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Introduction

Pteroplatytrygon is a monotypic genus (Compagno, 1999; Nelson, 2006) and one of the six genera of family Dasyatidae (Myliobatiformes), which is the largest stingray family comprising about 68 species. In the Indian waters, 32 rays including 18 species of Dasyatidae have been reported (Raje et al., 2002, 2007) and the presently described species Pteroplatytrygon violacea is a new addition. It was earlier considered as a rare species occurring only in the Mediterranean Sea (Tortonese, 1956), but later its distribution in the Indian, Pacific and Atlantic Oceans has been reported (McEachran and Capape, 1984; Mollet, 2002; Domingo et al., 2005; Ellis, 2007; Froese and Pauly, 2008). However, reports from the Indian Ocean are very rare and restricted to the waters off South Africa and eastern Indonesia (White and Dharmadi, 2007). P. violacea has been reported in the exploratory survey of FORV Sagar Sampada along the southwest coast of India (Jayaprakash et al., 2006) and in the fishery survey of Matisya Vrusti (Anon, 2007). This communication gives the first report on the morphometric characteristics of P. violacea from the Arabian Sea.

Material and methods

The pelagic stingray Pteroplatytrygon violacea (Bonaparte, 1832) was collected from the Cochin Fisheries Harbour, Kerala in August 2008. The mature male specimen was obtained as by-catch from a tuna gillnet, which operated at a depth of about 150 m. It measured 102 cm in total length (TL), 47 cm in disc width (DW) and 35 cm in disc length (DL) and weighed 2.5 kg. The morphometric characteristics of the specimen were very similar to that described from the North Sea. The present specimen has been deposited in the National Marine Biodiversity Referral Museum at CMFRI, Cochin.

Results and Discussion

The pelagic stingray P. violacea (Bonaparte, 1832) is found in the open oceans and inshore bays. It is the only whiptail stingray known to inhabit epipelagic waters of oceans (Wilson and
Introduction

Plesiobatis daviesi (Wallace, 1967) belongs to monotypic family Plesiobatidae (Rajiformes) which was established by Nishida (1990). The species was formerly included under the genus Urotrygon (Nelson, 2006). P. daviesi is well distributed in the Indo-West and Central Pacific Oceans from South Africa to Hawaii (Froese and Pauly, 2009). Nair and Soundararajan (1973) reported P. daviesi (female; 534 mm TL) for the first time from Indian waters off Mandapam in the Gulf of Mannar (08°58' N lat. 79°16' E long.), southeast coast of India. Like most of the deep-sea organisms, studies on deepwater stingray P. daviesi are limited. This communication presents the morphometric characteristics of two female P. daviesi specimens collected from the northeastern Andaman Sea.

Material and Methods

An exploratory deep-sea fishery survey (cruise: No. 252) was carried out by FORV Sagar Sampada in the Andaman Sea (Fig. 1) of the Indian EEZ during 2007. Trawling was carried out during daytime using EXPO and HSĐT nets at depths ranging from 300 to 700 m. A female P. daviesi measuring 156 cm total length (TL) with two spines, disc width 78 cm and weighing 15 kg (Fig. 2 and 3) was collected from the northeastern Andaman waters off Diglipur (13° 14’ N lat; 93° 09’ E long.) at 320 m depth and another one with a single spine measuring 92.5 cm TL and weighing 3 kg was collected off Mayabandar (12° 48’ N lat; 93° 07’ E long.) from 369 m depth. The specimens were identified following Wallace (1967) and Compagno (1986). Morphometric measurements were taken from formalin preserved (5%) specimens and comparisons (as % of TL) with earlier reports were made. Specimens were deposited in the National Biodiversity Referral Museum, CMFRI, Cochin, India (GA.7.6.1.1).

Results and Discussion

P. daviesi is mainly found on continental and insular slopes at a depth of about 275-680 m and is reported to attain at least 270 cm TL (Compagno, 1986; Nelson, 2006; White et al., 2006). P. daviesi can be identified from the following characters: snout pointed, broadly angular and markedly produced; snout length > 6 times orbit diameter, tail with a lobe-like caudal fin, upper and lower caudal present. No dorsal fin or skin folds on side or undersurface of tail. Upper surface of the disc covered with prickles. The morphometric characteristics of the present specimens match with the representative described from South African waters even though slight variations were observed in certain characteristics (Table 1). This includes the
New distributional records of deep-sea sharks from Indian waters


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Abstract
This paper reports the first documented record of three deepwater sharks from Indian waters i.e., Hexanchus griseus (Hexanchidae), Deania profundorum (Centrophoridae), pygmy false catshark (undescribed) (Pseudotriakidae) and presents a taxonomic account of smooth lanternshark, Etmopterus pusillus (Etmopteridae) and leafscale gulper shark, Centrophorus squamosus (Centrophoridae), caught by hooks & line units operated in the Arabian Sea, west coast of India and landed at Cochin Fisheries Harbour (Kerala), southwest coast of India.

Keywords: Deep-sea sharks, new reports, Arabian Sea, Indian EEZ

Introduction
The Arabian Sea with its unique ecological features such as position between two land masses, presence of islands, features like oxygen minimum zone (OMZ), circulation pattern, currents, influence of monsoon and high saline water intrusion from Persian Gulf and Red Sea etc. supports a very diverse ichthyofauna. Reports on the diversity of deep-sea fish fauna especially that on deep-sea chondrichthyans from Indian waters are very few. Raje et al. (2007) listed 47 species of sharks in commercial landings along the Indian coast mainly from catches made within 100 m depths. However elasmobranchs are also known from deeper waters and probably many species, which are not yet recorded, occur in the unexploited/underexploited deep waters of the Indian EEZ.

The targeted deep-sea shark fishery in Indian waters, especially along the southwest and southeast coasts of India started lately after 2002 by the multiday shark fishermen of Thoothoor (Tamilnadu). The fishery targets gulper sharks (Centrophoridae) but many other deep-sea chondrichthyans occur as by catch, which were dominated by bramble shark, Echinorhinus brucus and chimaera, Neoharriotta pinnata besides several small sized deep-sea sharks, skates and rays which are often discarded. Cochin Fisheries Harbour (Kerala), is a major fishing base where chondrichthyans which are caught along the entire west coast of India by multiday deep-sea trawlers, longlines and hooks & line units are landed throughout the year. The species described in this communication were captured by hooks & line units specifically targeting for deep-sea sharks operated off southwest coast of India at depths beyond 250 m. Deep-sea sharks, Hexanchus griseus (Hexanchidae), Deania profundorum (Centrophoridae) and pygmy false catshark (undescribed) (Pseudotriakidae) represent new species records from the Indian EEZ. In this paper these species are described and the occurrence of Etmopterus pusillus and Centrophorus squamosus off southwest coast of India is confirmed.

Material and Methods
During weekly observations of fish landings at Cochin Fisheries Harbour (CFH), Cochin, southwest coast of India, specimens of Hexanchus griseus, Centrophorus squamosus, Deania profundorum, Etmopterus pusillus and pygmy false catshark (undescribed) were collected from the deep-sea hooks & line landings operated in the Arabian Sea during April 2008. Species identification was based on Compagno (1984), Smith and Heemstra (1986), Shirai and Tachikawa (1993) and Compagno et al.
Aspects of the biology of the pygmy ribbontail catshark

**Eridacnis radcliffei** (Proscylliidae: Carcharhiniformes) from the south-west coast of India

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Biological data are presented for the pygmy ribbontail catshark **Eridacnis radcliffei** based on specimens collected from the by-catch of the commercial deep-sea shrimp trawl fishery operating in the Arabian Sea off the south-west coast of India. A total of 549 individuals, from 101 to 257 mm total length (*L*<sub>T</sub>) and 2.2 to 56 g, were collected. The *L*<sub>T</sub> at first maturity (*L*<sub>T50</sub>) of females and males was estimated at 183 and 170 mm, respectively, and analysis of stomach contents revealed that **E. radcliffei** feeds primarily on crustaceans.

Key words: Arabian Sea; diet; maturity; reproductive biology.

The pygmy ribbontail catshark **Eridacnis radcliffei** Smith 1913 (Proscylliidae: Carcharhiniformes) is one of the smallest living shark species and the smallest carcharhinoid shark, reaching only 257 mm total length (*L*<sub>T</sub>). **Eridacnis radcliffei** was described from the Philippines and has a scattered distribution in the Indo–West Pacific, from East Africa to the Philippines. It occurs on or near muddy bottoms on the continental shelf and slope at depths of 71–766 m, and is reported to be abundant at several locations, *i.e.* off southern India and the Philippines (Compagno et al., 2005a). The IUCN Red List of Threatened Animals lists the status of **E. radcliffei** as ‘Least Concern’ as it is a small species that is not targeted by fisheries and inhabits a wide range of water depths including depths not available to commercial fisheries (McCormack et al., 2009). Of the three species in the **Eridacnis** genus, **E. radcliffei** is by far the most widely distributed with a geographical range extending from waters off Tanzania to the Philippines (Compagno et al., 2005a). In comparison, Cuban ribbontail catshark **Eridacnis barbouri** (Bigelow & Schroeder 1944) is known from Florida and Cuba, and African ribbontail catshark **Eridacnis sinuans** (Smith 1957) from the east coast of South Africa. Compagno et al. (2005b) noted...
Rediscovery and description of the quagga shark, *Halaelurus quagga* (Alcock, 1899) (Chondrichthyes: Scyliorhinidae) from the southwest coast of India

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Abstract

The Quagga shark *Halaelurus quagga* (Alcock, 1899) is one of the poorest known scyliorhinid (Carcharhiniformes) sharks of the world, described from a single specimen collected from the Arabian Sea coast of India (off Malabar). Since its description, the only other published reports of this species are of specimens from Somalia. This paper reports on *H. quagga* from Indian waters, more than 100 years after its description, and only the third report of specimens of this species globally. A re-description of *H. quagga* is also provided based on the recent Indian specimens.

Key words: Rediscovery, *Halaelurus quagga*, Scyliorhinidae, Carcharhiniformes, Arabian Sea, India

Introduction

Indian waters support a diverse chondrichthyan fauna consisting of more than 150 known species (Raje et al., 2007; Akhilesh et al., in prep.), with the actual number probably being higher since there are no recent, exclusive studies on this group from the region. Of the reported shark species, some have a geographic distribution range restricted to the western Indian Ocean (Compagno et al., 2005).

The Scyliorhinidae (Carcharhiniformes) is one of the largest and diverse shark families with 17 genera, 146 recognized and described species, and at least 19 recognized but undescribed species to date (Human & D.A. Ebert, unpub. data), which is continually expanding with several species being described since 2005 (Last et al., 2008; Froese & Pauly, 2010). The Scyliorhinidae consist of very small sharks that have no commercial importance and very rarely occur as bycatch in shark fisheries of India.

Ten scyliorhinid shark species are reported from the Arabian Sea, of which two belong to the genus *Halaelurus*: *H. boesemani*, and *H. quagga* (Manilo & Bogorodsky, 2003; Human, in prep.). Compagno et al. (2005) recognised that the occurrence of *H. natalensis* needed confirmation; however previous reports of *H. natalensis* from the Arabian Sea are erroneous (Human, in prep.).

After the original description of *H. quagga* from the Arabian Sea coast of India (off Malabar), the only other reports of *H. quagga* came from off Somalia (Springer & D’Aubrey, 1972; Springer, 1979). The holotype is the only previously known specimen from India and this article presents the second report of *H. quagga* from Indian waters, over 100 years after its description. This is also the first report of a female and egg case for the species, and provides a re-description based on recent specimens collected from the southwest coast of India (Kerala coast), which are deposited at the Marine Biodiversity Museum at the Central Marine Fisheries Research Institute (CMFRI), Cochin, Kerala.
Landings of whale sharks *Rhincodon typus* Smith, 1828 in Indian waters since protection in 2001 through the Indian Wildlife (Protection) Act, 1972

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Abstract Since 28th May 2001, Whale shark *Rhincodon typus* Smith, 1828 have received the highest protected status for an animal in India through the Indian Wildlife (Protection) Act, 1972 Schedule-I. However, landings have still been recorded off the Indian coast since 2001, mostly as incidental bycatch in commercial fishing operations, and other sightings have also been reported. In the 1990’s, a targeted whale shark fishery existed off the Gujarat coast following increased demand for the flesh in some other Asian countries. Since the ban, landings of whale sharks have decreased substantially with only 79 recorded between 2001 and 2011. Landings were recorded in each year and in each month of the year with the highest landings in January and February. Between 2001 and 2011, the smallest specimen reported from Indian waters was a 94 cm TL individual and the largest was a 13.7 m TL individual, with most individuals recorded in the 4–6 m TL size class. Small juveniles of less than 3 m TL are rarely recorded in the literature and appear to be rarely observed globally. Between 2006 and 2011, seven juveniles of less than 3 m TL were recorded from two landing sites. Despite the continued landing of whale sharks along the Indian coasts since 2001, the protection of this species appears to have substantially reduced the catches with only incidental landings and strandings now evident. The protection status of whale sharks in India is generally well understood by fishers, but still there is need for further education regarding the current national legislation and vulnerability of the species.

Keywords India · Whale shark · *Rhincodon typus* · Landings · Strandings · Indian Wildlife Protection Act, 1972

Introduction

The whale shark *Rhincodon typus* Smith 1828 (Orectolobiformes: Rhincodontidae) is the largest species of fish and has a circumglobal distribution in all tropical and temperate waters, excluding the Mediterranean Sea (Compagno et al. 2005). It is an epipelagic and neritic species found in coastal to oceanic waters and
Notes on the Indian swellshark, *Cephaloscyllium silasi* (Scyliorhinidae: Carcharhiniformes) from deep waters off the west coast of India

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The Indian swellshark *Cephaloscyllium silasi* is a poorly known deep water scyliorhinid (Carcharhiniformes) shark described from the south-west coast of India (off Kollam). Since the original description, reports of this species are absent due to rarity of specimens. This paper presents the first report of its egg case and also provides detailed morphological data about *C. silasi* based on recently collected materials.

**Keywords:** morphology, *Cephaloscyllium silasi*, Scyliorhinidae, Carcharhiniformes, by-catch, Arabian Sea, India

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INTRODUCTION

Scyliorhinidae (Carcharhiniformes) is one of the largest and most diverse shark families with 17 genera, 146 recognized and described species and expanding (Yano et al., 2005; Last et al., 2008; Clark & Randall, 2011). Scyliorhinidae comprise very small sharks and have no importance in the commercial fishery of India. Ten scyliorhinid sharks are reported from the Arabian Sea, of which *Cephaloscyllium* is represented by only two species: Indian swellshark *Cephaloscyllium silasi* (Talwar, 1974); and balloon shark *Cephaloscyllium sufflans* (Regan, 1921) (Manilo & Bogorodsky, 2003).

For a long period after the original description by Talwar (1974) the validity status of *C. silasi* was under question; Springer (1979) in his review of the Scyliorhinidae family included *C. silasi* as a synonym of the quagga catshark *Halaelurus quagga* (Alcock, 1899). Compagno & Talwar (1985) discussing the generic character positioned the species in *Cephaloscyllium*. After the original description, reports of *Cephaloscyllium silasi* from the Arabian Sea coast of the Indian exclusive economic zone (EEZ) are absent. This paper is also the first report of the egg case for the species, and provides a detailed re-description based on recent specimens collected from deep waters off the south-west coast of India (Kerala coast).

MATERIALS AND METHODS

Three specimens of *Cephaloscyllium silasi* were collected occasionally during regular weekly observations of fish landings from 2008–2011 along the south-west coast of India as by-catch of commercial deep-sea shrimp trawlers operating in the Arabian Sea, off Kollam at 200–500 m depths. The specimens were collected from Sakthikulangara Fisheries Harbour (SFH), Kollam (Kerala). Species identification was based on Talwar (1974) and Compagno et al. (2005). Morphometric measurements of formalin (5%) preserved specimens were taken by following the method of Compagno (2001). Morphometric measurements for the egg case followed the method of Ebert et al. (2006). Tissue samples collected were preserved in 95% ethanol for genetic analysis. DNA was extracted by standard protocols (Miller et al., 1988) and partial sequence information of the mitochondrial gene, cytochrome oxidase subunit I (COI) were generated using primers from Ward et al. (2005) for DNA barcoding purposes. Bidirectional sequencing was carried out using an ABI 3730 sequencer. Sequence data were submitted to the NCBI GenBank (Accession number: HM467791).

RESULTS

SYSTEMATICS

Family Scyliorhinidae

Genus *Cephaloscyllium* Gill, 1862

The members of the genus *Cephaloscyllium* Gill, 1862 are known as swell sharks or balloon sharks related to their ability to inflate/swell body by swallowing seawater to deter predation and to settle the body among rocks or crevices (Nakaya et al., 2013). *Cephaloscyllium* can be separated from other species of the family by the lack of labial furrows, presence of supraorbital crests on the chondrocranium, first dorsal fin location behind pelvic origin, second