.

RESULTS

A 277cm TL mature male *P. microdon* (QM I.34963) (Fig. 1) was captured by deepwater multi-hook demersal dropline off the southwest side of Calder Reef, Coral Sea (~20°51' S, 153°13' E) at 350m depth on 03/02/2004. The individual was taken by an exploratory commercial fishing vessel targeting a broad range of deepwater reef fishes including flame and ruby snapper (*Etelis* spp.) and bar cod (*Epinephelus* spp.). Table 1 presents morphometrics for the Australian specimen, as well as the range of values for the 56 measurements given in Yano & Musick (1992).

A 287cm TL mature female *P. microdon* (Fig. 2) was observed and photographed at the fish landing site of Tanjung Luar on the eastern side of the island of Lombok, southeastern Indonesia on 08/09/2004 by a joint Australian-Indonesian team conducting fish market surveys. The individual was captured by demersal longline fishers targeting sharks (*e.g.* large carcharhinids and *Hexanchus griseus* (Bonnaterre, 1788)). No precise locality data was obtained, however the fishers are known to operate only around the

TABLE 1 (facing). *Pseudotriakis microdon* QM I34963, 2770mm TL. Proportional dimensions as percentages of total length, with comparison to values given in Yano & Musick (1992) where appropriate. Abbreviations follow Compagno (2001). Numbers in parentheses are those used for measurements by Yano & Musick (1992). * denotes proportional measurements for QM I.34963 which fall outside the range in Yano & Musick (1992).

TL (mm) 2770					
Measurement	Proportional dimension (%TL)	Yano & Musick (1992) range (%TL)	Measurement	Proportional dimension (%TL)	Yano & Musick (1992) range (%TL)
PRN (1)	4.15	2.61-4.79	D1B (32)	26.71	15.45-36.34
POB (2)	5.31	3.73-7.31	D1P (33)	11.37	4.89-14.64
PSP (3)	8.56	7.39-12.16	D1H (34)	5.23*	2.25-3.91
POR (4)	4.58	2.72-6.53	D1A	14.44	-
PG1 (5)	14.80	12.02-19.02	D1I	1.44	-
PG2	16.34	-	D2L (35)	15.16	11.88-16.49
PG3 (6)	17.36	14.86-21.68	D2B (36)	12.20	9.96-15.05
PG4	18.33	-	D2P (37)	8.12	4.31-8.81
PG5 (7)	19.15	16.13-23.52	D2H (38)	7.29	4.48-7.65
PP1 (8)	18.95	16.00-23.11	D2A	13.54	-
PP2 (9)	56.25	50.69-56.44	D2I	2.96	-
SVL (10)	59.21	54.66-60.93	ANL (39)	11.37*	8.59-11.04
PD1 (11)	29.60	28.38-38.18	ANB (40)	10.29*	7.02-9.82
PD2 (12)	64.26	60.53-67.43	ANP (41)	4.77	3.45-6.95
PAL (13)	68.59	63.39-74.18	ANH (42)	4.84	2.59-5.38
PCL dorsal (14)	80.79	77.33-83.32	ANA	9.68	-
PCL ventral (15)	80.25	74.44-81.61	ANI	1.08	-
IDS (16)	9.46	6.34-13.79	P1L	11.19	-
DCS (17)	3.25	2.46-5.62	P1B (43)	5.16	4.11-11.38
PPS (18)	33.21	26.35-35.13	P1H	9.78	-
PAS (19)	6.75	4.28-10.50	P1A (44)	11.73*	4.96-11.11
ACS (20)	2.89	1.35-4.66	P1I (45)	4.26	3.33-5.45
VCL	19.31	-	P1P (46)	11.88*	4.73-8.43
PCA	7.04	-	P2L (47)	9.93	7.99-10.91
PPO (21)	37.94	29.65-40.14	P2B (48)	8.09*	5.25-8.00
INW (22)	4.22	3.76-5.32	P2H	5.56	-
NOW	1.48	-	P2A (49)	8.16	4.99-9.33
ANF	0.47	-	P2I	2.31	-
MOW (23)	10.29	7.49-13.09	P2P	5.31	-
ULA	0.47	-	CLI (50)	9.10	3.74-9.20
LLA	0.79	-	CLO	5.31	-
ING	4.30	-	CLB	1.48	-
GS1 (24)	2.31	1.69-2.69	CPH	4.55	-
GS2	2.56	-	CPW	2.35	-
GS3 (25)	3.03*	2.03-2.88	CDM (51)	19.31	17.45-21.80
GS4	2.92	-	CPV (52)	8.48	7.33-9.82
GS5 (26)	2.17	1.35-2.59	CPU	13.72	-
ESL	1.55	-	CTR (53)	4.95	3.33-5.32
SPL (27)	1.34	0.78-2.30	CST (54)	3.39*	1.82-3.26
EYL (28)	2.67	2.26-4.09	CTL	5.20	-
EYH (29)	1.52	0.64-1.83	TRW (55)	13.36	9.14-16.86
INO (30)	4.62*	5.49-10.02	TRH (56)	11.91	5.77-14.18
D1L (31)	28.16	17.31-37.66			

FIG. 2. *Pseudotriakis microdon* Tanjung Luar fish landing site, Lombok. (Photo: Fahmi).

islands of Dana, Raijua and Sawu in the Sawu Sea, midway between Sumba and West Timor (~11°00' S, 121°30-40' E) in depths between 100 and 150m. Demersal longlines (one per boat, ~1,000m in length, with ~100 large hooks on 3m traces) are employed. The shark was processed by the fishers on site, for its meat, fins, skin and possibly the liver. Only total length and sex of the individual were recorded, and although no detailed examination of the dissection was carried out, the individual possessed mature female reproductive organs but was not gravid. The catch from this fishing boat also included two medium-sized *H. griseus* and at least one large *Carcharhinus obscurus* (Lesueur, 1818).

DISCUSSION

The new Australian and Indonesian records were easily identified as *P. microdon* from the descriptions and characters given in Compagno (1984, 1988). Consistent with the separation of *Pseudotriakis* from *Gollum*, the first dorsal fin height (D1H) was considerably lower than the second dorsal fin height (D2H) (QM I.34963; D1H 0.7 in D2H). The majority of measurements on the Australian specimen fall within the range of those presented in Yano & Musick (1992) and those that do not are generally close to the range presented (see Table 1). The exceptions are D1H and P1P (pectoral fin posterior margin). These differences are likely due to slight differences in measuring techniques between the methods followed here (Compagno, 2001) and those used by Yano & Musick (1992), or from general variability. Indeed, Gilhen & Coad (1999) report a D1H of 4.5%TL for a Canadian specimen, also outside the range given by Yano & Musick (1992). From the data presented in Table 1 it is clear that there is considerable variability in some morphometric characters in this species (Taniuchi et al., 1984; Yano & Musick, 1992). This is to be expected in deepwater chondrichthyans with flabby, easily deformed bodies. Baranes (2003) reported that a Seychelles specimen possessed a crest in continuation of the anterior margin of the first dorsal fin and that his morphometrics varied from those in the literature. However, most of his proportional measurements fall within or just outside the range presented in Yano & Musick (1992) (to which Baranes (2003) did not compare his specimen). The exception is pre-first dorsal fin (PD1) which is considerably lower due to the presence of the pre-dorsal crest, the origin of which Baranes (2003) took to be the origin of the first dorsal fin. The first dorsal-fin origin is difficult to assess in *Pseudotriakis* and this may lead to reported variation. Although PD1 is lower in the Seychelles specimen, first dorsal fin base (D1B) is within the reported range.

The maximum observed size of *P. microdon* is 296cm and 295cm TL for females and males, respectively (Yano, 1992). Variation in size at maturity is apparent from the literature. Compagno (1984) specified mature males as

small as 200cm TL. Yano (1992), based on a 250cm TL immature male and nine mature males greater than 261cm TL, concluded maturity in males is reached at ~260cm TL; whereas, Gilhen & Coad (1999) and Taniuchi et al. (1984) reported smaller adult males, of 223 and 228cm TL, respectively. The Australian specimen had completely calcified claspers, and at 277cm TL, is in the documented range of mature males. Forster et al. (1970) erroneously reported Saemundsson's (1922) gravid female at 212cm TL, while it was Saemundsson's male specimen that was this size and the gravid female was in fact reported in Saemundsson (1922) as "9 foot" (274cm TL). Reliable reports of female maturity in the literature start at 256cm TL (Forster et al., 1970) and the Indonesian female reported here at 287cm TL was mature. Documented size at birth is also variable, with Compagno (1984) suggesting 70-85cm TL, Saemundsson (1922) reporting near term embryos of 85cm TL from Icelandic waters, and Taniuchi et al. (1984) reporting a 96cm free-swimming individual (no details were provided). However, these are considerably lower than other reports of near-term embryos, i.e. 112 and 113cm TL (Sea of Kumanonada, Honshu, Japan; Taniuchi et al., 1984), 116-120cm TL (Okinawa Islands, Japan; Yano, 1992) and 138cm TL (Challenger Plateau, New Zealand; Stewart, 2000). Yano (1992) reported that a 156cm TL female possessed an umbilical scar which was 22mm long and 6mm wide. Stewart & Clark (1988) did not comment on the presence or absence of an umbilical scar in a 155.5cm TL male. Given its rarity, very little is known of the biology of *P. microdon*. Yano (1992) reviewed reproductive biology, confirming Forster et al.'s (1970) suggestion that the species was oophagous. Saemundsson (1922), Taniuchi et al. (1984), Yano (1992) and Stewart (2000) report litter sizes of two, while the gestation period is unknown (but is presumed to be extended).

Only a single *P. microdon* has been recorded in southeastern Indonesia during a comprehensive survey of a number of fish landing sites in this region between April 2001 and October 2004, in which time a total of ~36,000 individual chondrichthyans, representing ~138 species, were recorded. However, it should be noted that deepwater fisheries in Indonesia are very limited and only little demersal fishing occurs in depths >300m and none in depths >600m. Also, only small-scale longlining occurs in these deeper waters, i.e. there is no trawling. If fisheries in Indonesia did begin to operate in deeper waters, larger numbers of *P. microdon* may be encountered along with other slope species. At the Tanjung Luar landing site in Lombok, the local name used for *P. microdon* was "hiu tahu" (Bahasa Indonesia). It is not known whether this name applies solely to *P. microdon* (which would indicate that individuals may be caught on an irregular basis by fishers at this site, and perhaps elsewhere in Indonesia) or if it is used for a number of deeper water species.

The first Australian record, a 200cm TL female (WAM P.30826-001) was captured by a trawler targeting orange roughy (*Hoplostethus atlanticus*) off Cape Leeuwin (~35°00′S, 114°45′E), Western Australia at 830m depth on 10/08/1994 (Allen & Cowan, 1995). Other Southern Hemisphere records are presently confined to those from Aldabra and Cosmoledo Islands (to the north of Madagascar) and Geyser Reef (between Madagascar and the Comoros) in the western Indian Ocean (Forster et al., 1970) and from around New Zealand, where numerous specimens have been reported. The species has been recorded from three isolated locations around the North Island of New Zealand: Challenger Plateau to the west (Stewart, 2000); Hikurangi Trough off the eastern coast (Stewart & Clark, 1988; Stewart, 2000); and, Three Kings Ridge to the north (Yano, 1992). Given these records, it is highly likely that the species has a much wider distribution than presently known around New Zealand. The same can be implied for other regions, and as global deepwater fishing activities continue to expand and as further deepwater areas and environments are surveyed, the known distribution of *P. microdon* will likely be widened. Such catches and records will require close monitoring, not only to better define the species' distribution, but to ensure that such a rare, large, and reproductively limited chondrichthyan, does not suffer population collapse or localised extirpation (Cavanagh et al., 2003).

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