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SPECIES COMPOSITION, COMMERCIAL LANDINGS, DISTRIBUTION AND SOME ASPECTS OF BIOLOGY OF SHARK (CLASS PISCES: SUBCLASS: ELASMOBRANCHII: INFRACLASS: SELACHII) FROM PAKISTAN: TAXONOMIC ANALYSIS

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ABSTRACT

Sharks are important component of the coastal and offshore fisheries of Pakistan. A total of 79 species of sharks belonging to Infraclass Selachii (Subclass: Elasmobranchii) and 6 orders are recorded from Pakistan. Order Carcharhiniformeswas observed to be most prolific taxon represented by 48 species belonging to 6 families. Commercially important genus *Carcharhinus* is represented 18 species whereas genus *Chiloscyllium*by 5 species, genus *Sphyrna* by 4 species and genus *Alopias* by 3 species whereas other genera are represented by either 2 or 1 species. Three species namely Pondicherry shark (*Carcharhinus hemiodon*), Ganges shark (*Glyphis gangeticus*) and Indian sand tiger (*Carcharias tricuspidatus*) used to commonly occurring in Pakistan but now seem to be locally extinct as no confirmed record of their occurrence is available far the last about 40 years. The paper reviewed the historical records of shark species occurring in Pakistan resolving some of the issues in their taxonomy.

Key word: Elasmobranchii, Infraclass Selachii, Pondicherry shark (*Carcharhinus hemiodon*), Ganges shark (*Glyphis gangeticus*) and Indian sand tiger (*Carcharias tricuspidatus*), taxonomy.

INTRODUCTION

Fishes belonging to Class Pisces: Subclass: Elasmobranchii: Infraclass: Selachii includes "true" sharks and commonly known as "pagas" in Balochistan and "mangra" in Sindh. Sharks are exploited commercially for its meat for local consumption, fins for export to China and offal as raw material for fishmeal production. Presently there is no aimed fishery for shark in Pakistan and major part of the landings is made through by catch of trawling, bottom set gillnetting, gillnetting and longlining in coastal and offshore areas of Pakistan There is only a few dedicated study dealing with shark in Pakistan. Sharks have been included in checklist of fishes of Pakistan **(**Bianchi, 1985, Hoda, 1985, 1988; Hussain, 2003; Jalil and Khaliluddin, 1972, 1981;Misra, 1952 and Sorley, 1932). A few studies on elasmobranchs of Pakistan also listed species of shark (Ahmad and Niazi, 1975; Khan and Quadri, 1986; Misra, 1969; Niazi, 1994; Qureshi, 1953, 1977). Qureshi (1972) in his review of elasmobranchs have covered sharks of Pakistan in detail. Psomadakis, *et al.*, (2015)who dealt with commercially important fishes and shellfishes reported a number of shark species from Pakistan. Fatima *et al.* (2016) who have studied shark, guitarfish and rays landings at Karachi Fish Harbour, reported commercial landings and sizes of ten shark species. Fatima (2018) also reported 10 shark species from Karachi Fish Harbour.

Gore *et al.* (2019) studies elasmobranch from Balochistan coast and reportedthat the main species to be blacktip shark (*Carcharhinus limbatus*), bull shark (*C. leucas*) and spot-tail shark (*C. sorrah*). Altogether 25 shark species were identified, of which nine are regionally vulnerable, eight endangered, and one (the sand tiger shark, *Carcharias taurus*) are critically endangered. Bycatch of shark gillnet fisheries of Pakistan has been studied by Khan (2013), Moazzam (2012a-b, 2013, 2017, 2019), Moazzam *et al.*, (2016), Nawaz and Moazzam (2014), Shahid (2012) and Shahid *et al.*, (2015, 2016, 2018).

There has been a surge on the studies focused on fisheries of elasmobranch including sharks in the Arabian Sea and contiguous sea (Chen, 1996; Dent and Clarke, 2015; Dulvy *et al.*,2014; Haque *et al*., 2018; Henderson *et al.*, 2004; 2016; Jabado *et al.*, 2014, 2015, 2018; Karnard *et al.*, 2020). Some of these studies specifically dealt with fisheries (Jabado and Spaet, 2017). Some aspects of the fisheries of these species in Pakistan were also included in studies carried out by Jabado and Spaet (2017) and Jabado *et al.* (2017). They have given detailed description of shark fisheries of the Arabian Sea including Pakistan. Notarbartolo-di-Sciara and Jabado (2021) provided a review of shark and rays of the Arabian Sea.According to them a total of 138 chondrichthyan speciesare currently known to occur in the waters surrounding the Arabian Peninsula (Arabian Sea), including 68 sharks from 22 families and 41 genera.

Majority of elasmobranch species including sharks are considered to be overfished globally and some cases species have been fished to extinction or their numbers are dwindling considerably, a number of initiatives have been taken. These include placing sharks (as well as rays and guitarfishes) on CITES Appendices or on IUCN Red List (Dulvy *et al.*, 2014; Jabado *et al.*, 2018). There is dearth of knowledge about the shark species composition, fisheries and various aspects of the biology of shark species, Considering this lacunae in the information about shark of Pakistan, present study was initiated. In first part of this study species of shark occurring in Pakistan including their historical record is presented.

MATERIALS AND METHODS

Published scientific literature was examined for the records of various shark species occurrence from Pakistan coast (Fig.1). In addition, specimens of were collected between 2003 and 2021 from Karachi Fish Harbour which is the largest fish landing center for domestic fleet operating along coastal and offshore waters of Pakistan. Samples collected from the harbour, were photographed and salient features and measurement are recorded, before, their preservation in 5 % neutralized formalin.

RESULTS AND DISCUSSIONS

Sharks are important components of commercial fishing of Pakistanas these are caught mainly as bycatch of gillnetting, trawling and longlining. Important fishing areas and landing centers are given in Fig. 1.

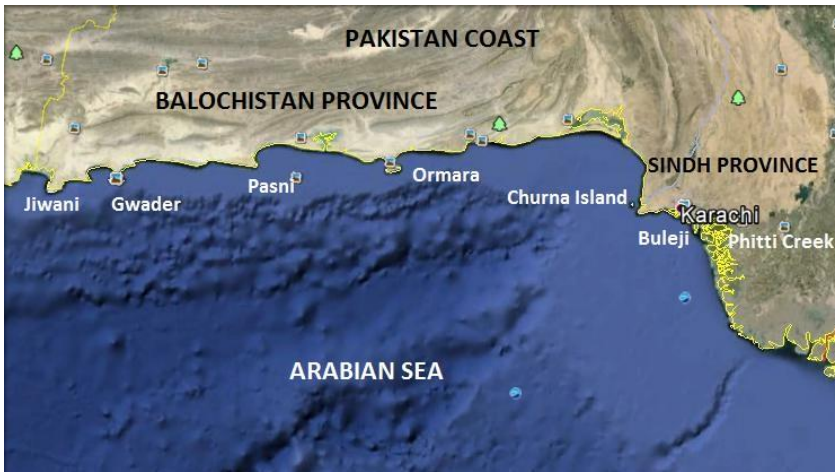


Fig. 1. Pakistan coast.

Living sharks are divided into 8 orders (Compagno, 2001); of these 6 are represented in Pakistan; Squatiniformes, Squaliformes, Pristiophoriformes, Heterodontiformes, Orectolobiformes, Lamniformes, Carcharhiniformes and Hexanchiformes.

ORDER SQUATINIFORMES

Angelsharks and monkfish are included in this order whose members are known to have a flat body with mouth at front and lack anal fin. This family is not known from Pakistan.

ORDER SQUALIFORMES

Dogfish and cookiecutter sharks are included in this order. Species included in this order are known to have short snout, mouth underneath, no anal fin. Species belonging to three families of this order i.e. Echinorhinidae (bramble sharks), Dalatiidae (sleeper sharks), Somniosidae (Sleeper sharks) and Squalidae (dogfish shark) are reported from Pakistan. Notarbartolo-di-Sciara and Jabado (2021) also reported Family Centrophoridae represented by two species; dwarf gulper shark *Centrophorus atromarginatus* Garman, 1913 and arrowhead dogfish *Deania profundorum* (Smith & Radcliffe, 1912) from Arabian Sea. They also reported smooth lanternshark- *Etmopterus*

pusillus (Lowe,1839) belonging to Family Etmopteridae from Arabian Sea. Occurrence of these species along Pakistan coast cannot be overruled.

Family Echinorhinidae

Family Echinorhinidae includes bramble sharks which is represented in Pakistan by one species *Echinorhinus brucus* (Bonnaterre, 1788).

Echinorhinus brucus (Bonnaterre, 1788)
(Fig. 2)

Material Examined

- 1 specimen collected on 26 February 2004 from Karachi Fish harbor (104 m TL)
- 1 specimen collected on 2 April 2010 from Karachi Fish harbor (71 m TL)
- 1 specimen collected on 9 October 2010 from Karachi Fish harbor (66 m TL)

This species was reported from Balochistan coast by Ormara, Balochistan by Moazzam *et al*. (1987). It was also reported from Pakistan coast by Jabado and Ebert (2015) and Psomadakis, *et al.*, (2015). It is commonly known as bramble shark and locally called "limpi paggas". Compagno (1984a, 1984e), Fowler (1941), Froese and Pauly (2020) and Zugmayer (1913) reported this species from Oman, India and other parts of the world.

Moazzam *et al* (1987) reported this species from Pakistani waters as *Echinorhinus brucus*. Two specimens (later on lost) were photographed in Ormara (Fig. 2b) which do not have prominent denticle patches on body, therefore, tentatively identified as *Echinorhinus cookei.* Samples of *Echinorhinus brucus* collected from off Sindh coast have prominent denticle patches on the body surface. Dr. Mark Harris (personal communications) is of the opinion that the specimens from Pakistan may not belong to *E. cookie*, as he has examined some specimens from India, Iran and Oman that have very few scattered denticles similar to the one observed in specimens from Pakistan. He tested the DNA of those specimens and it appears that those from India, Oman and Iran are concurrent with *E. brucus*.

This species is known from tropical and temperate areas of the western and Central Pacific, also occurring in theeastern Pacific from Oregon to the Gulf of California, New Zealand and in Peru and Chile (Froese and Pauly, 2020).According to Notarbartolo-di-Sciara and Jabado (2021) it is a large shark patchily occurring inslope habitats in tropical and temperateAtlantic, Indian (including Arabian Sea), and WestPacific waters.

Family Dalatiidae

Members of family Dalatiidae are commonly known as sleeper sharks and two species *Centroscyllium ornatum* and *Heteroscymnoides marleyi* are reported from Pakistan. According to Notarbartolo-di-Sciara and Jabado (2021) also reported spined pygmy shark (*Squaliolus laticaudus* Smith & Radcliffe, 1912) which one of the world smallest shark from Arabian Sea whose occurrence along Pakistan coast may not be overruled.

Centroscyllium ornatum (Alcock, 1889)

Material Examined

- None

It is commonly known as ornate dogfish and reported from off Sindh Coast by Ahmad and Niazi (1975) and Compagno (1984a). It was also recorded from Pakistan coast with mentioning any specific location by Froese and Pauly (2020), Hoda (1985, 1988), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Murty *et al* (2009) and Qureshi (1953). Jabado and Ebert (2015) shown its occurrence in offshore waters of Sindh and Balochistan. No specimen of this species was examined during the present study. According to Froese and Pauly (2020) this species is known from Arabian Sea and Bay of Bengal.

Heteroscymnoides marleyi Fowler (1934)

Material Examined

- None

Longnose pygmy shark was described from Pakistan byAhmad and Niazi (1975), Hoda (1985, 1988), Hussain (2003), Jalil and Khaliluddin (1972; 1981) and Khan and Quadri (1986), however, Compagno (1984a), Fowler (1941) and Froese and Pauly (2020) reported it only from Southeast Atlantic (near Ascension Island) and Western Indian Ocean (Durban, Natal, South Africa). Further studies are required to ascertain its presence in Pakistan.

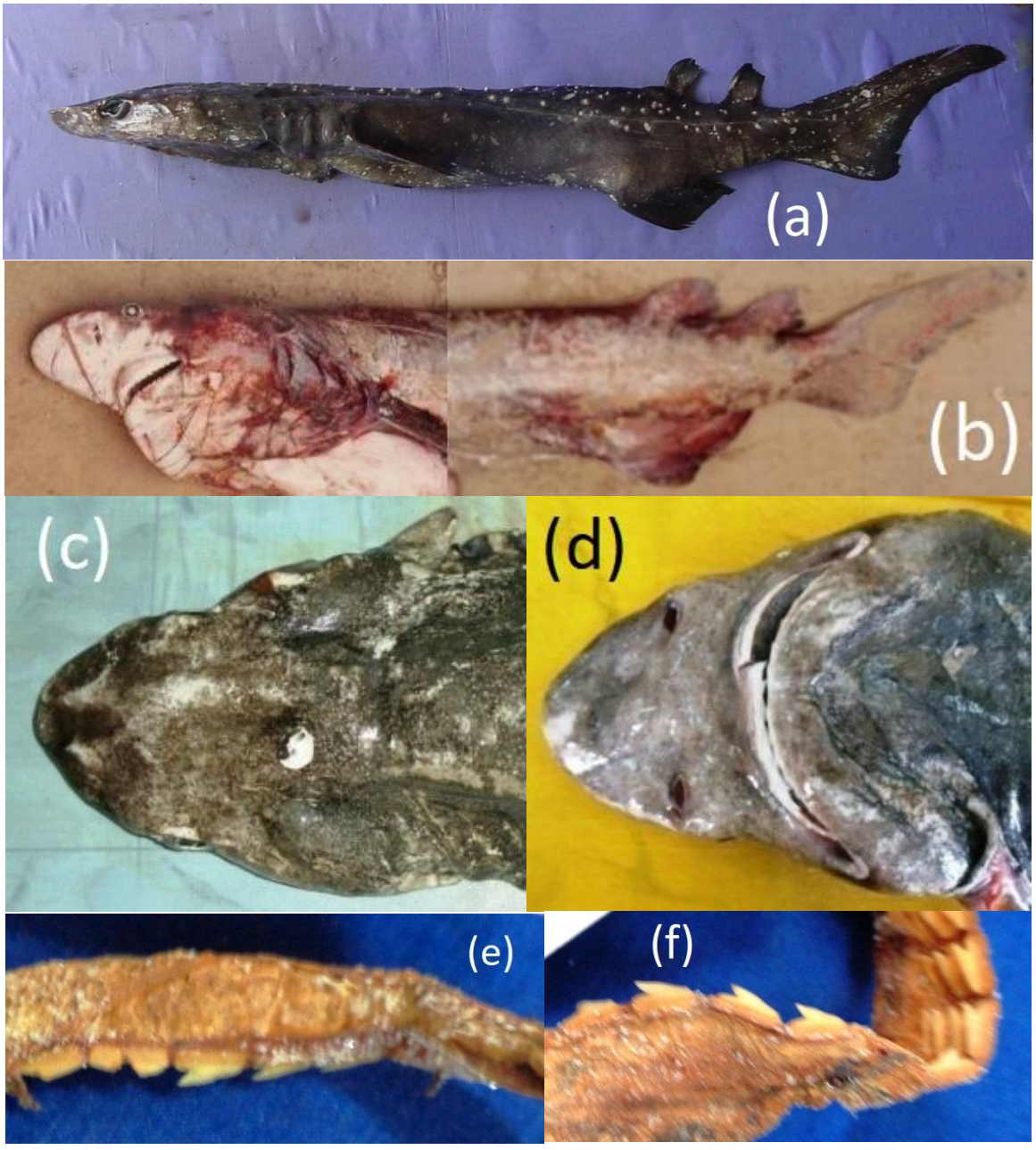


Fig.2. *Echinorhinus brucus* (a) specimen from Karachi (lateral view; (b) specimen from Ormara (lateral view); (c) head (dorsal view); (d) head (ventral view); (e) teeth (upper jaw); (f) teeth (lower jaw).

Family Somniosidae

Members of family Somniosidae are commonly also known as sleeper sharks and one species *Centroscymmus crepidater* is reported from Pakistan.

Centroscymnus crepidater (Barbosa du Bocage and de Brito Capello, 1864)

Material Examined

- None

This species is commonly known as longnose valvetfish and reported from Pakistan by Hoda (1988), however, Compagno (1984a, 1984p) reported this species from Indian Ocean and other parts of the world but not mentioned its presence in the Northern Arabian Sea. From the Arabian Sea only one specimen of *Centrophorus rossi* (now considered as synonym of this species) was reported by Alcock (1898b). Eschmeyer (2020) refers this species to belonged to genus *Centroselachus.* There is a need for further studies on the specimens collected from the Arabian Sea. It will also be desirable to examine the specimen reported by Alcock (1898b) from Arabian Sea to ascertain the identification.

Family Squalidae

Members of FamilySqualidaeare commonly known as dogfish sharks and one species *Squalus mitsukurii*is reported from Pakistan.

Squalus mitsukurii Jordan and Snyder, 1903

Material Examined

- None

Shortspine spurdog was reported from Pakistan by Hoda (1988), however, Compagno (1984a, 1984b) and Froese and Pauly (2020) did not show its distribution in Northern Arabian Sea. Further studies are required to ascertain its presence in Pakistan.

ORDER PRISTIOPHORIFORMES

Saw sharksare included in this order. Species included in this order have long snout, mouth underneath and no anal fin. Only one family Pristiophoridae represented by one species is reported from Pakistan.

Family Pristiophoridae

Only two species saw shark *Pristiophorus japonicas* and *Pristiophorus sp.* D. (undescribed species) were reported from Pakistan.

Pristiophorus japonicus Günther, 1870

Material Examined

- None

Japanese saw shark was reported from Pakistan by Hussain (2003). According to Compagno (1984a, 1984s) and Froese and Pauly (2020) this species is known from western north Pacific (Japan to Taiwan). Further studies are required to ascertain its presence in Pakistan.

Pristiophorus cf. nancyae **Ebert & Cailliet 2011**

Material Examined

- None

Compagno (1984s) reported first confirmed records of a five-gilled sawshark that had been collected in deepwater in the Arabian Sea off Karachi, Pakistan. Since the record of the *Pristiophorus* from off Karachi, Pakistan, mentioned by Compagno (1984s) is of uncertain validity (Ebert and Cailliet, 2011; Weigmann *et al.*, 2014). Ebert and Cailliet (2011) suggested that they might represent a new species. Compagno (2005) cited an undescribed species, *Pristiophorus sp. D*, from the western Indian Ocean and give its range as Mozambique, and possibly Somalia to the Arabian Sea off Pakistan.

Compagno (1984j) specified Bruce Welton (pers. comm.) as source of these records from Karachi, Pakistan but Bruce Welton (pers. comm.) on request by Stehmann in 1992 already confirmed to not have seen any specimens of *Pristiophorus* in fish markets or shrimp trawlers while staying in Karachi, and he confirmed this again on a recent request by the Weigmann in 2013 (Weigmann *et al*., 2014). Need not to mention that prior to 2000, shrimp trawlers and other boats in Pakistan used to be operating in shallow waters up to a maximum depth of 40 m, therefore, there was no possibility of record of any sawshark in Pakistan which are usually deep dwelling. The catch fishing boats are examined quite comprehensively (almost on daily basis) at Karachi Fish Harbour since 1995 but no sawshark was ever observed. It may be pointed out that Froese and Pauly (2020) and Jabado and Ebert (2015) have shown distribution of African dwarf sawshark (*P. nancyae*) extended to Arabian Sea (Pakistan coast).

ORDER HETERODONTIFORMES

Bullhead sharks are included in this order. Species included in this order are known to have anal fin, 5 gill slits, 2 dorsal fins and has dorsal fin spines and member of Family Heterodontidae (bullhead and horn sharks) are included in this order.

Family Heterodontidae

Only two species of Family Heterodontidae belonging to genus *Heterodontus* i.e. *Heterodontus omanensis* Baldwin, 2005 and *Heterodontus ramalheira* (Smith, 1949) are reported from Pakistan.

Heterodontus omanensis Baldwin, 2005
(Fig. 3)

Material Examined

- 1 specimen collected on 20 December 2009 from Karachi Fish Harbour (48 cm TL)

1 specimen collected on 17 March 2011 from Karachi Fish Harbour (44 TL)

Oman bullhead shark is reported from Psomadakis, *et al.,* (2015) from Pakistan coast. This species has four dark saddles, more or less equally distributed along the head and body. It has relatively small, dark pigmented dorsal fins, each with a white distal streak and possess large pectoral fins. This species differs from *H. japonicus* in having 4 dark saddles (11-14 in *H. japonicus*) and a smaller first-dorsal fin (9.3-10.9% TL vs. 11-21% TL in *H. japonicus*).

This species was originally described from Northeast of Ra's al Madrakah, Gulf of Masira, central Oman, and Arabian Sea by Baldwin (2005). This species has restrictive distribution along Oman and Pakistan coast (Eschmeyer, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a small-sized, rare and little known demersal sharkendemic to the Arabian Sea.

Heterodontus ramalheira (Smith, 1949)

Material Examined

- None

Whitespotted bullhead shark is reported from Pakistan by Hoda (1988), however, according to Compagno (1984a, 1984i) and Froese and Pauly (2020) this species is known from Southern Mozambique and Eastern shores of Arabian Peninsula (Oman). Further studies are required to ascertain its presence in Pakistan. According to Notarbartolo-di-Sciara and Jabado (2021) it is a small-sized, little known demersal shark restricted to shelf and upper slope habitat in the western Indian Ocean including Arabian Sea.

ORDER ORECTOLOBIFORMES

Carpet Sharks are included in this order. Species ofin this order are known to have anal fin, 5 gill slits, 2 dorsal fins, no fin spines and mouth in front of the eyes. Members of family Hemiscyliidae (bamboo sharks), family Stegostomatidae (zebra sharks), family Gingymostomatidae (nurse sharks), family Rhicodontidae (whale sharks), family Odontaspidae (slender tiger sharks) and family Pseudocarcharidae (crocodile shark) are included in this order.

Family Hemiscyliidae

Members of family Hemiscyliidae are known as bamboo or carpet sharks. Locally they are known as “Kori” or “Billi”in Sindh and “Pishi” or “Goj”in Balochistan. This family is represented by 6 species- *Chiloscyllium arabicum* Gubanov, 1980, *Chiloscyllium griseum* Muller and Henle, 1838, *Chiloscyllium indicum* (Gmelin, 1789), *Chiloscyllium plagiosum* (Bonnelt, 1830), *Chiloscyllium punctatum* Muller and Henle, 1838 and *Chiloscyllium sp. A.* in Pakistan. Fernando *et al*. (2019) noted issues with the identification of species of *Chiloscyllium* occurring in Sri Lanka. Similarly, there seems to be a number issues with the identification of genus *Chiloscyllium* occurring in Pakistan.

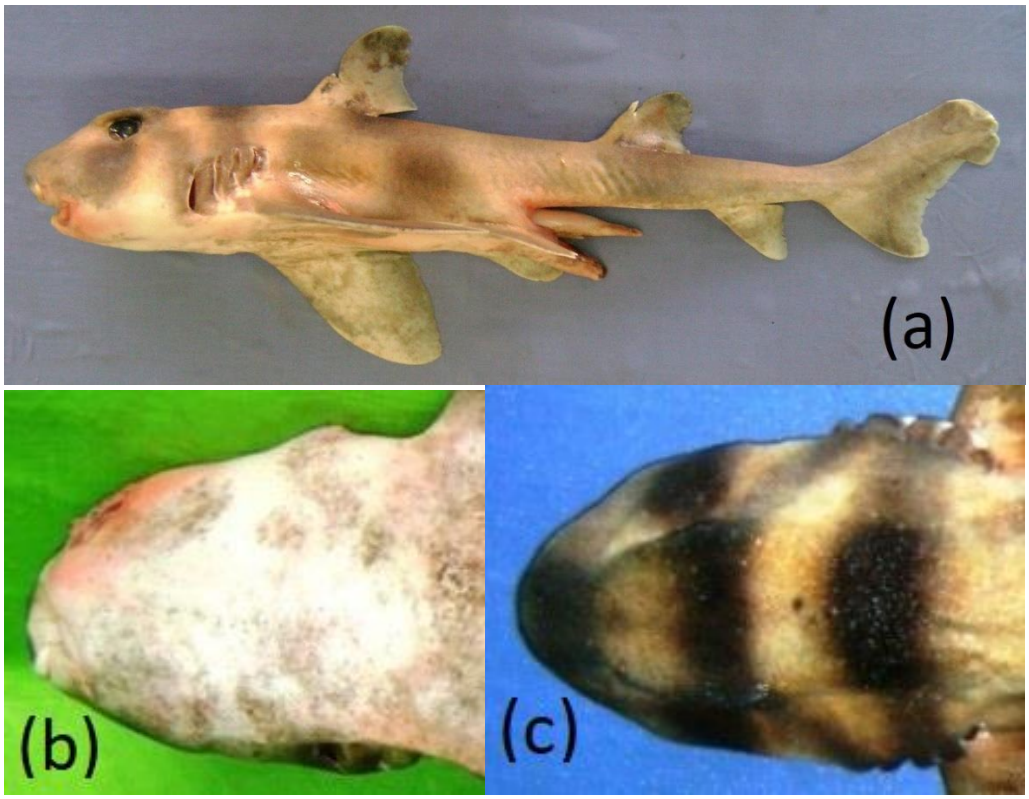


Fig. 3. *Heterodontus omanensis* (a) specimen from Karachi Fish Harbour (lateral view; (b) head (ventral view); (c) head (dorsal view).

Chiloscyllium arabicum Gubanov, 1980
(Fig. 4)

Material Examined

- 1 specimen collected on 11 April 2009 from Karachi Fish Harbour (64 cm TL)
- 1 specimen collected on 2 May 2013 from Karachi Fish Harbour (60 cm TL)

Arabian carpetshark was reported from off Ormara and off Sonmiani Bay by Anonymous(2001a) and Howe and Springer(1993) as *Chiloscyllium confusum.*It was reported from Pakistan coast by Jabado and Ebert (2015) and Psomadakis, *et al.*, (2015). It was originally described from Persian Gulf, India by Gubanov (1980), however, no type is known (Eschmeyer, 1998). This species occurs sporadically in Pakistani waters.

This species is known to have prominent predorsal and interdorsal ridges on back, dorsal fins with nearly straight posterior margins, first dorsal-fin origin opposite or just behind pelvic fin insertions, second dorsal fin usually with a longer base than first (Compagno, 2001). According to Dingerkus and DeFino (1983) *Chiloscyllium confusum* which is considered as a synonym of *C. arabicum*) has uniform body colour in both immature and the adults. Specimens of this species from Pakistan has the morphological characters and uniform colour, therefore,

rightly placed under *C. arabicum* (including *C. confusum* as synonym). It may be pointed out that Goto (2001) considered *C. confusum* as a valid species. Fernando *et al*. (2019) also argued about validity of *C. confusum.*

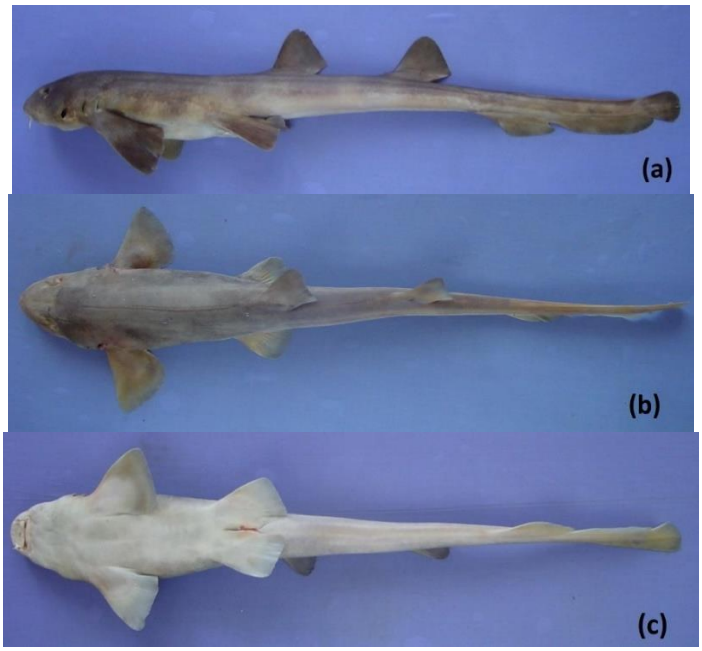


Fig.4. *Chiloscyllium arabicum*; (a) lateral view; (b) dorsal view; (c) ventral view.

This species is known from Western Indian Ocean including India, Pakistan, and the Persian Gulf between Iraq and the Arabian Peninsula (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a small reef-associated demersalshark endemic to the Arabian Sea.

Chiloscyllium griseum Muller and Henle, 1838

Material Examined

- None

Gray bamboo shark is reported from Sindh byAhmad *et al* (1973), Anonymous (1955), Hussain and Khatoon (1993), Misra (1962), Niazi (2001) and Regan (1908a). From Makran coast it was reported by Ahmad *et al* (1973), Anonymous (1952, 1955) and Qureshi (1952). It is reported from Pakistan coast without mentioning any location by Ahmad (1988), Ahmad and Niazi (1975), Bianchi (1985), Compagno (1984a, 1984h), Dingerkus and DeFino (1983), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al*., (2015), Qureshi (1972) and Weigmann (2012).

This species is known from Indo-West Pacific area including Persian Gulf, Arabian Sea to Pakistan, India, Sri Lanka, Malaysia, Thailand, Indonesia, China, Japan, the Philippines, Papua New Guinea northward to Japan (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a small reef-associated demersal shark occurring throughout the tropical Indo-West Pacific region including Arabian Sea.

Chiloscyllium indicum (Gmelin, 1789)

Material Examined

- None

Slender bamboo shark is reported from Sindh coast Anonymous, (1999), Hussain and Khatoon (1993) and Sorely (1932). From Balochistan it was reported by Day (1878), Fowler (1941) and Zugmeyer (1913). It was also reported from Pakistan without mentioning any specific location by Ahmad (1988), Ahmad and Niazi (1975), Ahmad *et al* (1973), Bianchi (1985), Compagno (1984a; 1984h), Froese and Pauly (2020), Hoda (1985 1988),

Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.,* (2015), Qureshi (1952, 1953) and Talwar and Jhingran (1991). This species is known from Indo-West Pacific area including India, Sri Lanka east to western Indonesia, north to Japan and China (Eschmeyer, 2020; Froese and Pauly, 2020).

This species is light brown above, cream below, with numerous dark spots on body, tail, and fins, these often forming indistinct vertical bars and saddles. It also has a dermal ridge on middle of back and two low lateral ridges. Although no specimen of this species was examined but considering its distribution range its occurrence in Pakistan is expected.

Chiloscyllium plagiosum (Bonnelt, 1830)

Material Examined

- None

Whitespotted bamboo shark was reported from Sindh Coast by Murray (1880). This species is reported from East coast of India, Sri Lanka, Malaysia, Singapore, Thailand, Kumpuchea, Indonesia, Vietnam, Hong Kong, the Maldives, China, Taiwan, Japan, PapUa New Guinea and the Philippines (Compagno, 1984a). There is no record of this species from Arabian Sea, therefore, the record of Murray (1880) may possibly be misidentification of some other species. Till some authentic records are available, it presence in Pakistan may be considered is doubtful.

Chiloscyllium punctatum Muller and Henle, 1838

Material Examined

- None

Brownbanded bamboo shark was reported from Karachi by Hussain and Khatoon (1993) based on an egg case with mature fetus (larvae!). This species is known from East coast of India, Malaysia, Singapore, Thailand, Indonesia, Vietnam, Kampuchea, China, Taiwan, Japan, the Philippines and Australia (Compagno, 1984a; Eschmeyer, 2020). Identification of this species based on an egg case cannot be done with certainty. Till some authentic records are available, its presence in Pakistan may be considered is doubtful.

Chiloscyllium sp. A.

(Fig. 5)

Material Examined

- 1 specimen collected from Karachi Fish Harbour on 5 January, 2017 (70 cm TL)
- 1 specimen collected from Karachi Fish Harbour on 11 November 2018 (84 cm TL)

This species has some of the characters of *C. punctatum* and *C. indicum.* It has snout narrowly rounded with mouth well in front of eyes. Its first and second dorsal fins small with straight or arched margins, well separated, and of similar sizes and first dorsal fin origin over or just behind pelvic fin insertions like in *C. indicum. C. punctatum* has pelvic fin rounded and flat and shape of pectoral and pelvic fin are similar but shape of dorsal fins is not comparable. Pre-dorsal and interdorsal ridges are present. Colouration and pattern on bars are also different from any other species.

In the light of abovesaid it requires further studies to ascertain it identification and referred as *Chiloscyllium Sp. A.* Fernanado et al. (2019) has given details of a species referred by them as *Chiloscyllium* Sp. 1 which is quite similar to specimens from Pakistan.

Family Stegostomatidae

Members of family Stegostomatidae are known as zebra sharks. Locally they are known as “Kori”, “Poonshrin”, or “Billi” in Sindh and “Pishi” or “Goj” in Balochistan. This family is represented in Pakistan by only one species - *Stegostoma fasciatum* (Hermann, 1783).

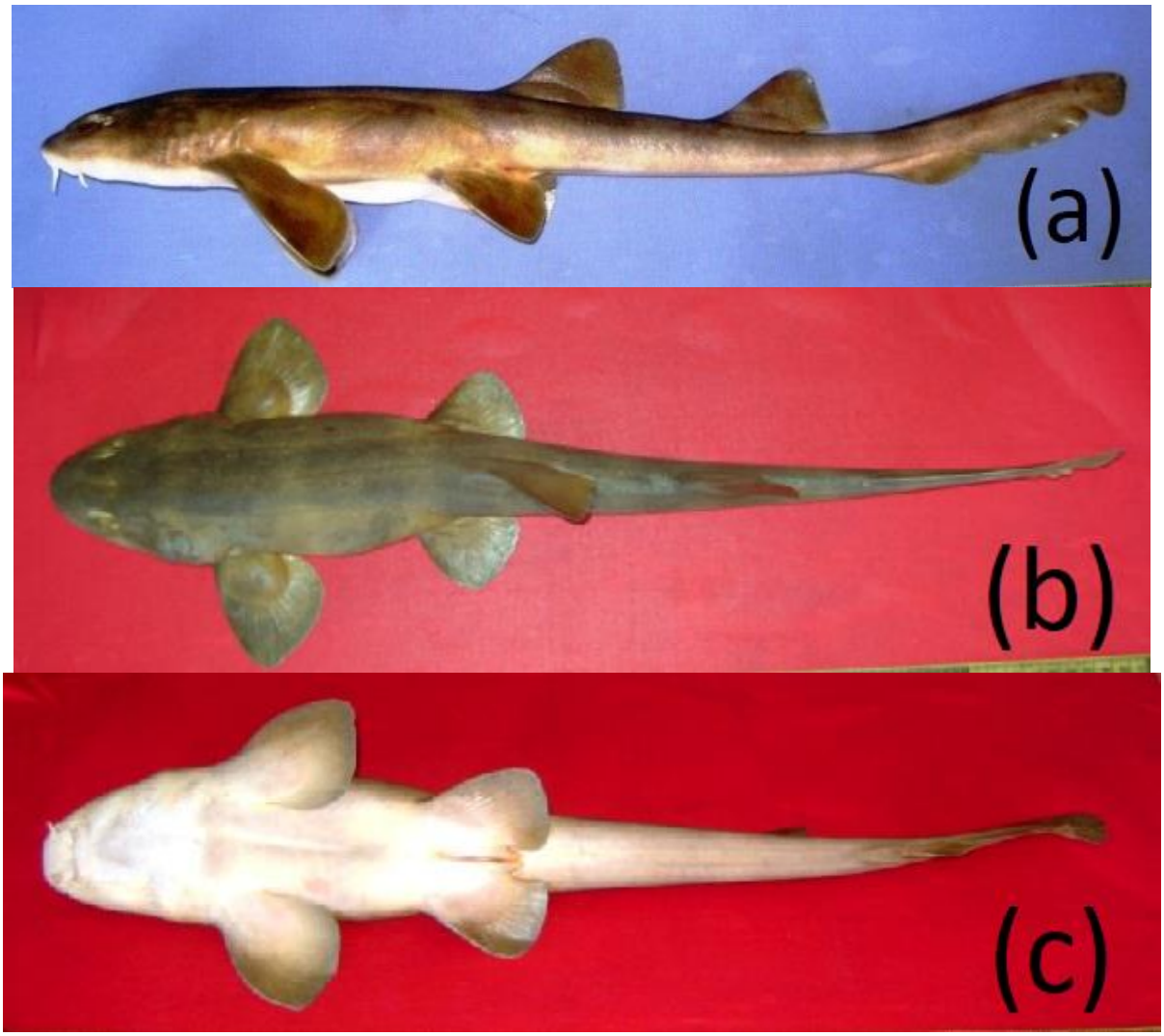


Fig. 5.*Chiloscyllium sp. A*. (a) lateral view; (b) dorsal view; (c) ventral view.

Stegostoma fasciatum (Hermann, 1783)
(Fig.6)

Material Examined

- 1 specimen collected on 3 March 2007 from Karachi Fish Harbour (116 cm TL)
- 1 specimen collected on 21 October 2008 from Karachi Fish Harbour (178 cm TL)
- 1 specimen collected on 5 October 2009 from Karachi Fish Harbour (193 cm TL)
- 1 specimen collected on 20 May 2014 from Karachi Fish Harbour (98 cm TL)

This species was reported from Sindh by Anonymous (1955), Compagno (1984a, 1984q), Misra (1962), Sorley (1932) and from Balochistan by Anonymous (1955), Compagno (1984a, 1984q) and Qureshi (1953). It was reported from Pakistan coast without mentioning any specific location by Ahmad (1988), Ahmad and Niazi (1975), Ahmad *et al* (1973), Bianchi (1985), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.*, (2015), Qureshi (1952, 1953, 1972) and Siddiqui (1956).

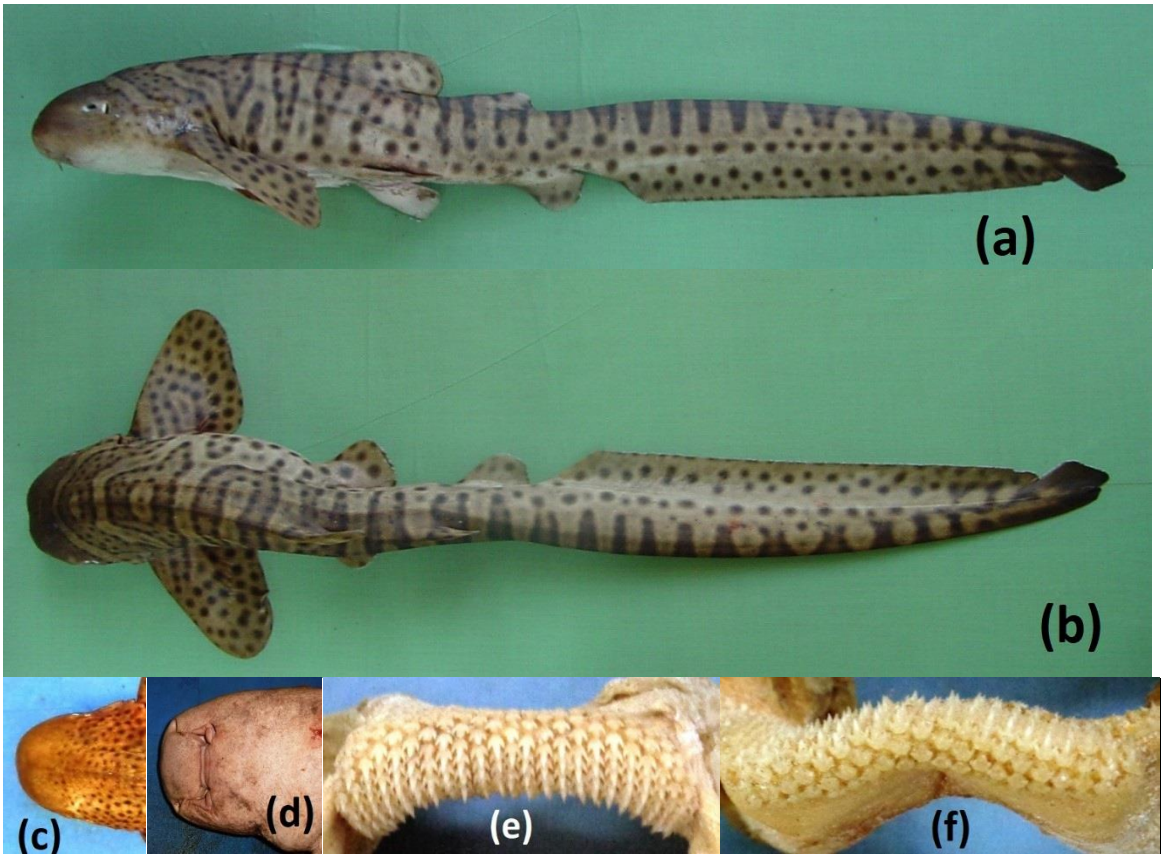


Fig.6. *Stegostoma fasciatum*; (a) lateral view; (b) dorsal view; (c) head (dorsal view); (d) head (ventral view); teeth plate (upper jaw); teeth plate (lower jaw).

Sorely (1932) described this species as *Stegostoma tigrinum* whereas Ahmad and Niazi (1975), Ahmad *et al* (1973), Anonymous (1955), Khan and Quadri (1986), Misra (1962, 1969), Qureshi (1952, 1953, 1972) and Siddiqi (1956) reported it as *Stegostoma varium.*

This species in known from Indo-West Pacific area East Africa, South Africa, Red Sea, Persian Gulf, Madagascar and Mauritius (Mascarenes) east to Marshall Islands and Samoa, north to southern Japan, south to Western Australia, New South Wales (Australia) and New Caledonia (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it (as *Stegostoma tigrinum*)is a tropical, medium-sized demersal shark widely spread from the western Indian (including Arabian Sea) to the western Pacific oceans. It is associated with reef and sandy bottom habitat.

Family Gingymostomatidae

Members of family Gingymostomatidae are known as nurse sharks. Locally they are known as "Kori", "Poonshrin", or "Billi" in Sindh and "Pishi" or "Goj" in Balochistan. This family is represented in Pakistan by only one species - *Nebrius ferrugineus* (Lesson, 1830).

Nebrius ferrugineus (Lesson, 1830)
(Fig.7)

Material Examined

- 1 specimen collected on 3 March 2007 from Karachi Fish Harbour (178 cm TL)
- 1 specimen collected on 21 October 2008 from Karachi Fish Harbour (136 cm TL)

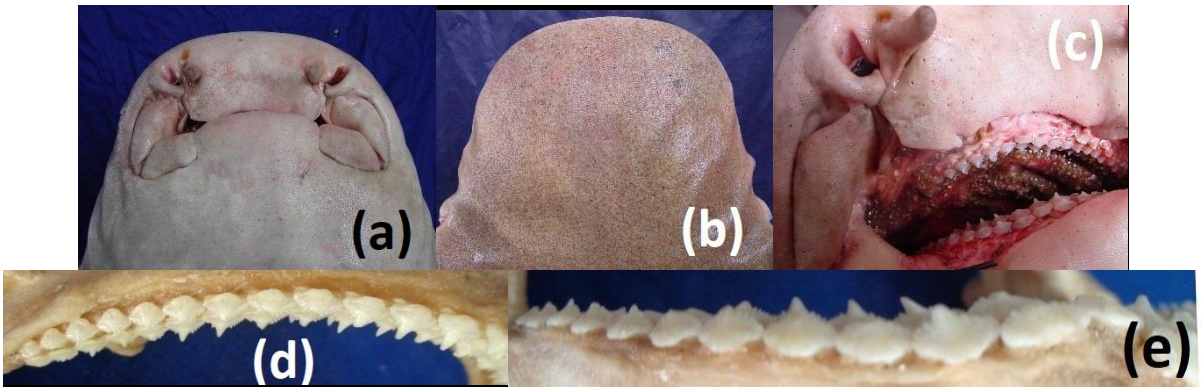


Fig. 7. *Nebrius ferrugineus.* (a) head (dorsal view); (b) head (ventral view); (c) head (front view showing jaws and teeth); (d) teeth (upper jaw); (e) teeth (lower jaw).

This species is commonly known as tawny nurse shark. It was was reported from Sindh coast by Compagno (1984a, 1984f), Jabado and Ebert (2015) and Misra (1962) and from Balochistan by Compagno (1984a, 1984f) and Niazi (1994). It was reported from Pakistan coast without mentioning any specific location by Ahmad (1988), Ahmad and Niazi (1975), Bianchi (1985), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.*, (2015) and Qureshi (1953). Ahmad and Niazi (1975), Hoda (1985, 1988), Hussain (2003), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Misra (1969), Niazi (1994), Qureshi (1953) listed this species as *Nebrius concolor.*

This species is known to be widely distributed in the Indo-West Pacific area from South Africa, Red Sea, Persian Gulf, Seychelles, Madagascar and western Mascarenes east to Society Islands and Marquesas, north to southern Japan, south to northern Australia and New Caledonia (Eschmeyer, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a large demersal shark which is widely spread throughout the tropical Indo-WestPacific region (including Arabian Sea) in association with reef habitast.This species, although grow to large size (>2.0m) but consider to be of little commercial value. Usually end up as raw material for fish meal, however, fins are exported.

Family Rhicodontidae

Member of family Rhicodontidae is known as whale shark. Locally they are known as “Andhi mangar” or “More mangars” in Sindh and “Baran” in Balochistan. This family is representedin Pakistan and globally by only one species - *Rhincodon typus* (Smith, 1828) which is largest known fish species.

Rhincodon typus (Smith, 1828)
(Fig. 8)

Material Examined

- 1 specimen collected on 3 March 2007 from Karachi Fish Harbour (237 cm TL)
- 1 specimen collected on 21 October 2008 from Karachi Fish Harbour (432 cm TL)
- 1 specimen collected on 3 March 2007 from Karachi Fish Harbour (153 cm TL)
- 1 specimen collected on 21 October 2008 from Karachi Fish Harbour (598 cm TL)

This was is reported from Sindh by Anonymous (1955), Compagnno (1984a, 1984m), and Qureshi (1972), from Baba Island by Anonymous(1950) and Wolfson (1986), from Cape Monz by Wolfson (1986), from Karachi by Anonymous (1955), Buist (1850), Gudger (1834), Heisch (1938), Prater (1941) and Wolfson (1986), from Balochistan coast by Anonymous (1955), Compagnno (1984a, 1984m) and Niazi (1994) and from Mekran coast by Anonymous(1955) and Qureshi(1952, 1972). It was reported from Pakistan coast without mentioning any specific location by Ahmad and Niazi (1975), Bianchi (1985), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), McCann (1955), Misra (1962, 1969), Psomadakis, *et al.*, (2015), Qureshi (1953, 1972), Silas (1986) and Wolfson (1986).

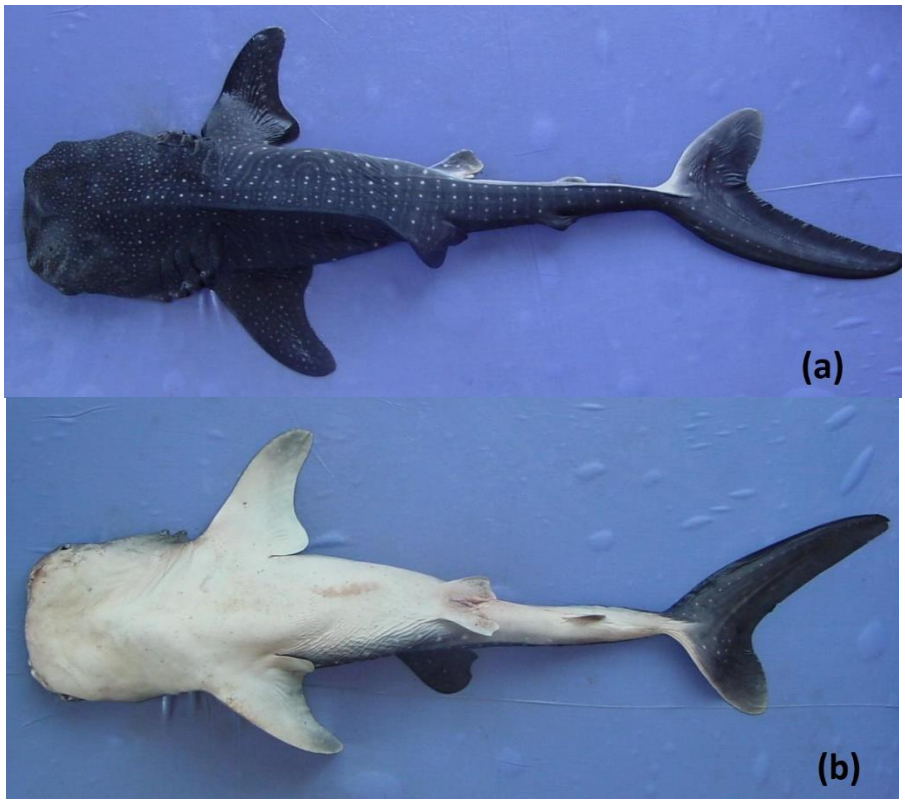


Fig. 8. *Rhincodon typus*; (a) dorsal view (b) ventral view.

This species has circumglobal distribution in all tropical and warm temperate seas except the Mediterranean (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is apelagic, circumtropical (including Arabian Sea).

It is identified as one of the species with an unfavourable conservation status in Appendix II of the Bonn Convention for the Conservation of Migratory Species of Wild Animals in 1999. It is also included in Appendix-II of CITES. Classified as a highly migratory species, in Annex I of the 1982 United Nations Convention on the Law of the Sea (UNCLOS) which called for 'coordinated management and assessment to better understand cumulative impacts of fishing effort on the status of the shared populations' of these shark. In Pakistan, there used to be an aimed fisheries prior to 1970 but at present occasionally caught is fishing gears. Because of poor quality of the flesh, this fish is usually ends up as raw material for fish meal.

Family Odontaspidae

Members of family Odontaspidae are known as slender tiger sharks. Locally they are known as "Dantani mangar" in Sindh and "Dantani pagas" in Balochistan. This family is represented in Pakistan by only three species - *Odontaspis ferox* (Risso, 1810), *Carcharias taurus* (Rafinesque, 1810) and *Carcharias tricuspidatus* (Day, 1878).

Odontaspis ferox (Risso, 1810)

Material Examined

- None

Commonly known as smalltooth sand tiger, it is reported from Pakistan by Hussain (2003) whereas Compagno (1984a, 1984k) showed questionable distribution in Pakistani waters. It is nearly circumglobal species and known from tropical and temperate waters (Eschmeyer, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is

a large cosmopolitan shark, with afragmented distribution in tropicaland warm temperate waters over shelf and slope habitats including in the Arabian Sea.

Carcharias taurus (Rafinesque, 1810)

Material Examined

- None

This species is commonly known as sand tiger shark and was reported from Pakistan coast byAnonymous,(1999), Bianchi (1985), Compagno (1984a; 1984k), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (1989, 2003), Jabado and Ebert (2015) and Psomadakis, *et al.,* (2015).

It is circumtropical species which is also known from Indo-West Pacific including Red Sea and off the coasts of South Africa to Japan, Korea and Australia (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a large coastal shark, widely but patchily distributed in tropical and warm temperate waters over shelf habitat in the Indo-Pacific regionand in the Atlantic and Indian Oceans (including Arabian Sea).

Carcharias tricuspidatus (Day, 1878)

Material Examined

- None

Indian sand tiger, as it is commonly known , was reported from Sindh by Anonymous (1955), Compagno (1984a, 1984k), Day (1878, 1889), Misra (1962) and Sorely (1932), from Karachi by Anonymous(1955, 1999), Day (1878), Fowler (1941) and Mould (1997), from Balochistan by Anonymous (1953), Compagno (1984a, 1984k), Day (1878) and Fowler (1941) and from Makran coast by Anonymous (1955).. It was reported from Pakistan coast without mentioning any specific location by Ahmad and Niazi (1975), Froese and Pauly (2002), Hoda (1985, 1988), Hussain (2003), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969) and Qureshi (1953).

Originally it was described as *Carcharias tricuspidatus* from Karachi and Balochistan, Pakistan by Day (1878). It holotype (ZSI 2337 or 2772) which used to be housed in Zoological Survey of India, Kolkata is apparently lost (Eschmeyer, 1998). Hoda (1985, 1988), Compagno (1984a, 1984k) and Mould (1997) listed this species as *Eugomphodus tricuspidatus* whereas Anonymous (1999), Day (1889) referred it as *Odontaspis cuspidata*. Although Day (1878) described it from Karachi and Balochistan, it used to occurring occasionally till early 1980's but since then it became extremely rare and not seen at least since 1985. It may possibly be locally extinct.

Family Pseudocarcharidae

Member of family Pseudocarcharidae is known as crocodile sharks. Locally they are known as "Dantani mangar" in Sindh and "Dantani pagas" in Balochistan. This family is represented in Pakistan and globally by only one species - *Pseudocarcharias kamoharai* (Matsubara, 1936).

Pseudocarcharias kamoharai (Matsubara, 1936)
(Fig. 9)

Material Examined

- 1 specimen collected on 9 February 2009 from Karachi Fish Harbour (111 cm TL)
- 1 specimen collected on 9February, 2017 from Karachi Fish Harbour (90 cm TL)
- 3specimen collected on 30 April, 2018 from Karachi Fish Harbour (83, 81, 73 cm TL)

This species which is commonly known as crocodile shark and is reported from Pakistan coast by Compagno (1984a, 1984l), Hoda (1988) and Psomadakis, *et al.,* (2015). Because of rarity of occurrence, it has no commercial value. It is an oceanic species usually found offshore and far from land but sometimes occurring inshore. It is found epi- and mesopelagic zones, with sometimes occurring in near-bottom area also. In Pakistan it is landed as bycatch of tuna gillnet fisheries but of rare occurrence. It has circumglobal distribution in tropical and temperate seas (Eschmeyer, 2020; Froese and Pauly, 2020)

ORDER LAMNIFORMES

Mackerel Sharksare included in this order. Species included in this order are known to have anal fin, 5 gill slits, 2 dorsal fins, no fin spines, mouthbehind the eyes and no nictitating eyelids. Members of family Alopiidae (thresher sharks) and family Laminidae (mackerel sharks and makos) are included in this order.

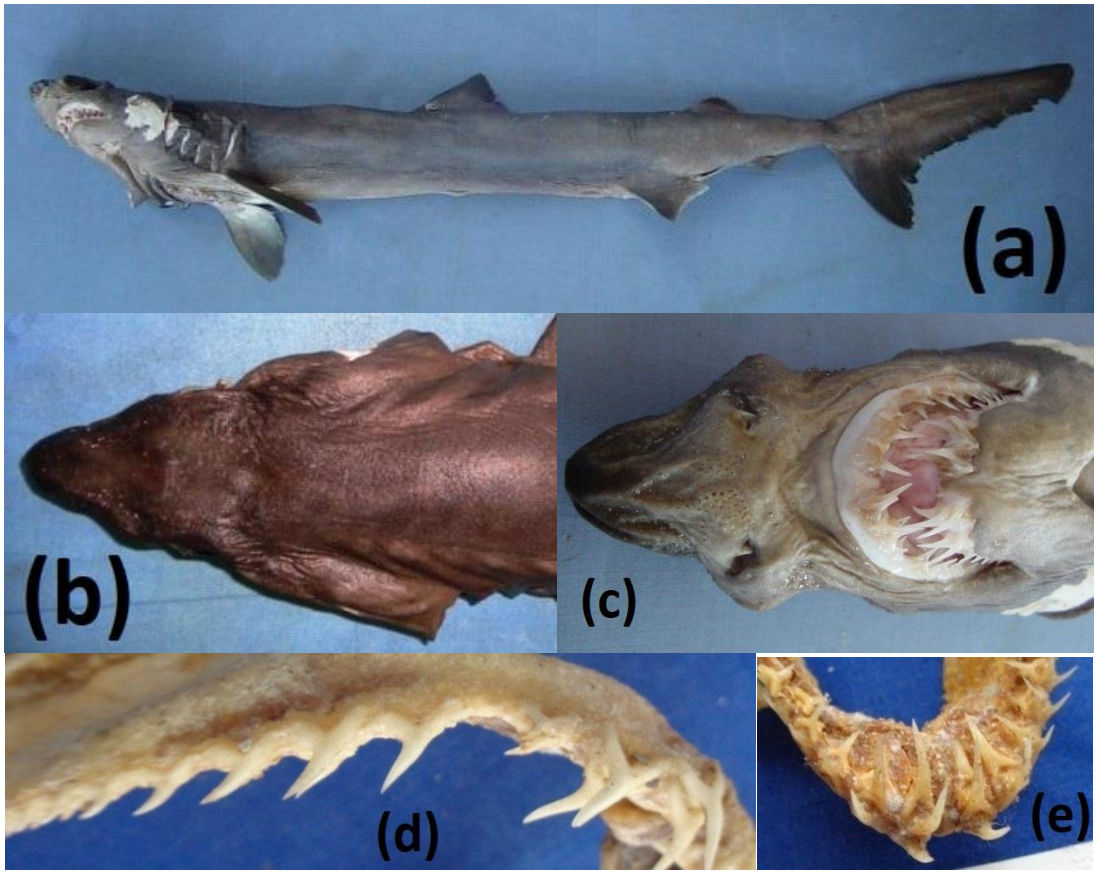


Fig. 9. *Pseudocarcharias kamoharai*;(a) lateral view; (b) head (dorsal view); (c) head (ventral view); (d) teeth (upper jaw); teeth (lower jaw).

Family Alopiidae

Members of family Alopiidae are known as thresher sharks. Locally they are known as "Parri" or "Poonshirin"in Sindh and "Dumbi"or "Mush" in Balochistan. Three species -*Alopias pelagicus* (Nakamura, 1936), *Alopias superciliosus* (Lowe, 1839) and *Alopias vulpinus* (Bonnaterre, 1788) of this family is reported from Pakistan. However, presence of *Alopias vulpinus*in Pakistani waters is considered doubtful.

Alopias pelagicus (Nakamura, 1936)
(Fig.10)

Material Examined

- 1 specimen collected on 22 April 2010 from Karachi Fish Harbour (173 cm TL)
- 1 specimen collected on 27 August 2013 from offshore waters of Pakistan (24°54.841'N; 64°38.206'E (176 cm TL)
- 1 specimen collected on 18 April 2014 from Karachi Fish Harbour (180 cm TL)
- 1 specimen collected on 26 April 2014 from Karachi Fish Harbour (170 cm TL)
- 1 specimen collected on 15 May 2014 from Karachi Fish Harbour (150 cm TL)
- 1 specimen collected on 08 October 2017 from Karachi Fish Harbour (130 cm TL)

This species is commonly known as pelagic thresher and reported from Pakistan by Bianchi (1985), Compagno (1984a, 1984c)**,** Froese and Pauly (2020), Hoda (1988)**,** Hussain (2003) and Psomadakis, *et al.*, (2015). Ahmad and Niazi (1975), Ahmad *et al* (1973), Compagno (1984a, 1984c), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986) and Qureshi (1972) reported *Alopias vulpinus* from Pakistan, however, there are doubt about occurrence of this species and it seems that these are based on misidentification of *Alopias pelagicus.*

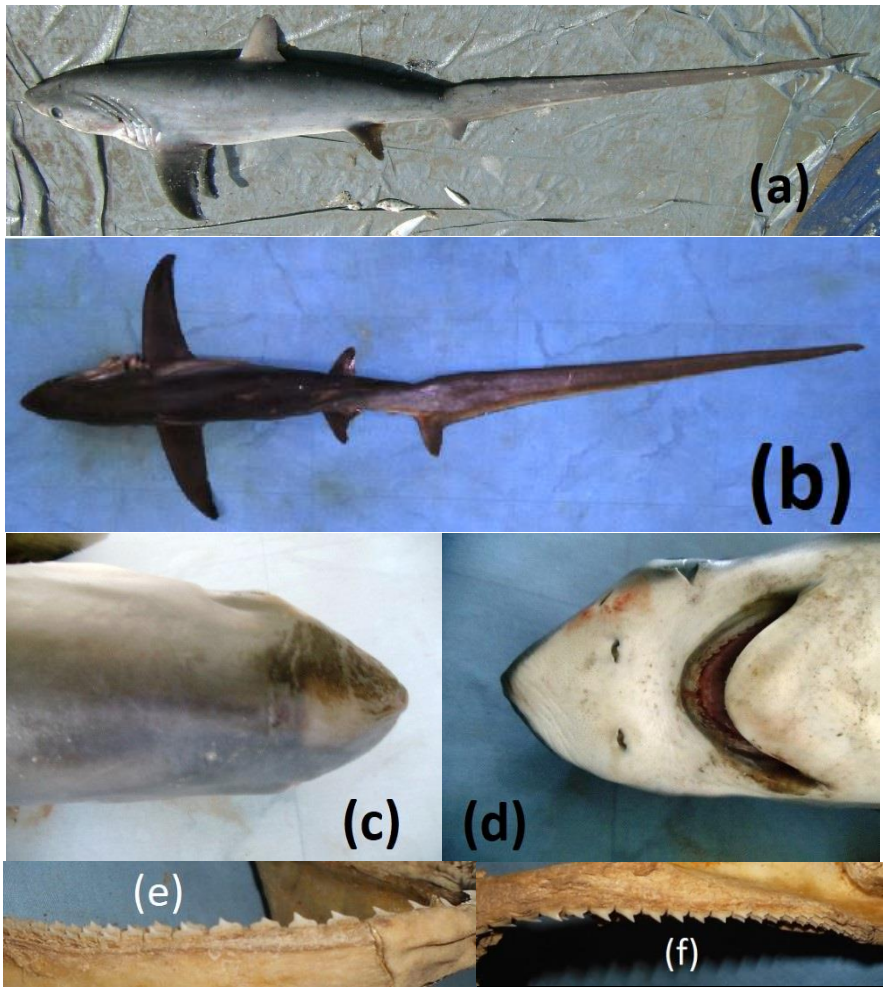


Fig.10. *Alopias pelagicus*; (a) lateral view; (b) dorsal view;(c) head (dorsal view); (d) head (ventral view); (e) teeth (lower jaw); (f) teeth (upper jaw).

This species has circumglobal distribution in Indo-Pacific in the Red Sea, Arabian Sea, Maldives, Somalia, South Africa, Western Australia, China, Taiwan, Japan, New Caledonia, Hawaiian Islands and Tahiti (Froese and Pauly, 2020). It is also known from from Eastern Pacific: Gulf of California and the Galapagos. According to Notarbartolo-di-Sciara and Jabado (2021) it is a large offshore epipelagic shark widely distributed across the Tropics (including Arabian Sea), with the exception of the Atlantic Ocean). It is considered as highly migratory species according to Annex I of the 1982 Convention on the Law of the Sea. It is a commercially important species commonly caught by tuna gillnet vessels operating in offshore waters.

Alopias superciliosus (Lowe, 1839)
(Fig. 11)

Material Examined

- 1 specimen collected on 15April, 2014 from Karachi Fish Harbour (290 cm TL)

- 1 specimen collected on 19 April, 2014 from Karachi Fish Harbour (284 cm TL)
- 1 specimen collected on 29 September, 2014 from Karachi Fish Harbour (125 cm TL)

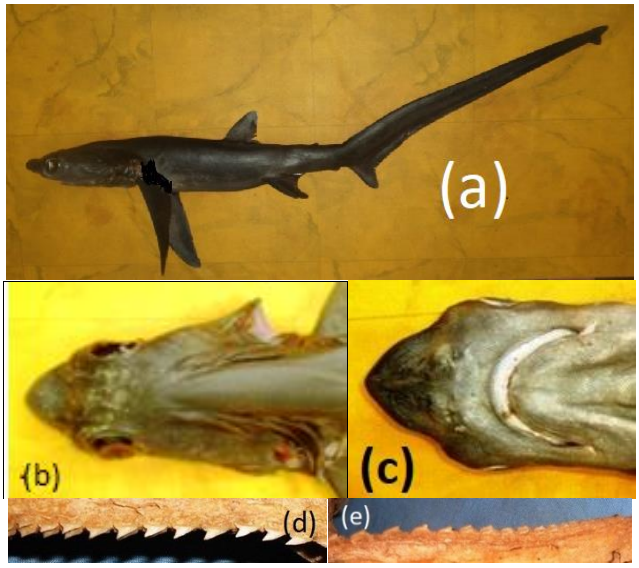


Fig. 11. *Alopias superciliosus*; (a) lateral view; (b) head (dorsal view); (c) head (ventral view); (d) teeth (upper jaw); (e) teeth (lower jaw).

Commonly known as bigeye thresher, this species was reported from Pakistan by Bianchi (1985), Compagno (1984a, 1984c), Froese and Pauly (2020), Hoda (1988), Hussain (2003), Jabado and Ebert (2015) and Psomadakis, *et al.,* (2015).

This species has circumglobal distribution tropical and temperate seas (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is large epipelagic shark having cosmopolitan occurrence in tropical to warm temperate watersfrom shelf to deep slope habitats (including in the Arabian Sea). It is considered as highly migratory species according to Annex I of the 1982 Convention on the Law of the Sea. It is a commercially important species commonly caught by tuna gillnet vessels operating in offshore waters.

Alopias vulpinus (Bonnaterre, 1788)

Material Examined

- None

Thintail thresher (*Alopias vulpinus*) was reported from Pakistan by a number of worker but there are doubts about occurrence of *Alopias vulpinus* in the area and it seems that *Alopias pelagicus* is misidentified as this species. All records of *Alopias vulpinus* from Pakistan are included in *Alopias pelagicus.* It may be pointed out that Jabado and Ebert (2015) have shown distribution of this species in Pakistani waters.

Family Laminidae

Members of family Laminidae are known as mackerel sharks and makos. Locally they are known as "Aiyan manger" or "Aar manger" in Sindh and "Nar manger" in Balochistan. Three species of this family - *Carcharodon carcharias* (Linnaeus, 1758), *Isurus oxyrinchus* Rafinesque, 1810 and *Isurus paucus* Guitart, 1966 are reported from Pakistan. However, presence of *Carcharodon carcharias* in Pakistani waters is doubtful.

Carcharodon carcharias (Linnaeus, 1758)

Material Examined

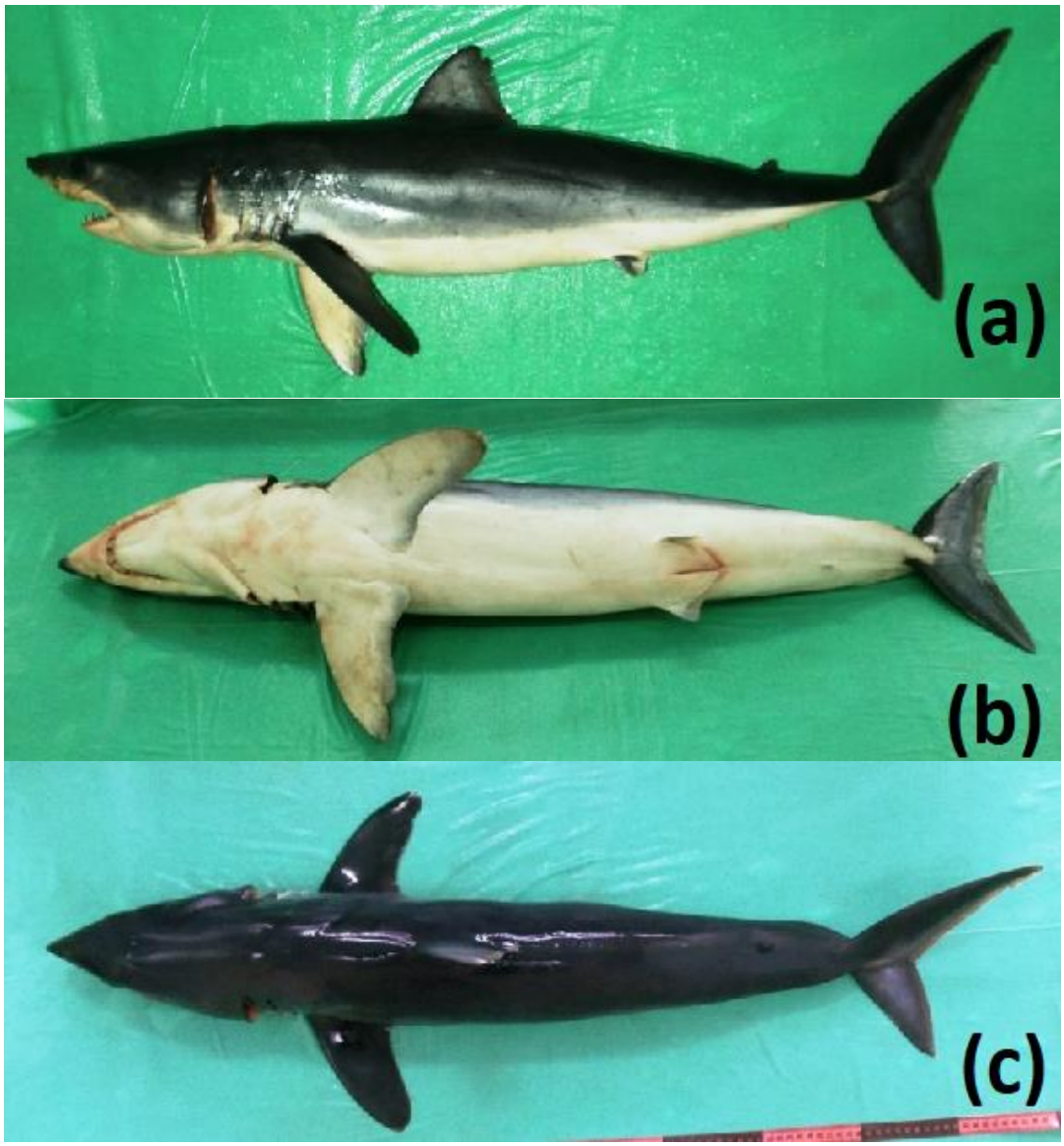
- None

Great white shark was reported from Pakistan by Murray (1880) as *Carcharias lamia* which is a synonym of this species. However, presence of great white shark in Pakistan is doubtful. Compagno (1984a, 1984j) have not shown distribution of this species in Arabian Sea. In Froese and Pauly (2020) there is a mention of a record of great white shark from Arabian Sea at Oman. No other record of great white shark from the area was made by any ichthyologist.

Isurus oxyrinchus Rafinesque, 1810

(Fig. 12)

- 1 specimen collected on 26 November 2018 from Karachi Fish Harbour (75cm TL)
- 1 specimen collected on 22 February 2014 from Karachi Fish Harbour (95 cm TL)
- 1 specimen collected on 19 February, 2015 from 266 km south of Karachi (23^{o}10.733'N; 65^{o} 44.640'E) (165 cm TL)
- 1 specimen collected on 03 March 2017 from Karachi Fish Harbour (320 cm TL)



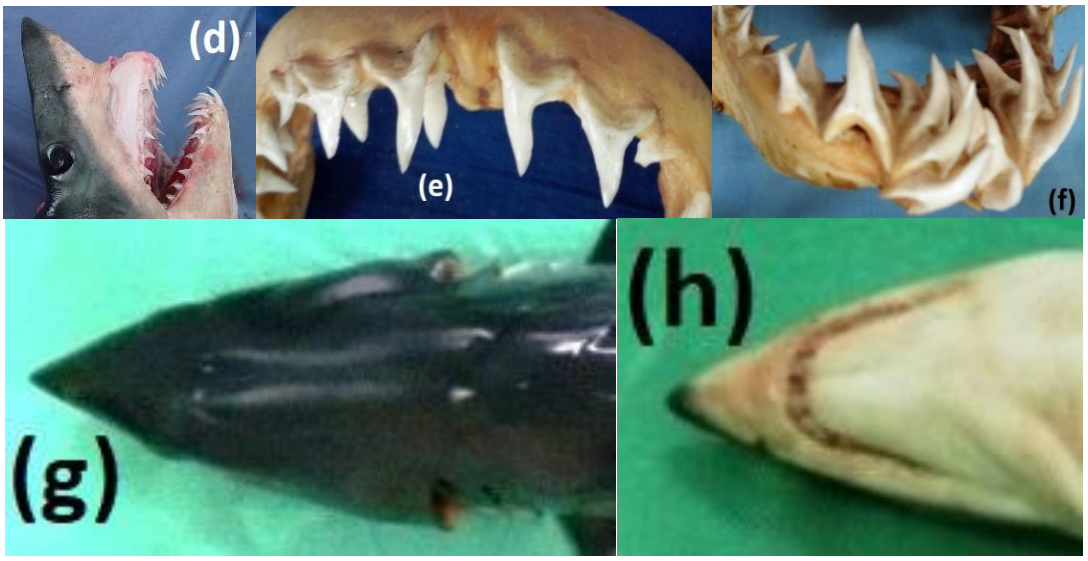


Fig. 12.*Isurus oxyrinchus*; (a) lateral view; (b) ventral view; (c) dorsal view; (d) head (lateral view); (e) teeth (upper jaw); (f) teeth (lower jaw); (g) head (dorsal view); (h) head (ventral view.

Commonly known as shortfin mako, this species was reported from Sindh by Compagno (1984a, 1984j), from Karachi by Day (1889), Garman(1913), Misra (1969), Mould (1997) and Murray (1884, 1887b), from Balochistan by Compagno (1984a, 1984j) and Niazi (1994). It is reported from Pakistan coast without mentioning any location byAhmad and Niazi (1975), Bianchi (1985), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.,* (2015) and Qureshi (1953, 1972). Murray (1884) described *Lamna guentheri* from Karachi Pakistan which is considered as a synonym of this species. No information on its types are available (Eschmeyer, 2020).

Ahmad and Niazi (1975), Hoda (1985), Hussain (2003), Khan and Quadri (1986), Misra (1969) and Qureshi (1953, 1972) listed this species as *Isurus glauca* whereas Ahmad and Niazi (1975), Day (1889), Garman (1913), Hoda (1985), Hussain (2003), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969) and Qureshi (1953a, 1972) referred it as *Isurus guentheri*.

It is a cosmopolitan species widely distributed in temperate and tropical seas (Eschmeyer, 2020). In the Indo-Pacific it is known from East Africa to Hawaii, north to Primorskiy Kray (Russian Federation), south to Australia and New Zealand (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a large cosmopolitan pelagic shark, widely occurring in tropical andtemperate waters (including in the Arabian Sea).

This is a commercially important species which is caught by tuna gillnet and possibly the second most important shark species.

***Isurus paucus* Guitart, 1966**

(Fig. 13)

- 1 specimen collected on 02 February 2009 from Karachi Fish Harbour (167 cm TL)
- 1 specimen collected on 09 February 2017 from Karachi Fish Harbour (130 cm TL)
- 1 specimen collected on 03 March 2017 from Karachi Fish Harbour (200 cm TL)
- 1 specimen collected on 31 December 2018 from Karachi Fish Harbour (120 cm TL)
- 1 specimen collected on 11 April 2019 from Karachi Fish Harbour (125 cm TL)

Longfin mako is reported from Pakistan by Psomadakis, *et al.,* (2015).It is a nearly circumglobal in tropical and subtropical seas (Eschmeyer, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it isa large cosmopolitan pelagic shark, sparsely occurring but widely distributedin tropical waters including in the Arabian Sea. This species is caught by tuna gillnet but is of rare occurrence in Pakistan.

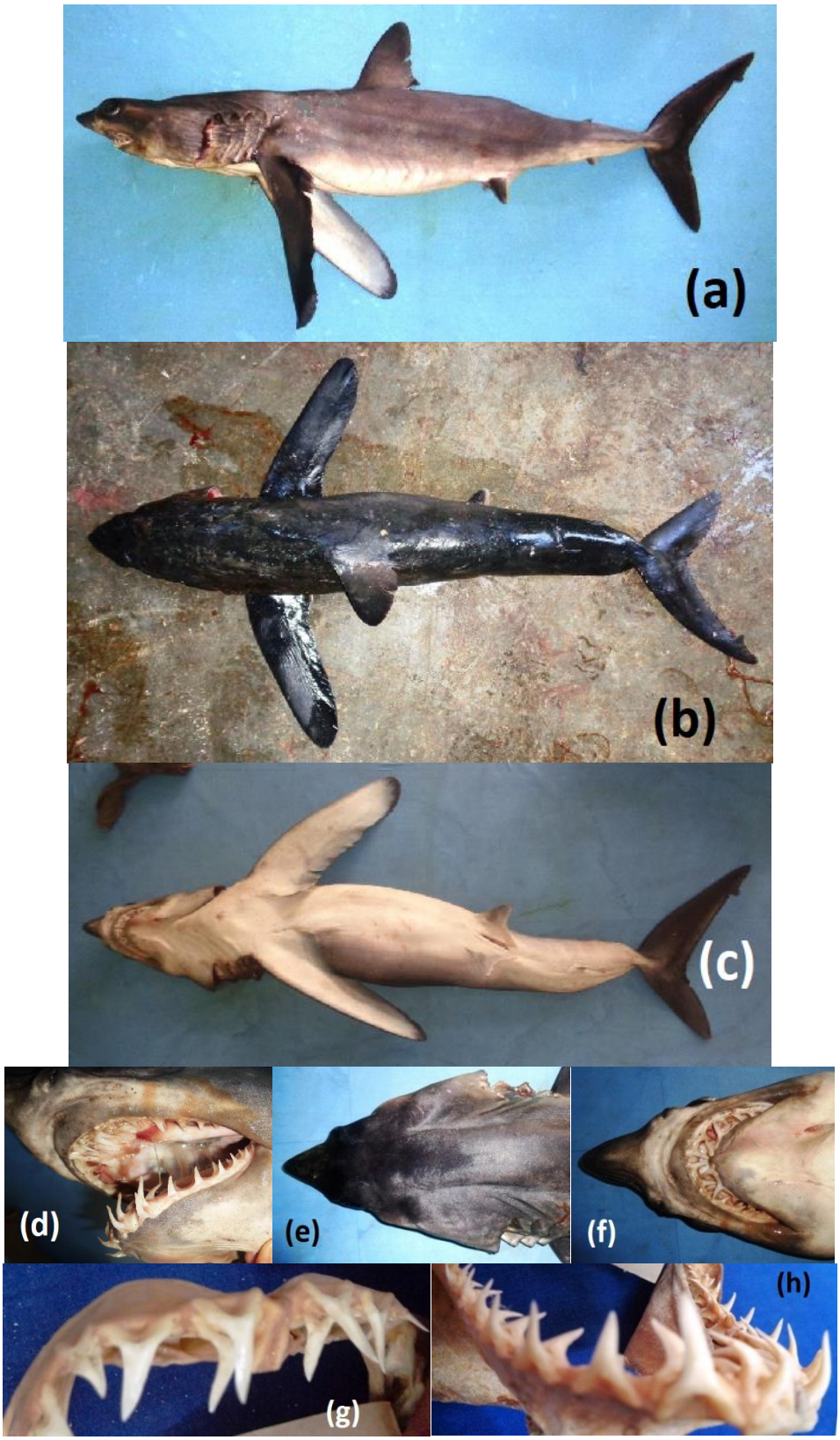


Fig. 13. *Isurus paucus*; (a) lateral view; (b) dorsal view; (c) ventral view; (d) head (lateral view); (e) head (dorsal view);(f) head (ventral view); (g) teeth (upper jaw); (h) teeth (lower jaw).

ORDER CARCHARHINIFORMES

Species included in this order (commonly known as ground sharks) are known to have anal fin, 5 gill slits, 2 dorsal fins, no fin spines, mouth behind the eyes and nictitating eyelids. Members of family Scyliorhinidae (cat sharks), family Proscylliidae (finback catsharks), family Triakidae (hound sharks), family Hemigaleidae (weasel sharks), family Caracharinidae (requiem sharks) and family Sphyrnidae (hammerhead sharks) are included in this order.

Family Scyliorhinidae

Members of family Scyliorhinidae are known as catsharks. Locally they are known as "Kori" in Sindh and "Tikki pishi" in Balochistan. Five species - *Apristurus indicus* (Brauer, 1906), *Atelomycterus marmoratus* (Bonnett, 1830), *Bythaelurus* alcocki (Garman, 1913), *Bythaelurus tenuicephalus* Kaschner, Weigmann and Thiel, 2015 and *Scyliorhinus capensis* (Muller and Henle, 1838) of this family are reported from Pakistan.

Apristurus indicus (Brauer, 1906)

Material Examined

- None

Jabado and Ebert (2015), Norman (1939) and Qureshi (1953) reported this species from Arabian Sea off the coast of Oman as *Scyliorhinus (Halaelurus) indicus.*Compagno (1984b) also showed distribution of this species extending to the Arabian Sea (including Pakistan coast). According to Notarbartolo-di-Sciara and Jabado (2021) it is a small deepwater shark, rare and endemic to the region including in the Arabian Sea.

Atelomycterus marmoratus (Bonnett, 1830)

Material Examined

- None

This species was reported from Pakistan coast by Ahmad and Niazi (1975), Bianchi (1985), Compagno (1984b, 1984n), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1962, 1969), Mould (1997), Psomadakis, *et al.*, (2015), Qureshi (1953, 1972) and Springer (1979).

It is little-known inshore shark found on coral reefs and though to inhabit crevices and holes on reefs. It is found in Indo-West Pacific area including Pakistan and India to Malaysia, Singapore, Indonesia, New Guinea, Thailand, Vietnam, the Philippines, southern China; north to Japan (Froese and Pauly, 2020).

***Bythaelurus* alcocki** (Garman, 1913)

Material Examined

- None

It was described from northern Arabian Sea (off the coast of Pakistan) by Garman (1913). Its holotype (ZSA F 68/1) is housed in Zoological Survey of India, Kolkata (Eschmeyer, 2020).This species was reported from Sindh by Alcock (1896, 1899), Compagno (1984b) and, Garman (1913) and from Balochistan by Compagno (1984b) and Garman (1913). It was also reported from Pkistan coast without mentioning any specific location by Froese and Pauly (2020), Misra (1969). Mould (1997) and Springer (1979). Garman (1913) reported this species from Arabian Sea based on species reported by Alcock (1896, 1899) as *Scyllium canescens* (Gunther, 1878). Spinger (1979) considered this as *species dubium* because of scanty information about it. Misra (1969) referred it as *Scyliorhinus* (*Halaelurus) alcocki* Alcock (1896, 1899), Compagno (1984b), Mould (1997) and Springer (1979) reported this species as *Halaelurus alcocki*. According to Notarbartolo-di-Sciara and Jabado (2021) it is known from only one specimen and its taxonomic status is uncertain.

***Bythaelurus tenuicephalus* Kaschner, Weigmann and Thiel 2015**

Material Examined

- None

This species commonly known as narrowhead catshark and was described from off northern Tanzania by Kaschner *et al.* (2015). It is also known from East African coast (Tanzania and Mozambique) (Eschmeyer, 2020; Froese and Pauly, 2020). It is a small deepwater shark limited to mid-slope waters along the tropical EastAfrican coast (Notarbartolo-di-Sciara and Jabado, 2021). Froese and Pauly (2020) have shown the distribution of this species extending to Pakistan coast. Although there is no authentic record of this species from the area but its occurrence in Pakistani waters cannot be overruled.

In addition possibility of occurrence of speckled catshark-*Halaelurus boesemani* Springer and D'Aubrey, 1972 and quagga catshark-*Halaelurus quagga* (Alcock, 1899) which are known from southern Arabian coast (Somalia and Socotra respectively) and considered to be endemic in the area (Notarbartolo-di-Sciara and Jabado, 2021). Their occurrence in Pakistani waters cannot be overruled.

***Scyliorhinus capensis* (Muller and Henle, 1838)**

Material Examined

- None

Yellowspotted catshark was reported from India and Pakistan by Ahmad and Niazi (1975), Ahmad *et al* (1973), Compagno (1984b), Day (1878), Günther (1870), Hoda (1985, 1988), Hussain (2003), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Qureshi (1972), Springer (1979 but according to Bass *et al* (1975) the species differs from those reported from South African coast especially in colour pattern and position of first dorsal fin.Possibly it is an undescribed species as suspected also by Compagno (1984b).

Family Proscylliidae

Members of family Proscylliidae are known as finback catsharks and represented in Pakistan by only one species *Eridacnis radcliffei* Smith 1913.

***Eridacnis radcliffei* Smith 1913**

Material Examined

- None

This species which is commonly known as pygmy ribbontail catshark and was reported from Pakistan by Jabado and Ebert (2015). It was known to have wide distribution but spotty in Indo-West Pacific area from Tanzania, the Gulf of Aden, India (Gulf of Mannar, Bay of Bengal), Andaman Islands, Vietnam, and the Philippines.

Family Triakidae

Members of family Triakidae are known as houndsharks and represented in Pakistan by 5 species - *Hypogaleus hyugaensis* (Miyosi, 1939), *Iago omanensis* (Norman, 1939), *Iago* Sp., A., *Mustelus manazo*Bleeker, 1854 (doubtful occurrence) and *Mustelus mosis* Hemprich and Ehrenberg, 1899.

Hypogaleus hyugaensis (Miyosi, 1939)

Material Examined

- None

Commonly known as blacktip tope, this species is known from from Persian Gulf and Northwestern part of the Arabian Sea (Compagno, 1984b). It is also reported from Australia (Froese and Pauly, 2020) and South Africa; Taiwan to Japan (Eschmeyer, 2020). Considering its wide distribution in the Arabian Sea, it presence in Pakistan cannot be overruled.

Iago omanensis (Norman, 1939)

(Fig. 14)

Material Examined

- 1 specimen collected on 11 March 2008 from Karachi Fish Harbour (71 cm TL)
- 1 specimen collected on 22 October 2017 from Karachi Fish Harbour (51 cm TL)

– 1 specimen collected on 11 December 2018 from Karachi Fish Harbour (64 cm TL)

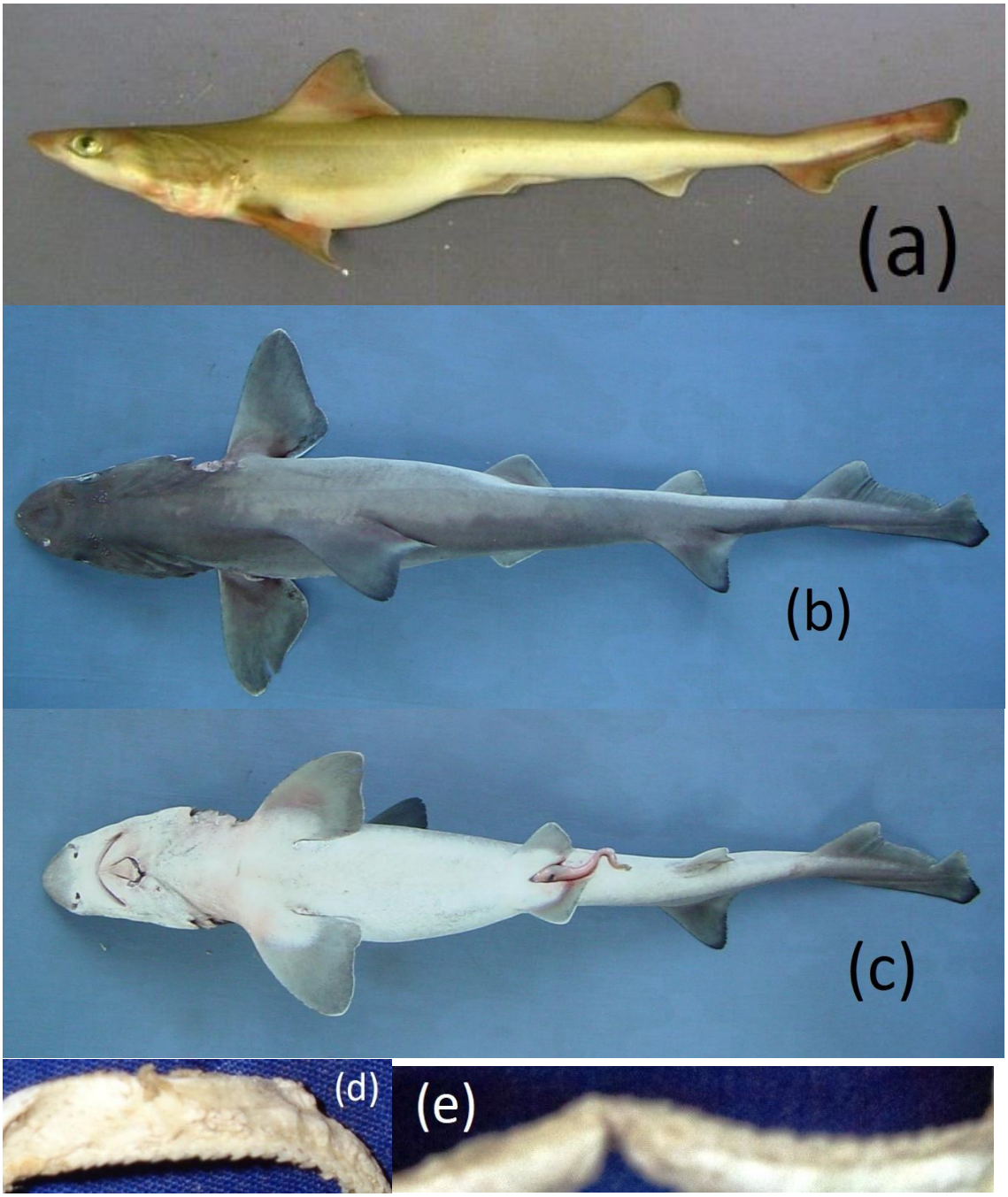


Fig. 14. *Iago omanensis* (a) lateral view;(b) dorsal view;(c) ventral view; (d) teeth (upper jaw); (e) teeth (lower jaw).

Commonly known as bigeye houndshark, it is called "Chuha"in Sindh and"Chao" in Balochistan. It was described as *Eugaleus omanensis* from Gulf of Oman by Norman (1939). It was reported from Pakistan by Bianchi (1985), Compagno (1984b, 1984r), Compagno and Springer (1971), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Mould (1997) andPsomadakis, et al., (2015).

This species is known to be widely distributed in Western Indian Ocean including Red Sea, Gulf of Aqaba and Gulf of Oman to Pakistan and southwestern India (Eschmeyer 2020; Froese and Pauly, 2020). According to

Notarbartolo-di-Sciara and Jabado (2021) it is a small-sized shark which is found at deep-shelf to deep-slope depths, confined to the northern andnorth-western Indian Ocean including Arabian Sea.

Sen *et al.* (2020) reported instance of hermaphroditism in large number of *Iago cf. omanensis* from India coast, north-western Bay of Bengal. They examined 154 samples, most of the specimens (145) exhibited uncalcified claspers, except a few which were having long, calcified claspers. Most of the sharks appeared to be male juveniles but almost all of them were fully functional females with clearly visible ovaries, oviducal glands, oviducts, uteri and a few with pups. They stressed the need for comprehensive and focused study to understand the reproductive strategy of this species. It is a commercially important speciesand is usually marketed alongwith other small sharks such as *Scoliodon laticaudus* and *Rhizoprionodon spp.*

Iago sp. A.

(Fig. 15)

Material Examined

- 1 specimen collected on 13 January 2012 from Karachi Fish Harbour (55 cm TL)
- 1 specimen collected on 07 December 2016 from Karachi Fish Harbour (61 cm TL)

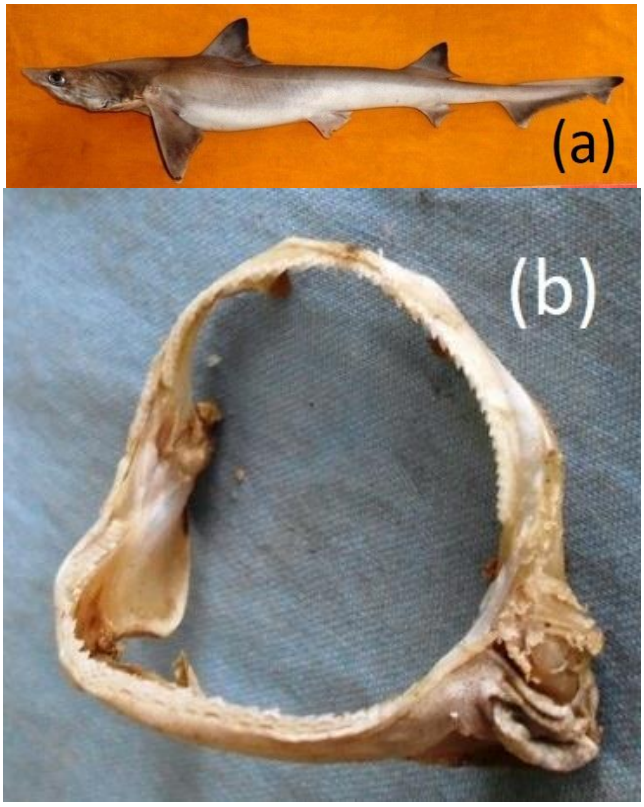


Fig. 15. *Iagosp. A.* (a) lateral view; (b) teeth (upper and lower jaws).

Psomadakis, *et al.*, (2015) reported a undescribed species similar to *Iago omanensis* but with shorter head; slimmer body; much lower dorsal fins; smaller pectoral fins; softer skin and muscles and darker coloration.This *Iago* species (yet to be described) can be confused with *I. omanensis*. It also have some characters of *Iago mangalorensis* (Cubelio, Remya & Kurup 2011) which was described from southern India. Froese and Pauly (2020) pointed out that a low-finned, somewhat short-headed *Iago* is largely sympatric with *Iago omanensis* occur at least off southwestern India, and in the Bay of Bengal which they opined to be possibly a dwarf, *omanensis*-like *Iago* that may or may not be distinct.

Mustelus manazo Bleeker, 1854

Material Examined

- None

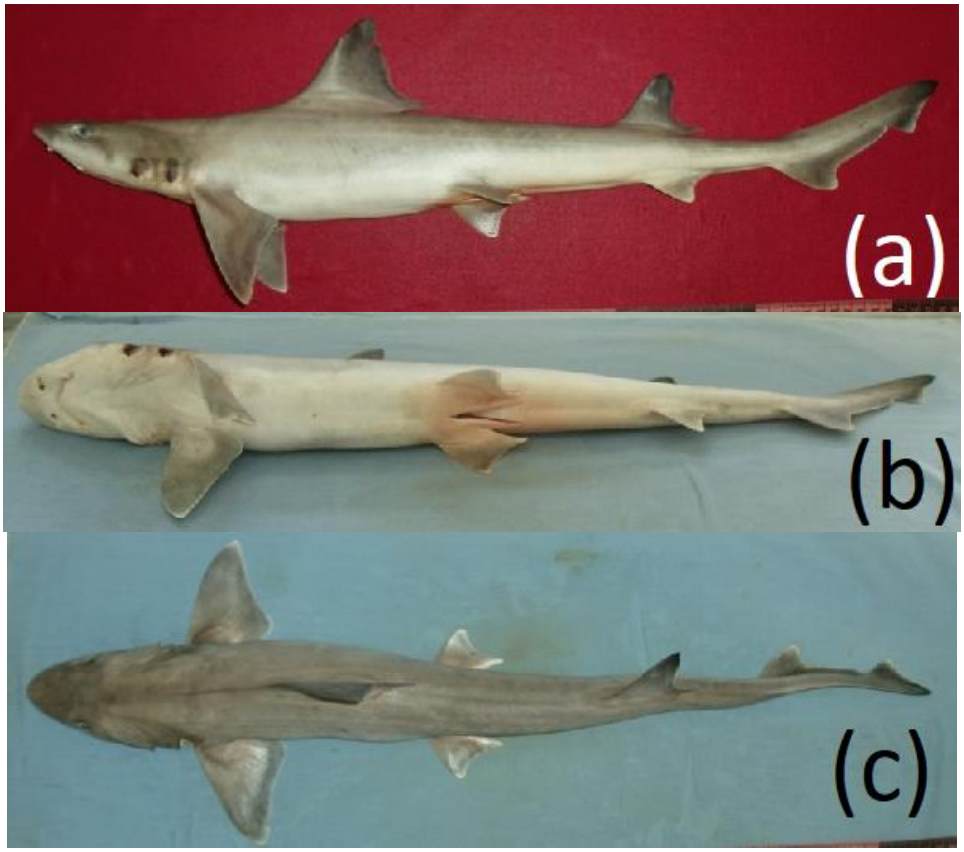
This species is commonly known as starspotted smoothhound and was reported from Sindh byAnonymous (1955) and Sorley (1932) and from Karachi by Anonymous (1955), Day (1878, 1889) and Fowler (1941), from Balochistan by Zugmayer (1913) and from Makran coast by Anonymous (1955) and Qureshi (1952). It was also reported from Pakistan coast without mentioning any specific location byAhmad and Niazi (1975), Hoda (1985, 1988), Hussain (2003), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Zugmayer (1913). Qureshi (1953, 1972) and Siddiqi (1956). Hussain (2003), Qureshi (1952, 1953, 1972), Siddiqi (1956) and Sorley (1932) referred this species as *Myrrillo manazo*.

Despite reports by a number of authors from Pakistani waters, its presence in the area is considered doubtful (Compagno, 1984b, 1984r). According to Froese and Pauly (2020) and Compagno (1984b, 1984r) this species is reported from east Africa east to Philippines, north to Japan, south to Queensland (Australia), Chesterfield Islands and New Caledonia (Eschmeyer, 2020; Froese and Pauly, 2020). It is presumed that this species reported by various authors from Pakistan belong to *Mustelus mosis.*

Mustelus mosis Hemprich and Ehrenberg, 1899
(Fig. 16)

Material Examined

- 1 specimen collected on 04 March 2009 from Karachi Fish Harbour (72 cm TL)
- 1 specimen collected on 03 May 2013 from Karachi Fish Harbour (68 cm TL)
- 1 specimen collected on 27 March 2014 from Karachi Fish Harbour (66 cm TL)



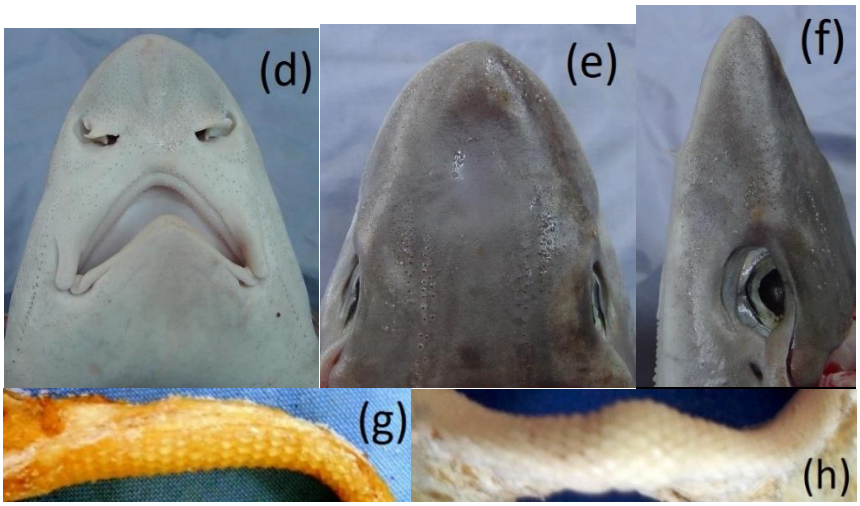


Fig. 16. *Mustelus mosis*(a) lateral view; (b) ventral view; (c) doral view; (d) head (ventral view); (e) head (dorsal view); (f) head (lateral view; (g) head (upper jaw); head (lower jaw).

It is commonly known as Arabian smoothhound. In Sindh it is known as "Bappha"or "Chuha" and "Zaid"in Balochistan.This species was reported from Pakistan by Bianchi (1985), Compagno (1984b, 1984r),Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Psomadakis, *et al.*, (2015) and White *et al.* (2021).This species is known from Red Sea, India, Pakistan, Persian Gulf and east African coast (Compagno, 1984b, 1984r; Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a small-sized shelf shark with a patchy Indo-West Pacific distribution including in the Arabian Sea. Using buccopharyngeal patterns and vertebral counts as well as other morphological differences and molecular data. White *et al*. (2021) verified presence of this species in the Northern Indian Ocean including along Pakistan coast. .

It is a commercially important species is usually market alongwith other small sharks such as *Scoliodon laticaudus*, *Iago omanensis* and *Rhizoprionodon spp.* Considered to have better quality meat than other species.

Family Hemigaleidae

Members of family Hemigaleidae are known as weasel sharks and represented in Pakistan by 4 species - *Chaenogaleus macrostoma* (Bleeker, 1852), *Hemigaleus microstoma* Bleeker 1852, *Hemipristis elongatus* (Klunzinger, 1871) and *Paragaleus randalli* Compagno, Krupp & Carpenter, 1996.

Chaenogaleus macrostoma (Bleeker, 1852)

Material Examined

- None

This species is commonly known as hooktooth shark and called "Loan"in Sindh and Balochistan. It was reported from Sindh by Anonymous (1955), Compagno (1984b, 1984g), from Karachiby Anonymous (1955), from Balochistanby Compagno (1984b, 1984g) and from Makran coast by Anonymous (1955) and Qureshi (1952). It was reported from Pakistan coast without mentioning any specific location byAhmad and Niazi (1975), Bianchi (1985), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.*, (2015). Qureshi (1953 1972) and Siddiqi (1956).

Ahmad and Niazi (1975), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986) and Misra (1969) refrred this aspcies as *Chaenogaleus balfouri* whereas Hussain (2003), Qureshi (1952, 1953, 1972), Siddiqi (1956) listed it as *Hemigaleus balfouri.*This species is known to have distribution in Indo-West Pacific including Gulf of Aden and Persian Gulf, Pakistan, India, Sri Lanka, Singapore, Thailand, Vietnam, China, Taiwan, Java and Sulawesi in Indonesia. According to Notarbartolo-di-Sciara and Jabado (2021) it is a small inshore shark which is widely distributed across the Indian and Indo-Pacific regions including Arabian Sea. This name has been used indiscriminately for the three species of hemigaleids in Indo-Pakistani waters other than *Hemipristis elongatus*.

***Hemigaleus microstoma* Bleeker 1852**

Material Examined

- None

This species commonly known as sicklefin weasel shark and was described from Jakarta, Java, Indonesia by Bleeker (1852). It is known from Red Sea, Indo-West Pacific: Gulf of Aden east to Indonesia and New Guinea, north to China, south to northern Australia. (Eschmeyer, 2020; Froese and Pauly, 2020). It is small little-known coastal shark species which is widely distributed across the Indian and Indo-Pacific regions including Arabian Sea. (Notarbartolo-di-Sciara and Jabado, 2021). Although there is no authentic record of this species from the area but its occurrence in Pakistani waters cannot be overruled.

Hemipristis elongatus (Klunzinger, 1871)
(Fig. 17)

Material Examined

1 specimen collected on 04 March 2014 from Karachi Fish Harbour (122 cm TL)

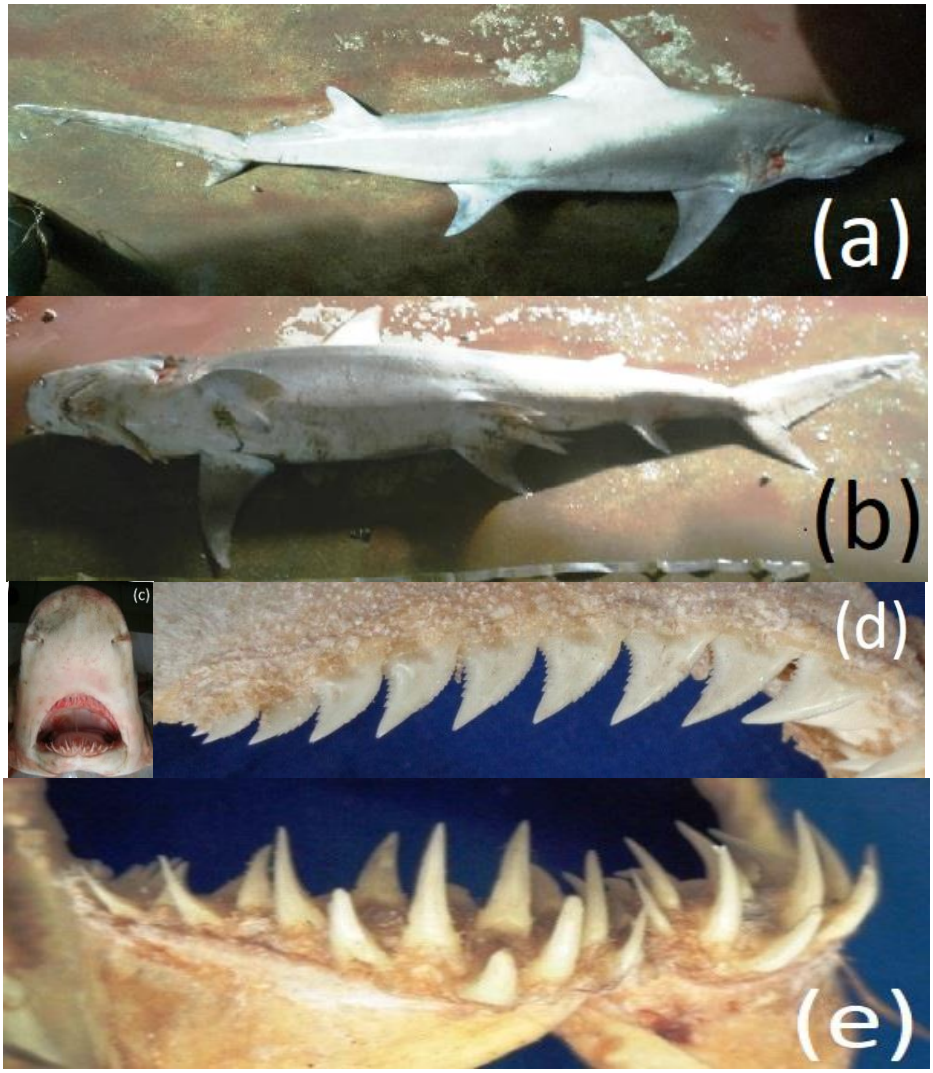


Fig. 17. *Hemipristis elongates* (a) lateral view; (b) ventral view; (c) head (ventral view); (d) teeth (upper jaw); (e) head (lower jaw).

This species is commonly known as snaggletooth shark and called "Loan"in Sindh and Balochistan. It was reported from Sindh by Anonymous (1955) and Compagno (1984b, 1984g), from Karachi by Anonymous(1955), Day (1878, 1890 and Fowler (1941), from Balochistan by Compagno (1984b, 1984g) and from Makran coast by Anonymous (1955, Qureshi (1952)and Zugmeyer (1913)**.** It was reported from Pakistan coast without mentioning any specific location by Ahmad and Niazi (1975), Bianchi (1985), Froese and Pauly (2002), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Psomadakis, *et al.*, (2015). Qureshi (1953, 1972) and Siddiqi (1956).

Carcharias ellioti was described by Day (1878) from Karachi Pakistan is considered as a synonym of this species (Eschmeyer, 2020). Ahmad and Niazi (1975); Anonymous (1955), Day (1878), Khan and Quadri (1986), Qureshi (1952, 1953, 1972), Siddiqi (1956) and Zugmayer (1913) listed this species as *Carcharhinus ellioti* whereas Fowler (1941) and Jalil and Khaliluddin (1972, 1981) referred it as *Eulamia ellioti.*According to Notarbartolo-di-Sciara and Jabado (2021) it is a small inshore shark widelydistributed across the Indian and Indo-Pacific regions including Arabian Sea. It is occasionally landed in the fish harbours and considered to be commercial importance, as its fin fetched higher prices.

***Paragaleus randalli* Compagno, Krupp & Carpenter, 1996**

Material Examined

- None

This species is called slender weasel shark and is reported from Pakistan by Jabado and Ebert (2015) and Weigmann (2012). It is reported from western Indian Ocean including Bahrain, Arabian Gulf, the Gulf of Oman, India, and Sri Lanka (Froese and Pauly, 2020). According to Eschmeyer (2020) this species is a synonym of *Paragaleus longicaudatus* (Bessednov 1966).

Family Caracharinidae

Members of family Caracharinidae are known as requiem sharks and represented in Pakistan by 28 species - *Carcharhinus albimarginatus* (Ruppell, 1837), *Carcharhinus altimus* (Springer 1950), *Carcharhinus amblyrhynchoides* (Whitley, 1934), *Carcharhinus amblyrhynchos* (Bleeker, 1856), *Carcharhinus amboinensis* (Muller and Henle, 1839), *Carcharhinus brevipinna* (Muller and Henle, 1839), *Carcharhinus dussumieri* (Muller and Henle, 1839), *Carcharhinus falciformis* (Muler and Henle, 1839), *Carcharhinus hemiodon* (Valenciennes, 1839), *Carcharhinus humani* White and Weigmann 2014, *Carcharhinus leucas* (Muller and Henle, 1839), *Carcharhinus limbatus* (Muller and Henle, 1839), *Carcharhinus longimanus* (Poey, 1861), *Carcharhinus macloti* (Muller and Henle, 1839), *Carcharhinus melanopterus* (Quoy and Gaimard, 1824), *Carcharhinus obscurus* (LeSueur, 1818), *Carcahrhinus plumbeus* (Nardo, 1827), *Carcharhinus sorrah* (Muller and Henle, 1839), *Galeocerdo cuvier* (Peron and LeSueur, 1822), *Glyphis gangeticus* (Muller and Henle, 1839), *Lamiopsis temmincki* (Muller and Henle, 1839), *Loxodon macrorhinus* Muller and Henle, 1839, *Negaprion acutidens* (Ruppell, 1837), *Prionace glauca* (Linnaeus, 1758), *Rhizoprionodon acutus* (Ruppell, 1837), *Rhizoprionodon oligolinx* Springer, 1964, *Scoliodon laticaudus* Muller and Henle, 1838 and *Triaenodon obesus* (Ruppell, 1837).

Carcharhinus albimarginatus (Ruppell, 1837)
(Fig. 18)

Material Examined

- 1 specimen collected on 11September 2016 from Karachi Fish Harbour (145 cm TL)

This species is commonly known as silvertip shark. Loally it is called "Barkali"in Sindh and Balochistan. It was reported from Pakistan by Hoda (1988). In addition, Compagno (1984d) have shown questionable distribution of this species in Pakistani waters. According to Eschmeyer (2020) and Froese and Pauly (2020) this species is known from Indo-Pacific area including Red Sea, East Africa, Seychelles, Madagascar and Mascarenes east to Hawaiian Islands, Clipperton Island, Revillagigedo Islands and Galapagos Islands; north to southern Japan and Ogasawara Islands, south to northern Australia, New Caledonia and Tuamotu Archipelago. It is also known from eastern Pacific including Mexico south to Ecuador. In the area it is known from Oman (Randall, 1995). According to Notarbartolo-di-Sciara and Jabado (2021) this species is a circumtropical shark, with a patchy distribution which is also known from Arabian Sea.

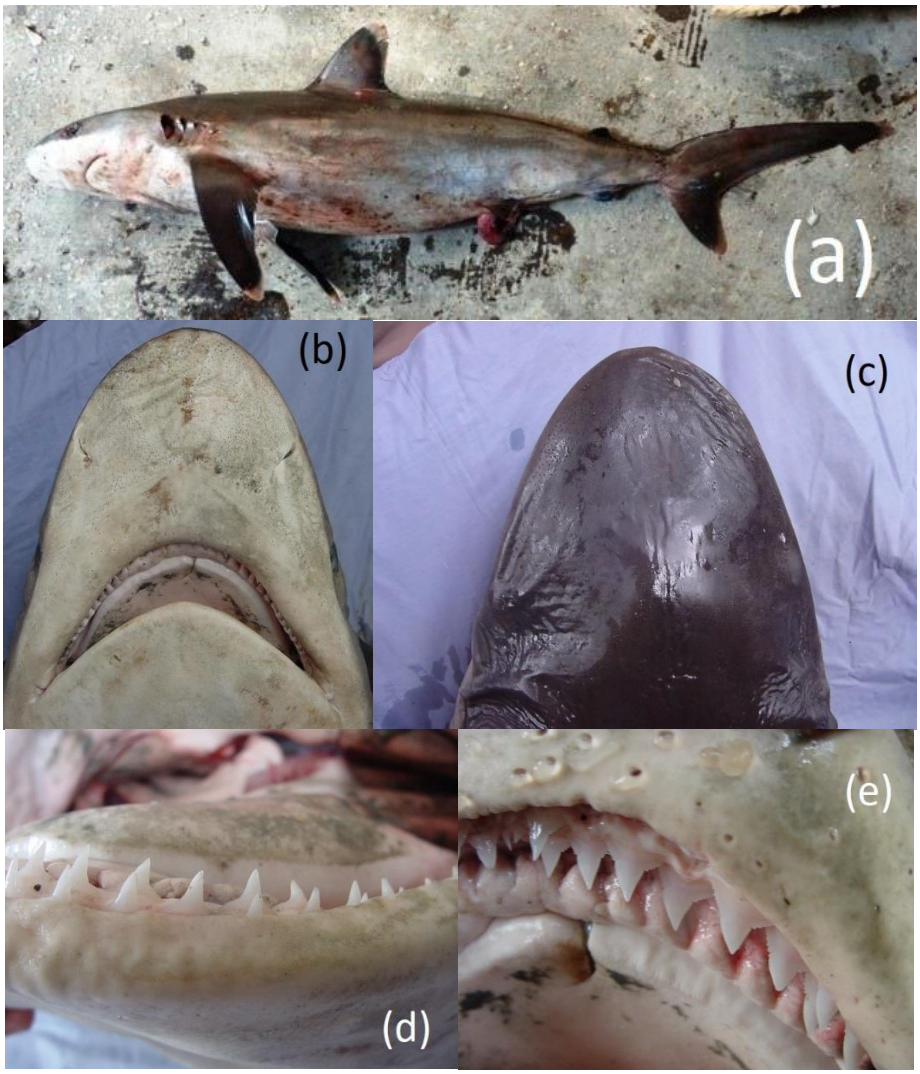


Fig. 18. *Carcharhinus albimarginatus.* (a) lateral view; (b) head (ventral view); (c) head (dorsal view); (d) teeth (lower jaw); (e) teeth (upper jaw).

***Carcharhinus altimus* (Springer 1950)**

(Fig. 19)

Material Examined

1 specimen collected on 14 October 2015 from Karachi Fish Harbour (85 cm TL)

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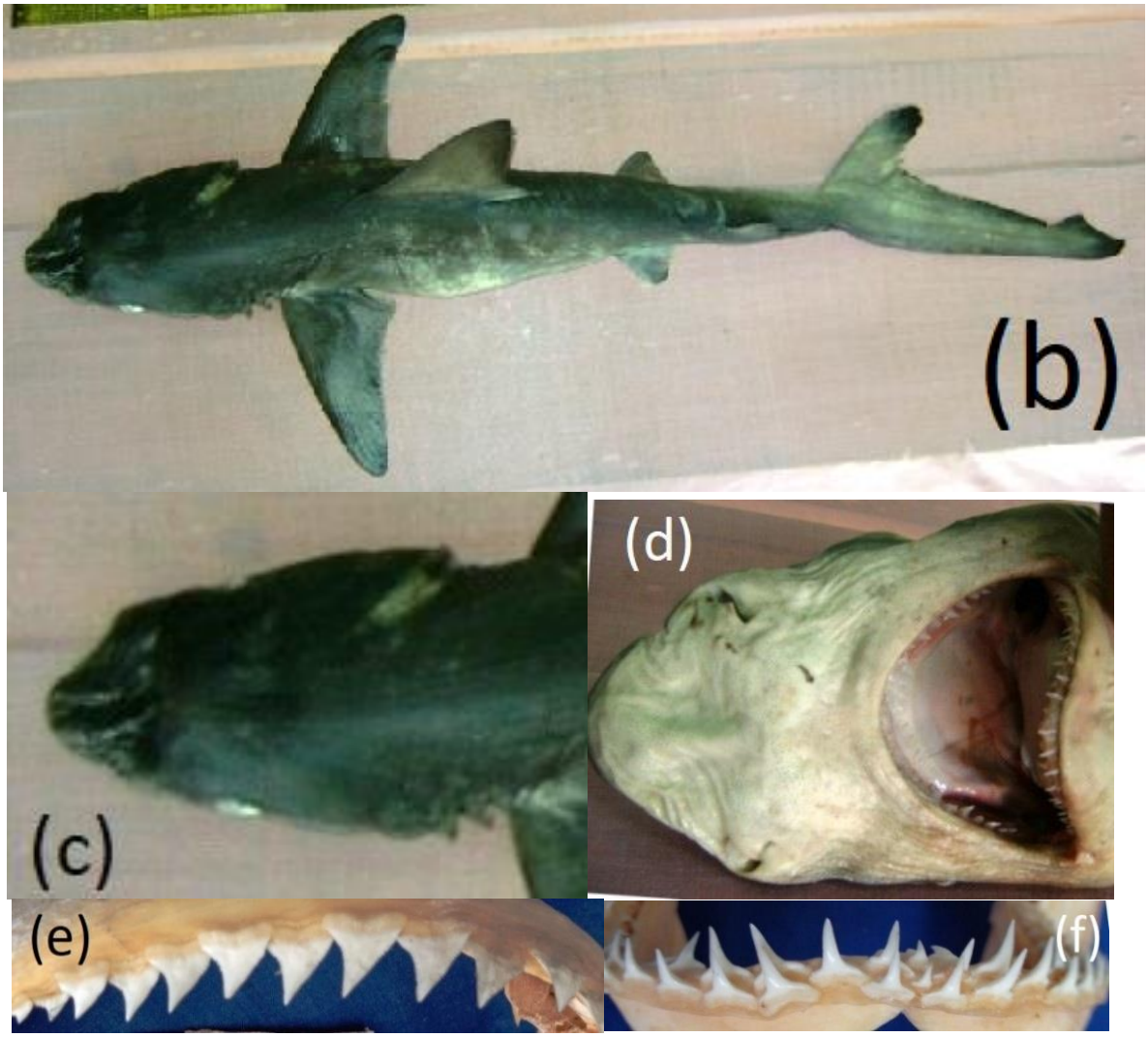


Fig. 19. *Carcharhinus altimus* (a) lateral view); (b) dorsal view; (c) head (dorsal view); (d) head (ventral view); (e) teeth (upper jaw); (f) teeth (lower jaw).

It is commony known as bignose shark. Locally it is known as "Jangli ham". It wasreported from Pakistan by Jabado and Ebert (2015) and Psomadakis, *et al.*, (2015).This is a circumglobal species which is found in tropical and warm temperate seas (including Gulf of California/Mexico, Caribbean Sea, and Mediterranean Sea). In the Indian Ocean it is known from Red Sea, Mozambique, South Africa, Madagascar, and India (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) this species is found around slopes and deep water and circumtropical species also known from Arabian Sea.

Carcharhinus amblyrhynchoides (Whitley, 1934)
(Fig. 20)

Material Examined

- 1 specimen collected on 23 October 2009 from Karachi Fish Harbour (114 cm TL)
- 1 specimen collected on 21 October 2017 from Karachi Fish Harbour (70 cm TL)
- 1 specimen collected on 01 October 2019 from Karachi Fish Harbour (73 cm TL)

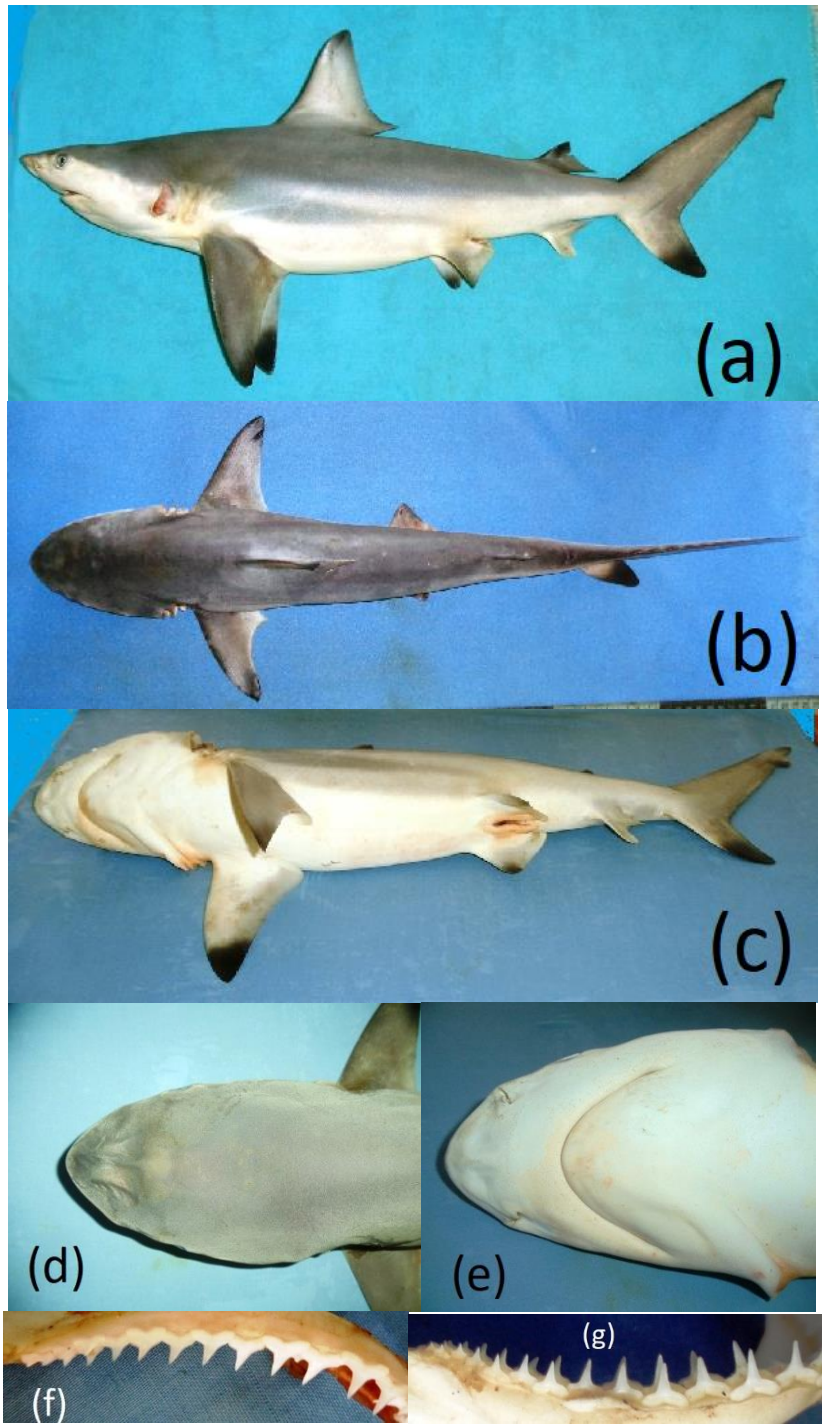


Fig. 20. *Carcharhinus amblyrhynchoides*. (a) lateral view; (b) dorsal view; (c) ventral view; (d) head (dorsal view); (e) head (ventral view); (f) teeth (upper jaw); (g) teeth (lower jaw).

This species is commonly known as graceful shark, It is called "karpic" or "Moey" in Sindh and"Moozi"in Balochistan. It was reported from Pakistan by Bianchi (1985), Compagno (1984b), Hussain (2003), Jabado and Ebert (2015) and Niazi (1994). This species is known from Indo-West Pacific area including Gulf of Aden and Persian Gulf east to Philippines and Papua New Guinea, north to Taiwan, south to northern Australia (Eschmeyer, 2020; Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a large inshore shark which is widely distributed across the Indian and PacificOceans including Arabian Sea.

Carcharhinus amblyrhynchos (Bleeker, 1856)

Material Examined

- None

This species is commonly known as blacktail reef shark. In Balochistan it is called "Gwareen". It is reported from Pakistan by Bianchi (1985), Hoda (1988) and Hussain (2003). It is known from Indo-West Pacific area including Red Sea, East Africa, Seychelles, Madagascar, western Mascarenes and Persian Gulf east to Marquesas Islands and Easter Island, north to South China Sea and Hawaiian Islands, south to New Caledonia; Galápagos Islands(Eschmeyer, 2020; Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) this species is widely distributed across the tropical Indian andWest Pacific Oceans (including Arabian Sea) and associated with coral reef habitats.

Carcharhinus amboinensis (Muller and Henle, 1839)
(Fig. 21)

Material Examined

- 1 specimen collected on 17 May 2013 from Karachi Fish Harbour (190 cm TL)
- 1 specimen collected on 11 October 2016 from Karachi Fish Harbour (240 cm TL)
- 1 specimen collected on 05 November 2018 from Karachi Fish Harbour (179 cm TL)

This species is commonly known as pigeye shark. Locally it is known as "Kandri" and "More mangra" (for juveniles) in Sindh and "Warook" and "Gwark" (for juveniles) in Balochistan. It was reported from Sindh by Anonymous (1955) and Compagno (1984b, 1984d), from Karachi by Anonymous (1955), Day (1878, 1889) and Fowler (1941), from Balochistan by Compagno (1984b, 1984d), from Makran coast by Anonymous (1955) and Garman (1913). It was reported from Pakistan without mentioning any specific location by Bianchi (1985), Brandhorst and Crockett (1994), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Misra (1969) and Qureshi (1952).

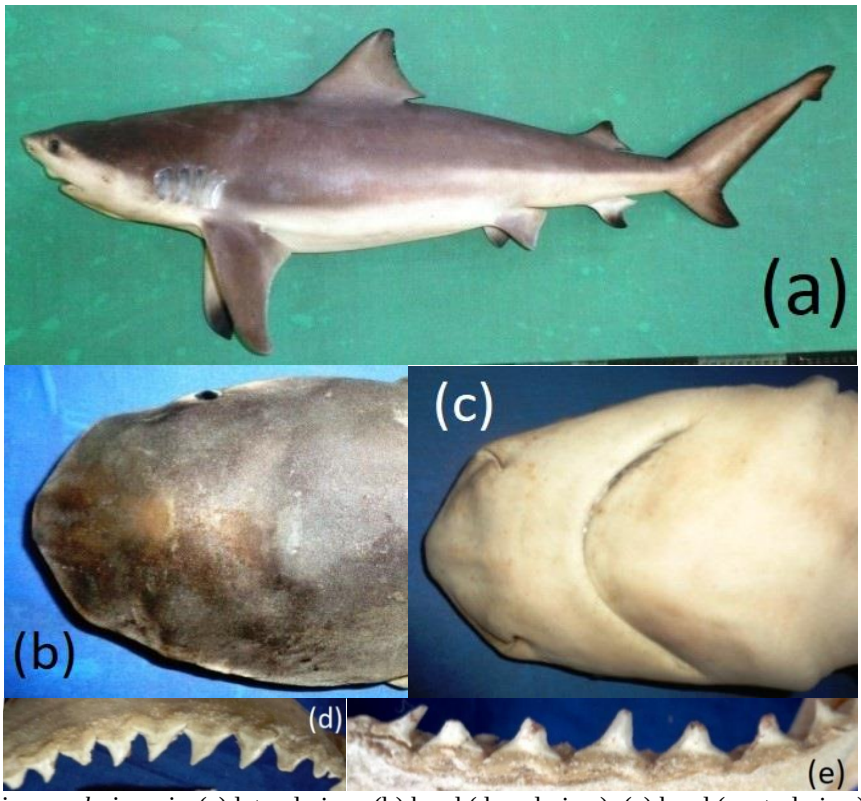


Fig. 21.*Carcharhinus amboinensis*. (a) lateral view; (b) head (dorsal view); (c) head (ventral view); (d) teeth (upper jaw); (e) teeth (lower jaw).

Triaenodon obtusus Day, 1878 reported from Karachi was found out to be a term foetus of this species (Compagno, 1984b). Anonymous (1955), Day (1878, 1889), Fowler (1941), Garman (1913), Misra (1969) and Qureshi (1952) referred this species as *Triaenodon obtusus*. This species has a circumglobal distribution in tropical and warm temperate seas (including Red Sea, Persian Gulf), but not eastern Pacific. Gulf of Aden, South Africa, Madagascar, Pakistan, Sri Lanka, Indonesia, Papua New Guinea and Australia. It is also reported from Eastern Atlantic (Nigeria) and the Mediterranean. According to Notarbartolo-di-Sciara and Jabado (2021) this species is distributed throughout the tropical Indian Ocean (including Arabian Sea) and West Pacific but also in theEast Atlantic. They also mentioned that this species is present mostly in inshore, reef habitats, but has a patchily distributed.

***Carcharhinus brevipinna* (**Muller and Henle, 1839)
(Fig. 22)

Material Examined

- 1 specimen collected on 11February 2010 from Karachi Fish Harbour (172 cm TL)
- 7 Term foetus on 07March 2017 from Karachi Fish Harbour (Term foetus between 35 and 38 cm TL)
- 1 specimen collected on 08 March 2017 from Karachi Fish Harbour (115 cm TL)

This species is commonly known as spinner shark. It is locally called “Shid” or:”Shida” in Sindh and Balochistan. It was reported from Pakistan by Compagno (1984b), Jabado and Ebert (2015), Niazi (1994) and Psomadakis, *et al.,* (2015). This species has circumglobal distribution in tropical through warm temperate seas (including Caribbean Sea, Mediterranean Sea, Red Sea, Persian Gulf, and Sea of Japan). Seven term foetus having size range of 35 to 38 cm were dissected from a female in March 2017.According to Notarbartolo-di-Sciara and Jabado (2021), this species is widely spread across the tropical Indian (including Arabian Sea), West Pacific and Atlantic oceans, and it is mostly inshore, reef associated species.

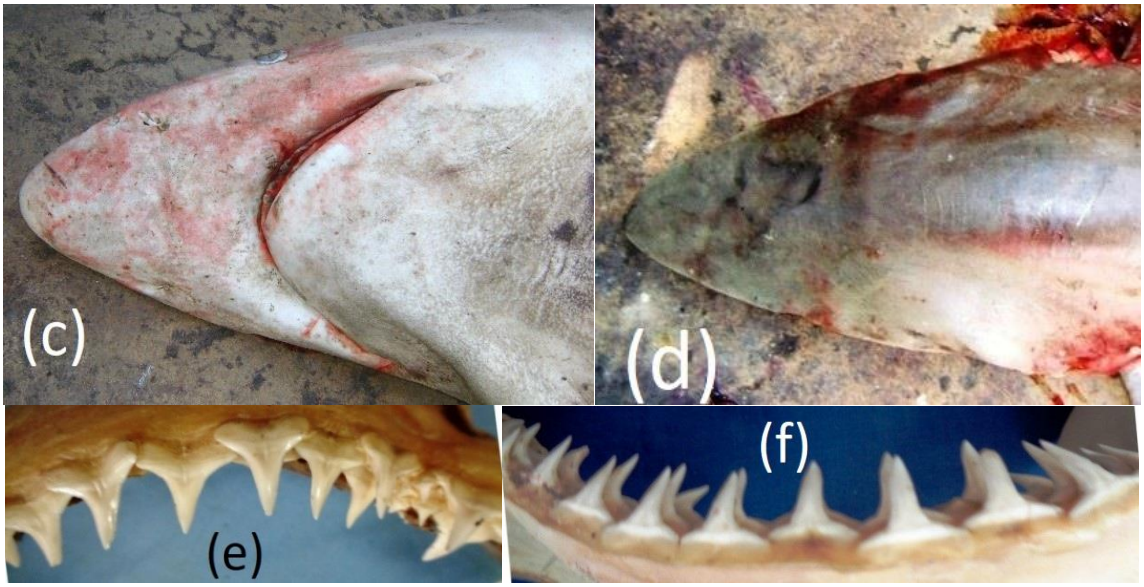


Fig. 22. *Carcharhinus brevipinna*. (a) lateral view; (b) dorsal view; (c) head (ventral view); (d) head (dorsal view); (e) teeth (upper jaw); (f) teeth (lower jaw).

Carcharhinus dussumieri (Muller and Henle, 1839)
(Fig.23)

Material Examined

- 1 specimen collected on 06 January 2020 from Karachi Fish Harbour (63 cm TL)

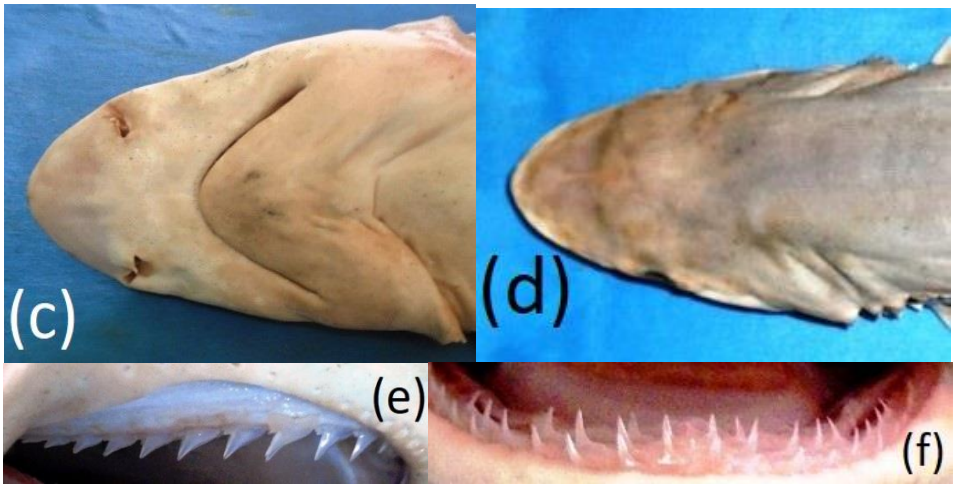


Fig. 23. *Carcharhinus dussumieri*.(a) lateral view; (b) dorsal view; (c) head (ventral view); (d) head (dorsal view); (e) teeth (upper jaw); (f) teeth (lower jaw).

It is commonly known as whitecheek shark and locally known as "Bhusa"in Sindh and "Gussi" or"Gusso"in Balochistan. It was reported from Sindh by Compagno (1984b, 1984d), Misra (1962) and Sorley (1932), from Karachi by Anonymous (1999) and White and Weigmann (2014), from off River Indus mouth by Anonymous (1993) and White and Weigmann 2014), from Balochistan by Compagno (1984b, 1984d) and Zugmayer (1913), from off Jiwani by Anonymous (1993) and from Sonmiani by (White and Weigmann, 2014). It was reported from Pakistan without mentioning any specific location by Ahmad and Niazi (1975), Anonymous (1993, 1999), Bianchi (1985), Froese and Pauly (2002), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.* (2015), Qureshi (1953, 1972) and White and Weigmann (2014).

This species is known from western and northern Indian Ocean including Persian Gulf east to India and Myanmar (Eschmeyer.2020). According to Notarbartolo-di-Sciara and Jabado (2021) this small species is a tropical Indian Ocean inshore shark known also from Arabian Sea. Weigmann (2012) reported *Carcharhinus sealei* from Pakistan. It seems that this may be *C.dussumieri* but need further investigations.

Carcharhinus falciformis (Muler and Henle, 1839)
(Fig. 24)

Material Examined

- 1 specimen collected on 16 December 2013 from offshore waters of Gunz (79 cm TL)
- 1 specimen collected on 10 March 2014 from Karachi Fish Harbour (74 cm TL)
- 1 specimen collected on 12 October 2016 from Karachi Fish Harbour (63 cm TL)
- 1 specimen collected on 11 January 2014 from Karachi Fish Harbour (81 cm TL)

It is commonly known as silky shark and called "Kali tilli" or "Tilli"in Sindh and "Kanaitar" in Balochistan. It was was reported from Sindh by Anonymous (1955), Misra (1962) and Sorley (1933). from Karachi by Anonymous(1955) and Misra (1962), from Balochistan by Anonymous (1953), Compagno (1984b, 1984d) and Zugmayer (1913) and from Makran coast by Anonymous (1955), Misra (1962) and Qureshi (1952). It was reported from Pakistan without mentioning any specific location by Ahmad and Niazi (1975), Bianchi (1985), Hoda (1985, 1988), Hussain (2003), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.*, (2015), Qureshi (1953, 1972) and Siddiqi (1956).

Ahmad and Niazi (1975), Bianchi (1985), Compagno (1984b, 1984d), Eschmeyer (2020), Hoda (1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Sorley (1933) and Zugmayer (1913) as *Carcharias menisorrah*,Ahmad and Niazi (1975), Anonymous (1953, 1955), Hoda (1985), Misra (1962, 1969), Qureshi (1952, 1953, 1972) and Siddiqi (1956) as *Carcharhinus menisorrah* and Fowler (1941) as *Eulamia menisorrah.*

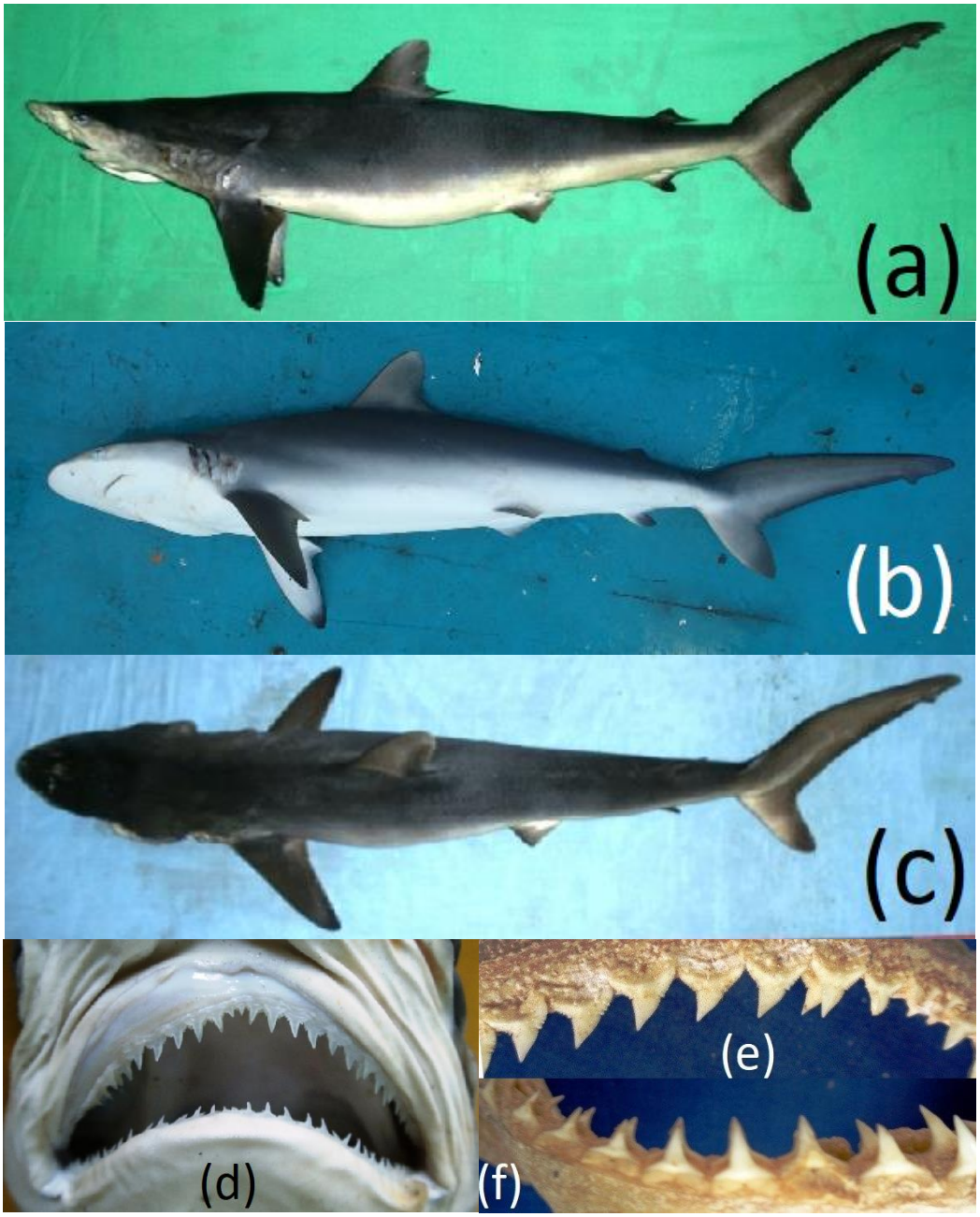


Fig. 24. *Carcharhinus falciformis.* (a) lateral view; (b) ventral view); (c) dorsal view; (d) jaws; (e) teeth (upper jaw); (f) teeth (lower jaw).

This species has circumglobal distribution in tropical seas (including Gulf of California/Mexico, Caribbean Seaand Mediterranean Sea). In the Indian Ocean known from Red Sea, Persian Gulf, Natal, South Africa to China (Eschmeyer, 2020; Froese and Pauly, 2020).According to Notarbartolo-di-Sciara and Jabado (2021), it is a large, circumtropical, widespread oceanic species which is also known from Arabian Sea.

It is included in the highly migratory species, and included in the Annex I of the 1982 Convention on the Law of the Sea. It is also included in the CITES and CMS Appendix-II. It is second most common shark being harvested

and landed in fish harbours and most dominating in the catches of tuna gillnet fleet in the offshore waters of Pakistan.

Carcharhinus hemiodon (Müller & Henle 1839)

Material Examined

- None

This species is commonly known as Pondicherry shark and called "Barkali" in Sindh and Balochistan. It was reported from Pakistan by Ahmad and Niazi (1975), Ahmad *et al* (1973), Bianchi (1985), Compagno (1984b, 1984d), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Psomadakis, *et al.*, (2015) and Qureshi (1953, 1972). Ahmad and Niazi (1975), Ahmad *et al* (1973), Hoda (1985), Jalil and Khaliluddin (1981), Khan and Quadri (1986) and Qureshi (1953, 1972) referred this species as *Hypoprion hemiodon.*

This species is known from Indo-West Pacific including Gulf of Oman to Pakistan, India, and possibly Sri Lanka and western Pacific ranging from India to New Guinea. This is one of the species which used to be on common occurrence prior to 1970's but since early 1980's it was not seen in landing centers in Pakistan indicating that it may be locally extinct. According to Notarbartolo-di-Sciara and Jabado (2021), it is small and rare Indian–West Pacific inshore shark which also used to occur in the Arabian Sea but it has not been recorded since 1979.

Carcharhinus humani White and Weigmann 2014

Material Examined

- None

This species was described from off Socotra Islands by White and Weigmann (2014) and now known from Western Indian Ocean: South and East Africa, Seychelles and Madagascar to Persian Gulf (Eschmeyer, 2020; Froese and Pauly, 2020). It is commonly known as human whaler's sharkand is small little-known coastal shark species limited to the Western Indian Ocean and is of rare occurrences in the Arabian Sea and Persian Gulf (Notarbartolo-di-Sciara and Jabado, 2021). Although there is no authentic record of this species from the area but its occurrence in Pakistani waters cannot be overruled.

This species belongs to *C. dussumieri/sealei* group and differs from *C. dussumieri* in having smooth basal cusplets on upper anterolateral teeth (vs. coarsely serrated basal cusplets), first dorsal fin apically narrow and falcate (vs. broadly triangular and not falcate), and more vertebrae (total centra 152–167 vs. 113–138, precaudal centra 74–85 vs. 55–70) (White and Weigmann 2014). Second dorsal fin with a distinct black apical blotch on upper two thirds of fin, strongly demarcated from the rest of the fin (diffuse-edged in *C. dussumieri*), not extending onto upper sides of body below second dorsal-fin base.

In addition possibility of occurrence of *Carcharhinus leiodon* Garrick, 1985 which is known from southern Arabian coast (Yemen) and considered to be endemic in the area (Notarbartolo-di-Sciara and Jabado, 2021) in Pakistani waters cannot be overruled.

Carcharhinus leucas (Muller and Henle, 1839)
(Fig.25)

Material Examined

- 1 specimen collected on 18 November 2008 from Karachi Fish Harbour (145 cm TL)

This species is commonly known as bull shark. Locally it is known as "Kandri" or "More mangra" (specially juveniles) in Sindh and"Warook", or "Bagore warook", and "Gwark" (for juveniles) in Balochistan. It was reported from Sindh by Compagno (1984b, 1984d), from Karachi by Gunther (1883) and Fowler (1941), from from Mekran by Fowler (1941) and Zugmeyer (1913). It was reported from Pakistan without mentioning any specific location by Bianchi (1985), Brandhorst and Crockett (1994), Hoda (1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981) and Psomadakis, *et al.*, (2015).

Mould (1997) considered *Carcharias murrayi* Günther 1883to be a synonym of this species whereas Fowler (1941) considered *Carcharias murrayi* to be a synonym of *Eulamia ellioti*. According to Compagno (1984g), *Carcharias murrayi* is a synonym of *Glyphis gangeticus* which is being adopted here. Zugmeyer (1913) who also listed this species as *Carcharias murrayi* whereas Fowler (1941) referred it as *Eulamia ellioti.*According to Froese and Pauly (2020) this species is sympatric with *Carcharhinus amboinensis* and *Glyphis gangeticus.*

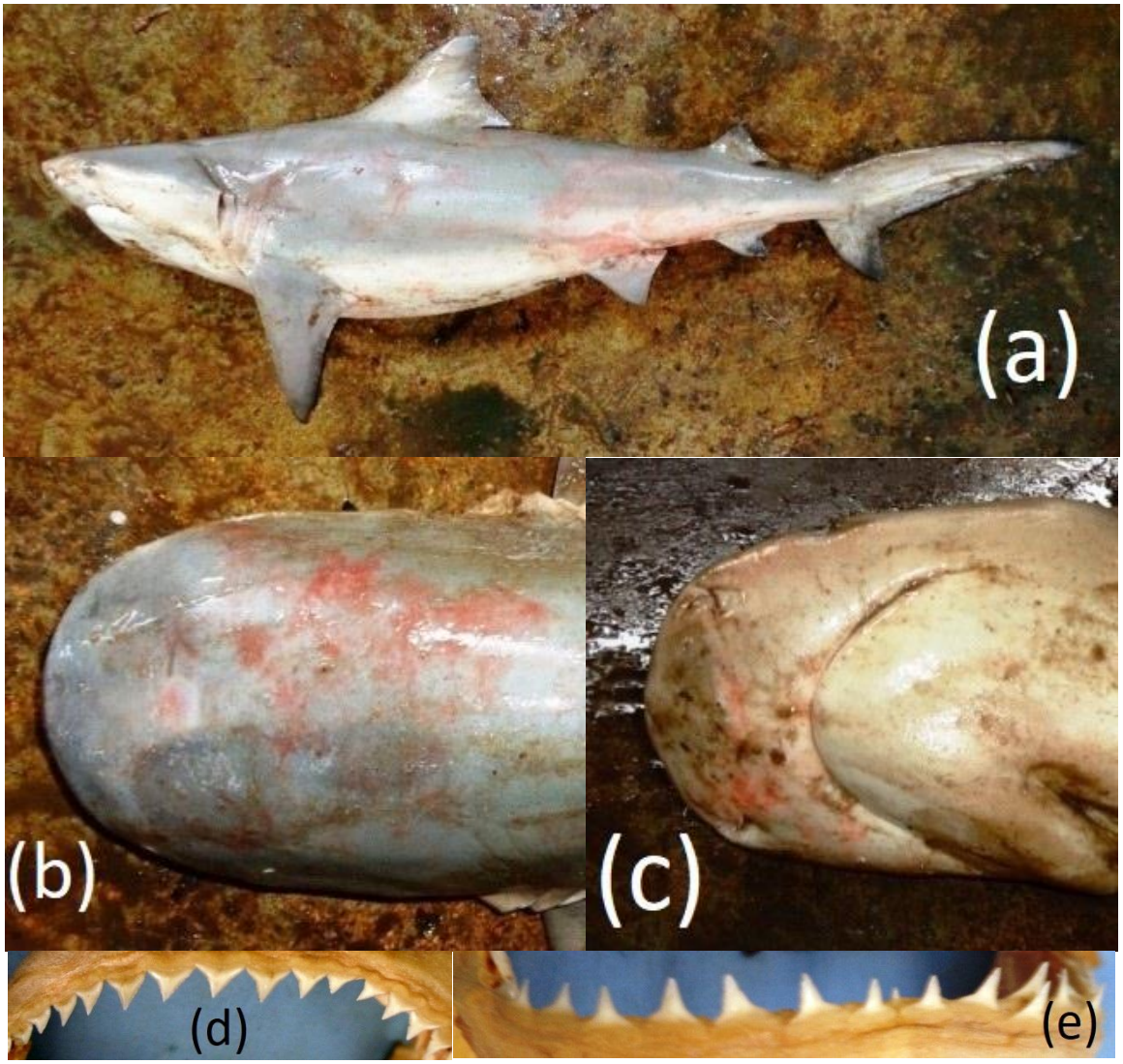


Fig. 25. *Carcharhinus leucas*. (a) lateral view; (b) head (dorsal view); (c) head (ventral view); (d) teeth (upper jaw); (f) teeth (lower jaw).

According to Eschmeyer (2020) and Froese and Pauly (2020) it is cosmopolitan species occurring in tropical and subtropical waters including warm oceans, rivers and lakes. In the Indo-Pacific it is known from Kenya and South Africa to India, Vietnam to Australia to southern Baja California, Mexico to Ecuador and possibly occurring in Peru. It is known from in freshwater and ound in rivers of West Africa from Gambia River to Ogowe River and in the Cuanza in Angola. In Pakistan also this species is known to occur in Indus estuarine area even ascending to freshwater areas.According to Notarbartolo-di-Sciara and Jabado (2021), it is a large coastal shark, with circumtropical distribution including in the Arabian Sea.

Carcharhinus limbatus (Muller and Henle, 1839)
(Fig. 26)

Material Examined

1 specimen collected on 16 January 2010 from Karachi Fish Harbour (112 cm TL)

- 1 specimen collected on 08 March 2016 from Karachi Fish Harbour (180 cm TL)
- 1 specimen collected on 26 August 2016 from Karachi Fish Harbour (74 cm TL)

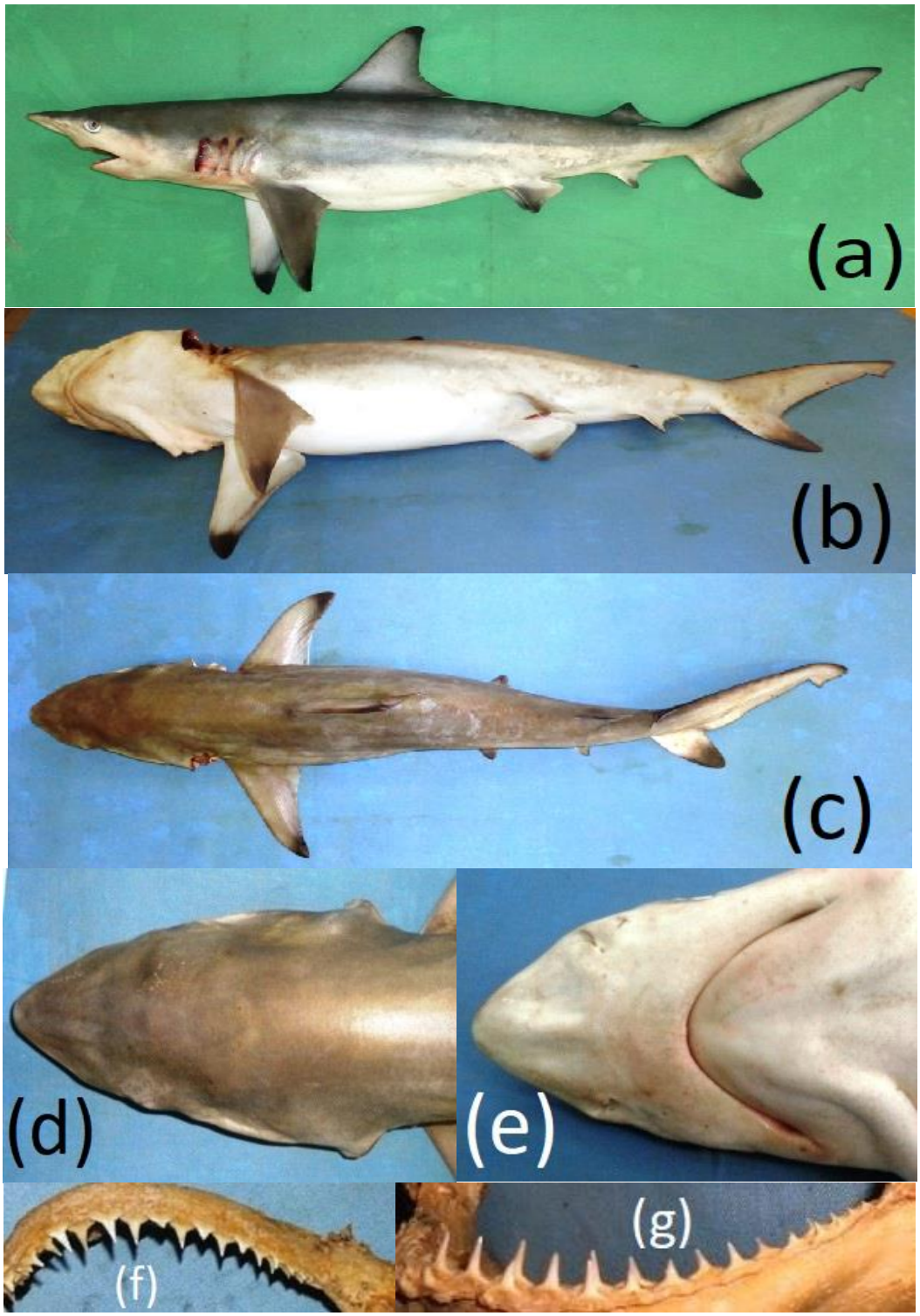


Fig. 26. *Carcharhinus limbatus*. (a) lateral view; (b) ventral view; (c) dorsal view; (d) head (dorsal view); (e) head (ventral view); (f) teeth (upper jaw); (g) teeth (lower jaw).

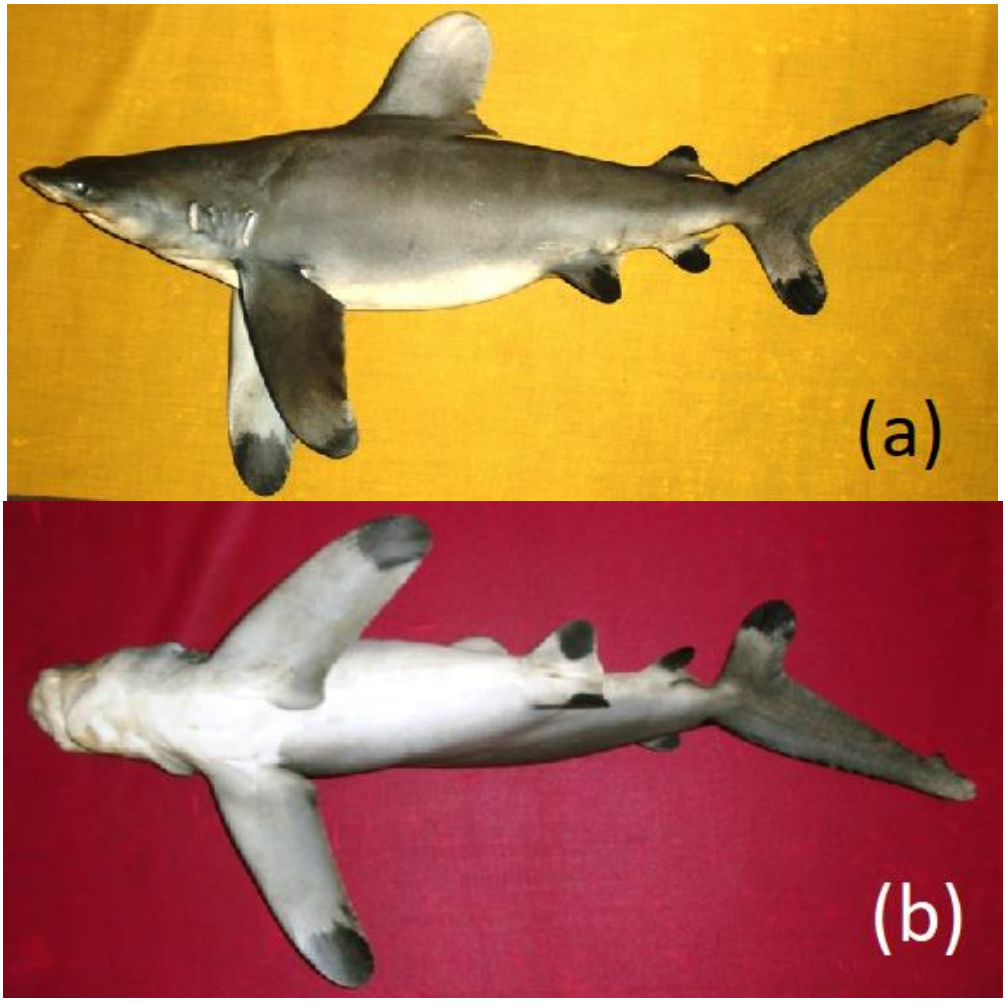
This species is commonly known as blacktip shark and locally called “Karpic”or “Kanti”in Sindh and “Kalawani kanaitar”in Balochistan. It was reported from Sindh by Anonymous (1955), Compagno (1984b, 1984d), Mirsa (1962) and Sorley (1932) from Karachi by Anonymous (1955, 1999), Misra, 1962), from Balochistan by Anonymous (1953), Compagno (1984b, 1984d) and Niazi (1994), from Makran coast by Anonymous(1955), Misra (1962) and Qureshi(1952).It was reported from Pakistan without mentioning any specific location byAhmad and Niazi (1975), Bianchi (1985), Brandhorst and Crockett (1994), Froese and Pauly (2002), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015),Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.,* (2015),Qureshi (1953, 1972) and Siddiqi (1956).

It has a circumglobal distribution in tropical and warm temperate seas (including Gulf of California/Mexico, Caribbean Sea and Mediterranean Sea). From Indo-Pacific area it is known from Persian Gulf, Red Sea, Madagascar and South Africa to China, Australia, Tahiti, Marquesas, and Hawaii (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a large mostly coastal shark with circumtropical and warm temperate distribution including in the Arabian Sea.

Carcharhinus longimanus (Poey, 1861)
(Fig. 27)

Material Examined

- 1 specimen collected on 16 January 2010 from Karachi Fish Harbour (112 cm TL)
- 1 specimen collected on 08 March 2016 from Karachi Fish Harbour (180 cm TL)
- 1 specimen collected on 26 August 2016 from Karachi Fish Harbour (74 cm TL)



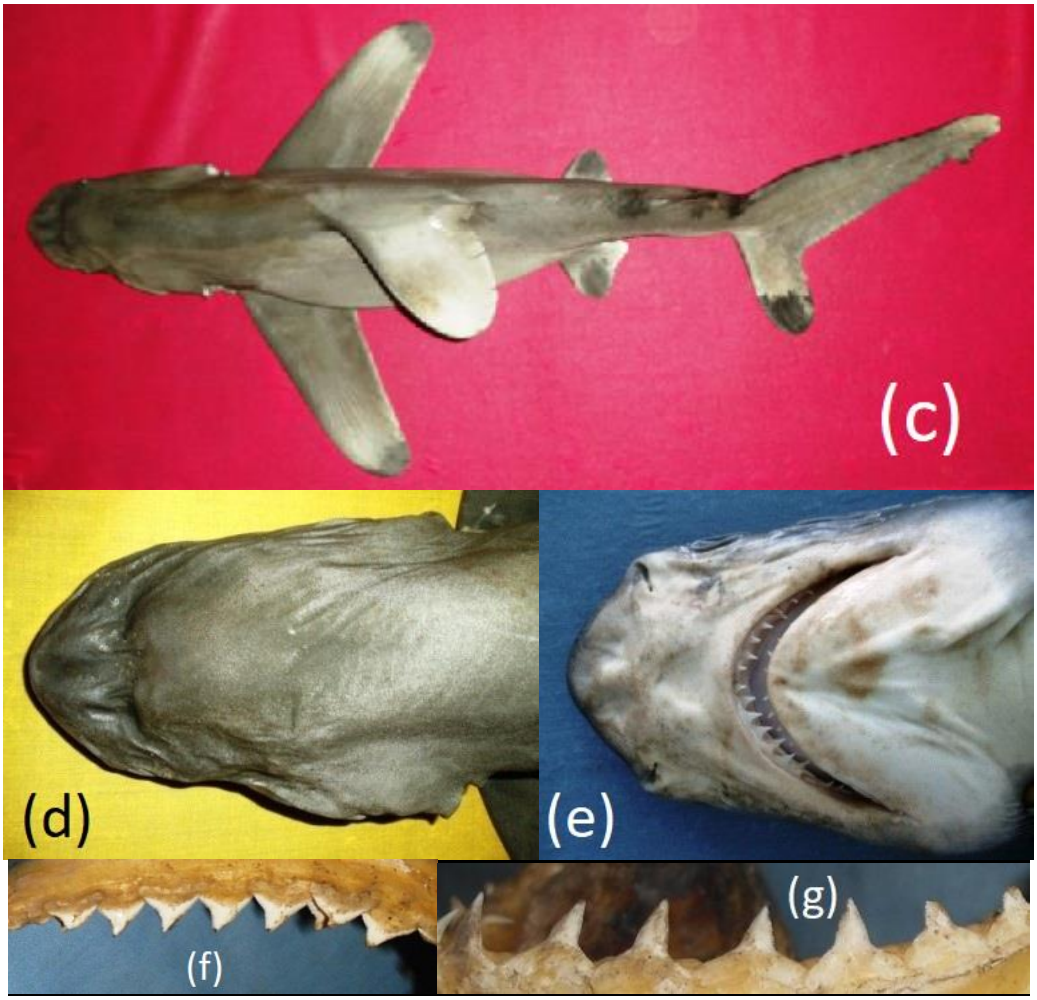


Fig. 27. *Carcharhinus longimanus*.(a) lateral view; (b) ventral view; (c) dorsal view; (d) head (dorsal view); (e) head (ventral view); (f) teeth (upper jaw); (g) teeth (lower jaw).

This species is known as oceanic whitetip shark. It is locally known as "Ham" or "Jagri Ham". It was reported from Pakistan by Bianchi (1985), Compagno (1984b, 1984d); Eschmeyer (1998), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Niazi (1994) and Psomadakis, *et al.*, (2015).

This species has a circumglobal distribution in tropical and subtropical seas (including Gulf of California/Mexico, Caribbean Sea, Red Sea), straying into temperate waters including North Sea (Eschmeyer, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) this is one of the most widely spread large oceanic shark which is also known from the Arabian Sea.

Sreelekshmi *et al.* (2020) studied population genetic of this species and noted a lack of significant genetic differentiation along the Indian coast indicating substantial gene flow and connectivity among populations. They compared the data of Indian coast with that of Atlantic Ocean regions and onserved significant connectivity and gene flow between Indian and East Atlantic regions and a lack of connectivity between Indian and West Atlantic Ocean regions which indicates that oceanic whitetip sharks have substantial capacity for oceanic migration resulting in the mixing of gene pools.

It is considered as highly migratory species, and included in the Annex I of the 1982 Convention on the Law of the Sea. It is also included in the CITES Appendix-II. It used to be one of the common shark of tuna gillnet fleet in the offshore waters of Pakistan about 25 years back, however, now extremely rare.

***Carcharhinus macloti* (**Muller and Henle, 1839)
(Fig. 28)

Material Examined

1 specimen collected on 26 November 2013 from Karachi Fish Harbour (64 cm TL)
- 1 specimen collected on 11 January 2014 from Karachi Fish Harbour (66 cm TL)
- 1 specimen collected on 22 December 2017 from Karachi Fish Harbour (71 cm TL)

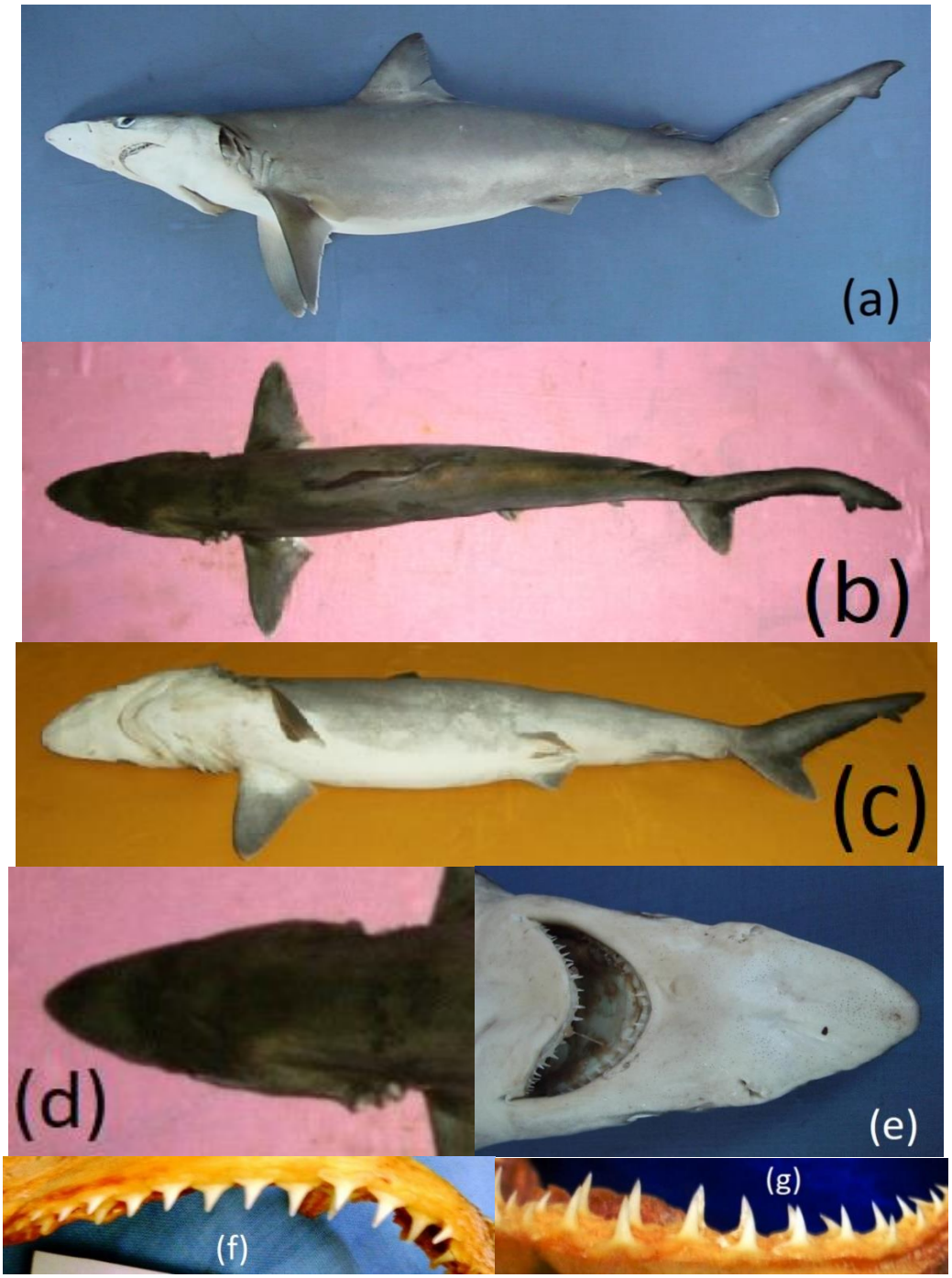


Fig. 28. *Carcharhinus macloti*. (a) lateral view; (b) dorsal view; (c) ventral view; (d) head (dorsal view); (e) head (ventral view); (f) teeth (upper jaw); (g) teeth (lower jaw).

This species is commonly known as hardnose shark and locally known as "Bhusa" or "Tum kairo" in Sindh and "Gussi" or "Gusso" or "Jarroi pishik"in Balochistan. It was was reported from Sindh by Compagno (1984b, 1984d), from off Karachi by Anonymous (1993) and Niazi(2001), from Balochistan by Compagno (1984b, 1984d) and Niazi (1994) and from Makran coast by Fowler (1941), Misra (1962) and Zugmayer (1913).It was reported from Pakistan without mentioning any specific location byAhmad and Niazi (1975), Bianchi (1985), Froese and Pauly (2002), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969),Psomadakis, *et al.,* (2015) and Qureshi (1972).

This species is known from Indo-West Pacific area including Kenya, Tanzania, Persian Gulf, Pakistan, India, Sri Lanka, Andaman Sea, Myanmar, Vietnam, China, Taiwan, Hong Kong and the Philippines, New Guinea east to Papua New Guinea, north to Japan, south to Western Australia and Queensland (Eschmeyer, 2020; Froese and Pauly, 2020).According to Notarbartolo-di-Sciara and Jabado (2021) it is a small shelf-shark wide spread in the Indo-West Pacific region including in the Arabian Sea.

Carcharhinus melanopterus (Quoy and Gaimard, 1824)

Material Examined

- None

This species is commony known as blacktip reef shark aand locally known as "Barkali"in Sindh and Balochistan. It was reported from Sindh byAnonymous (1955), Compagno (1984b, 1984d), Misra (1962) and Murray (1880), from Karachi by Anonymous (1955, 1999) and Misra (1962), from Balochistan byAnonymous (1953) and Compagno (1984b, 1984d) and Makran coast by Anonymous (1955), Misra (1962), Qureshi (1952) and Zugmayer (1913). It was reported from Pakistan without mentioning any specific location by Ahmad and Niazi (1988), Ali (2002), Bianchi (1985), Brandhorst and Crockett (1994), Froese and Pauly (2002), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.,* (2015), Qureshi (1953, 1972) and Siddiqi (1956).

Ahmad and Niazi (1988). Hoda (1985) and Khan and Quadri (1986) referred this species as *Carcharhinus commersonii* whereas Jalil and Khaliluddin (1972, 1981) listed it as *Eulamia melanoptereus* and Murray (1880) and Zugmayer (1913) as *Carcharias melanopterus*.

This species is known from Indo-Pacific area including Persian Gulf, Red Sea South Africa, East Africa, Madagascar, Seychelles, Mascarenes and to the Hawaiian Islands and the Tuamoto Archipelago, north to Japan and south to Australia (Eschmeyer, 2021; Froese and Pauly, 2021). According to Notarbartolo-di-Sciara and Jabado (2021) it is fairly common especially around coral reef habitats. It is a medium-sized coastal shark typical of the reef habitat from the Western Indian Ocean to the WesternTropical Pacific including in the Arabian Sea. It used to be occurring commonly in Pakistan about 30 years back but no specimen of this species was observed in commercial landings since last 15 years. Recently Akbar Ali Asif posted a photo of this species from Churna Island on social media (Fig. 41).

Carcharhinus obscurus (LeSueur, 1818)

Material Examined

- None

This species is commony known as dusky reef shark aand locally known as "Barkali"in Sindh and Balochistan. It was reported from Pakistan by Compagno (1984d) and Hoda (1988). It is considered as nearly circumglobal species in tropical and subtropical seas (Eschmeyer, 2020). In the Indo-West Pacific are it is known from Red Sea, Mozambique and South Africa to Japan, China, Vietnam and Australia (Froese and Pauly, 2020). It is considered as a highly migratory species and included in the Annex I of the 1982 Convention on the Law of the Sea.

Carcahrhinus plumbeus (Nardo, 1827)
(Fig.29)

Material Examined

- 1 specimen collected on 11June 2012 from Karachi Fish Harbour (110 cm TL)
- 2 Term foetus collected on 16October 2014 from Karachi Fish Harbour (98 cm TL)

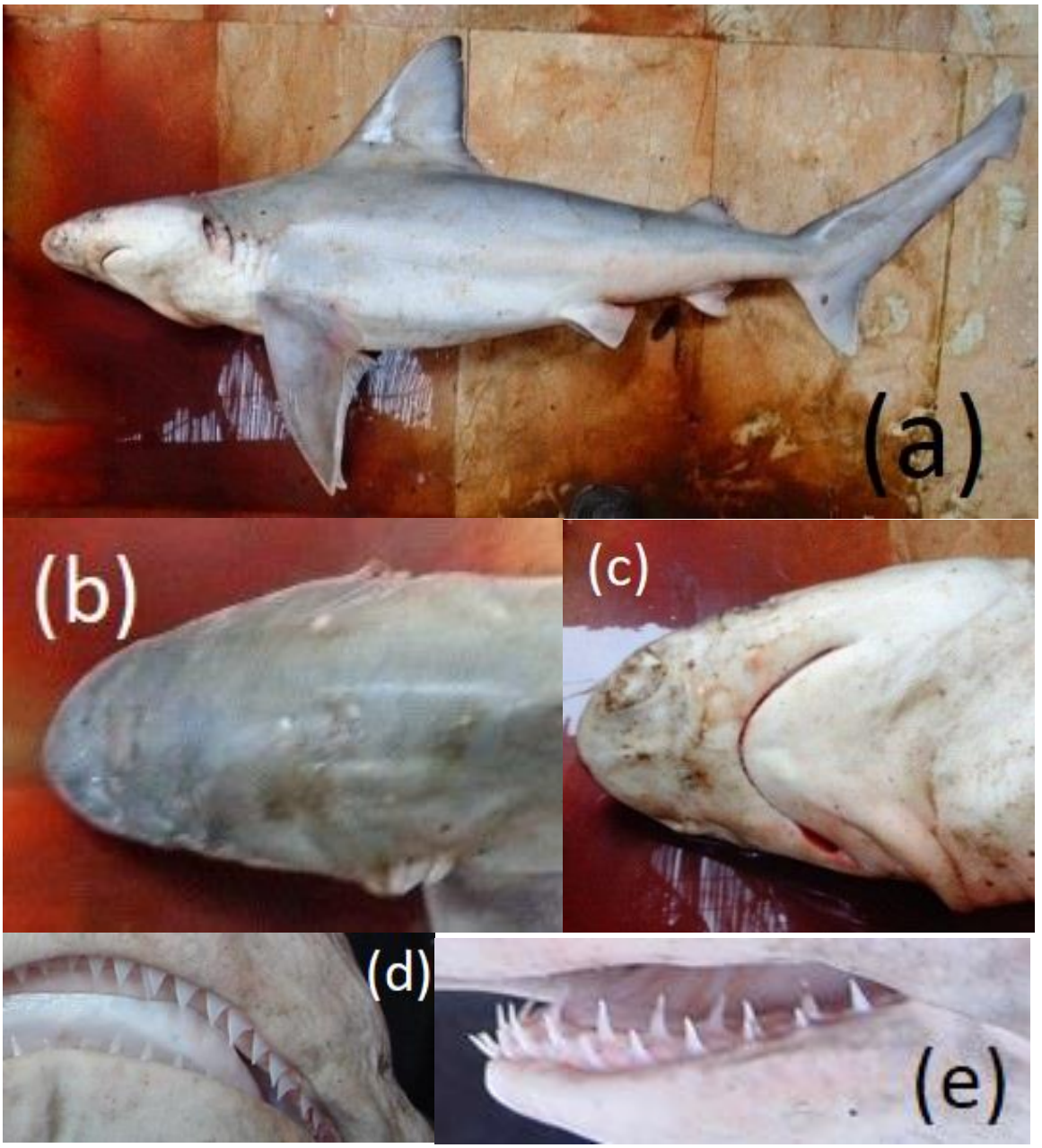


Fig. 29.*Carcahrhinus plumbeus*. (a) lateral view; (b) head (dorsal view); (c) head (ventral view); (d) teeth (upper jaw); (f) teeth (lower jaw).

It is commonly known as sandbar shark and locally known as "Kanati" in Sindh and Balochistan. This species is reported from Pakistan by Compagno (1984b, 1984d), Hoda (1988), Jabado and Ebert (2015) and Psomadakis, *et al.*, (2015). This species is known to have circumglobal distribution in tropical through warm temperate seas (Eschmeyer, 2020). It has scattered records in the Indo-Pacific: ranging from the Red Sea, Persian Gulf and East Africa to the Hawaiian Islands (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a medium-sized shark occurring worldwide over shelf and upper slope habitat. It has a patchily distributed in the Arabian Sea.

Carcharhinus sorrah (Muller and Henle, 1839)
(Fig. 30)

Material Examined

- 1 specimen collected on 19 May 2010 from Karachi Fish Harbour (37 cm TL)

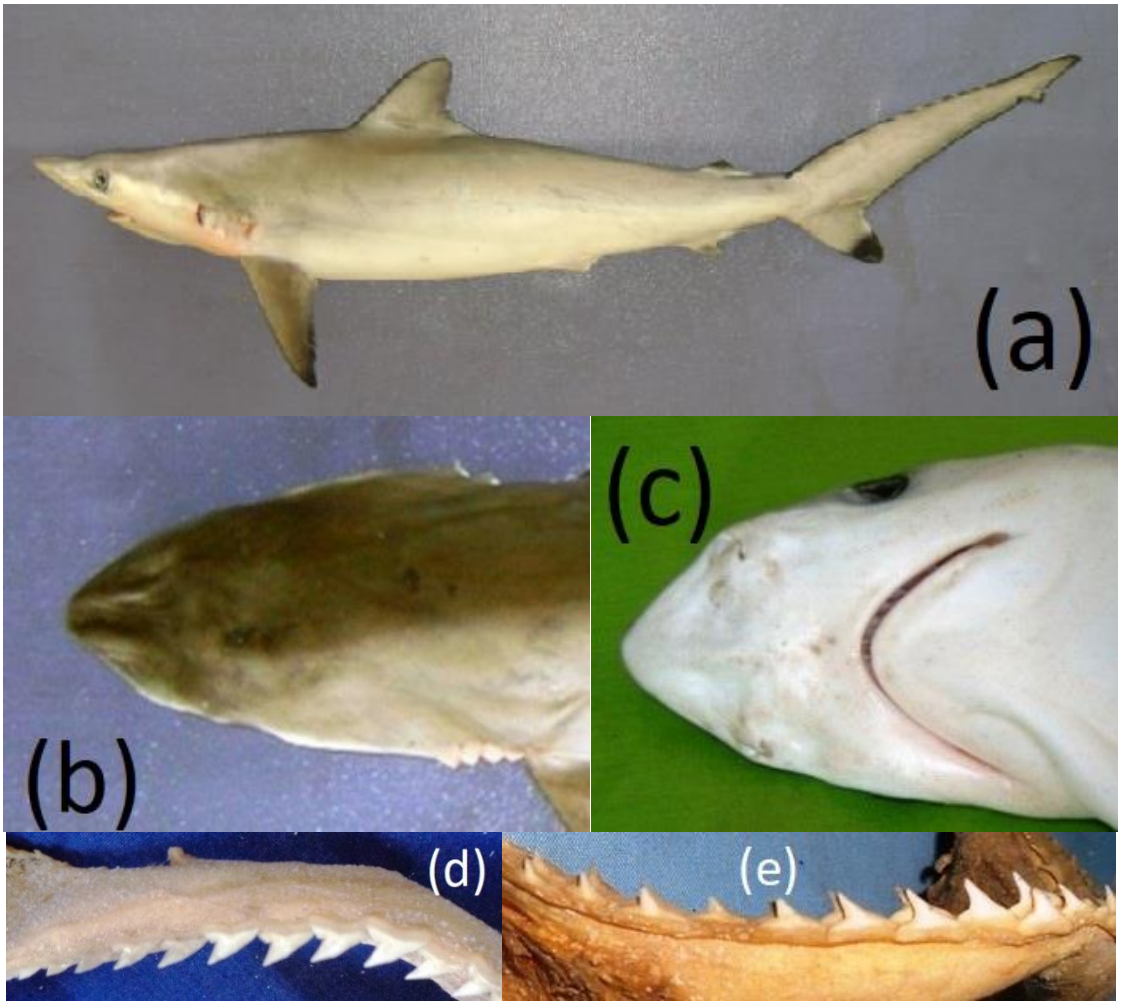


Fig.30. *Carcharhinus sorrah.* (a) lateral view; (b) head (dorsal view); (c) head (ventral view); (d) teeth (upper jaw); (f) teeth (lower jaw).

It is commonly known as spottail shark and locally known as "Karpic", "Karaint" or "Kayon"in Sindh and "Kanaitar" in Balochistan. It was reported from Sindh by Compagno (1984d), Misra (1962) and Sorley (1932) and from Balochistan by Compagno (1984d), Qureshi (1952) and Zugmayer (1913). It was reported from Pakistan without mentioning any specific location byAhmad and Niazi (1975), Bianchi (1985), Brandhorst and Crockett (1994), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969),Psomadakis, *et al.*, (2015) and Qureshi (1972).

Hussain (2003) and Jalil and Khaliluddin (1972, 1981) referred this species as *Eulamia spallanzani*, Sorley (1932) as *Carcharias sorrah* whereas Ahmad and Niazi (1975), Khan and Quadri (1986) and Misra (1969) listed it as *Carcharhinus spallanzani* and Zugmayer (1913) mentioned it as *Lamna spallanzanii*.Ahmad and Niazi (1975), Hoda (1985), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Misra (1969) and Qureshi (195b, 1972) referred this species as *Carcharhinus bleekeri*.

This species has Indo-West Pacific distribution in Red Sea, East Africa, South Africa, Persian Gulf, Seychelles, Madagascar and western Mascarenes east to Solomon Islands and northern Vanuatu, north to Taiwan, south to New

South Wales (Australia) and New Caledonia (Froese and Pauly, 2020).According to Notarbartolo-di-Sciara and Jabado (2021) it is a medium-sized shark which is widely distributed in the Indo-West Pacific region (including Arabian Sea). It occurs in coastal and shelf waters.

Galeocerdo cuvier **(**Peron and LeSueur, 1822)
(Fig.31)

Material Examined

- 1 specimen collected on 10 November 2008 from Karachi Fish Harbour (178 cm TL)
- 1 specimen collected on 16 November 2008 from Karachi Fish Harbour (169 cm TL)
- 1 specimen collected on 17 December 2008 from Karachi Fish Harbour (232 cm TL)
- 1 specimen collected on 18 December 2012 from off Sindh Coast (139 cm TL)
- 1 specimen collected on 8 May 2013 from Karachi Fish Harbour (95 cm TL)

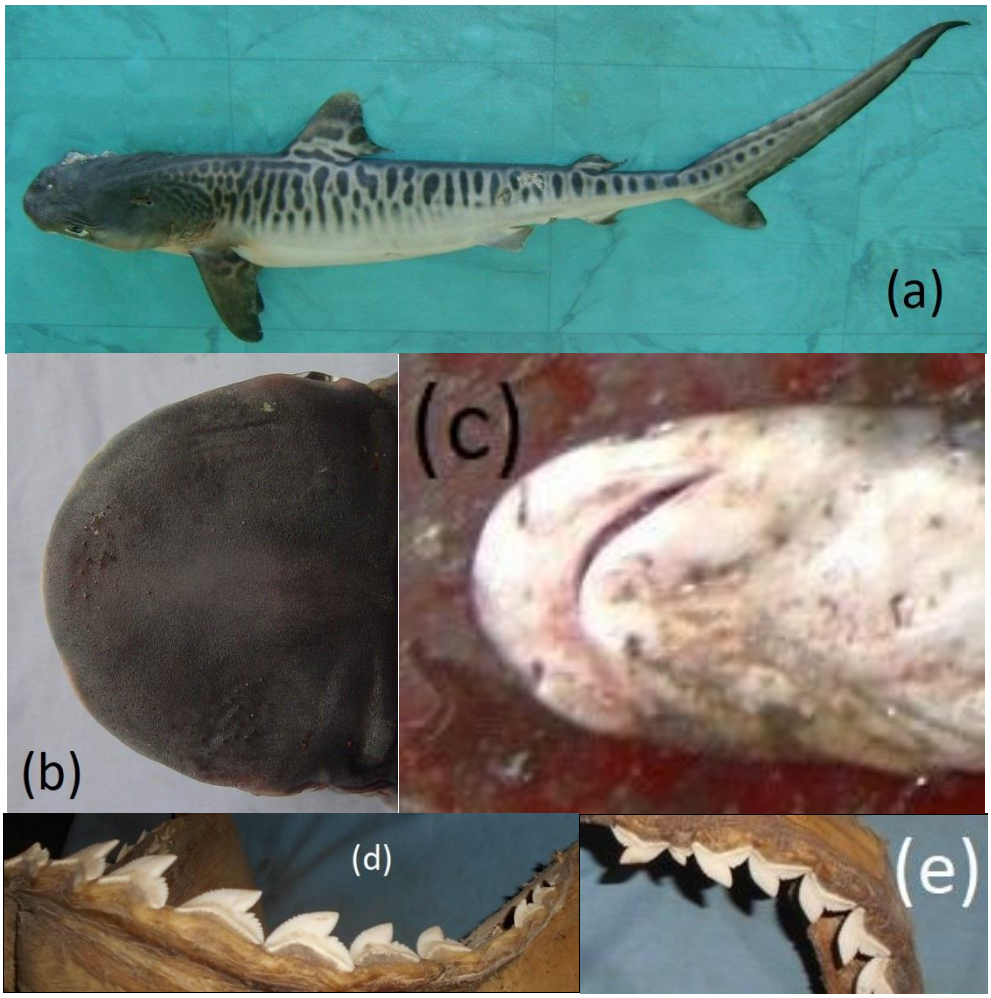


Fig. 31.*Galeocerdo cuvier*.(a) lateral view; (b) head (dorsal view); (c) head (ventral view); (d) teeth (upper jaw); (f) teeth (lower jaw).

This species is commonly known as tiger shark and locally called “Kar” or “Kari”in Sindh and “Nar-mani”in Balochistan. It was reported from Sindh by Anonymous (1955) and Compagno (1984b, 1984d), from Karachi by Anonymous (1955, 1999), Day (1878) and Qureshi (1952), from Balochistan by Compagno (1984b, 1984d) and Niazi (1994) and from Makran coast by Anonymous (1955), Fowler (1941) and Zugmeyer(1913), It was reported from Pakistan without mentioning any specific location by Ahmad and Niazi (1975, 1988), Ali (2002), Bianchi (1985), Brandhorst and Crockett (1994), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and

Khaliluddin (1972, 1981), Khan and Quadri (1986), Qureshi (1972), Misra (1969), Psomadakis, *et al.,* (2015), Qureshi (1952, 1953) and Siddiqi (1956).

Ahmad and Niazi (1975, 1988), Ali (2002), Bianchi (1985), Brandhorst and Crockett (1994), Compagno (1984b, 1984d), Fowler (1941), Hoda (1985, 1988), Hussain (2003), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Qureshi (1972), Niazi (1994), Siddiqi (1956) and Qureshi (1952, 1953) referred this species as *Galecerdo arcticus.* Anonymous (1955) and Day (1878) memtioned it as *Galeocerdo rayneri.* Zugmayer (1913) referred this species as *Galeocerda tigrinus* and Anonymous (1999) called it as *Carcharias fasciatus.*

This species has a circumglobal distribution in tropical, temperate and subarctic seas and vagrant in Mediterranean Sea (Eschmeyer, 2020). In the Indo-Pacific area it is known from Persian Gulf, Red Sea and East Africa to Hawaii and Tahiti, north to southern Japan, south to New Zealand. It is one of the highly migratory species and Annex I of the 1982 Convention on the Law of the Sea (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is one of the world's largest predatory sharks which has wide distribution in the shelf habitats in the circumtropical area. It is known to make extensive migratorymovements.

Glyphis gangeticus (Muller and Henle, 1839)

Material Examined

- None

This species is commonly known as Ganges shark and called "Gwareen"in Balochistan. It was reported from Sindh by Compagno (1984b, 1984d), Garrick (1982), Misra (1962) and Sorley (1932), from Karachi by Day (1878, 1889), Froese and Pauly (2020), Günther (1883), Mould (1997) and Murray (1880, 1887b), from Balochistan by Compagno (1984b, 1984d) and Zugmayer (1913). It was reported from Pakistan without mentioning any specific location by Ahmad and Niazi (1975), Bianchi (1985), Garrick (1982), Froese and Pauly (2020), Hoda (1985, 1988), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.,* (2015), Qureshi (1953) and Talwar and Jhingran (1991).

Carcharias murrayi Günther, 1883 that was reported from Karachi is considered as a synonym of this species (Compagno, 1984b), Garrick, (1982). Hoda (1988), Mould (1997), Sorley (1932) and Talwar and Jhingran (1991) recrded this species as *Carcharias gangaticus* whereas Ahmad and Niazi (1975), Hoda (1985), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Misra (1962, 1969) and Qureshi (1953) reported it as *Carcharhinus gangaticus*. Day (1878, 1889), Gunther (1883), Murray (1887b) and Zugmayer (1913) reported this species as *Carcharias murrayi* and by Murray (1880) as *Carcharias gangeticus.* Fowler (1941) considered *Carcharias murrayi* to be a synonym of this species whereas Mould (1997) considered *Carcharias murrayi* to be a synonym of *Carcharhinus leucas.* According to Compagno (1984g) and Eschmeyer (2020), *Carcharias murrayi* is a synonym of *Glyphis gangeticus* which is being adopted here.

This species is reported from Northern Indian Ocean including Pakistan (vicinity of Karachi) and India east to Bangladesh, West Bengal (Hooghly River, Ganges system), Myanmar and Taiwan (Eschmeyer, 2020; Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a rarely occurring large Indo-West Pacific shark confined to freshwater, estuarine, and coastal habitats including Arabian Sea.

There is no doubt that the Ganges sharks used to occurring in Pakistan but never common. No specimen of this species was observed, though monitoring of shark catch is being done for past 50 years in all major fish harbours. It seems that it is already locally extinct. Monitoring has also been done in Indus estuarine area and also in lower reaches of the River Indus

Lamiopsis temmincki (Muller and Henle, 1839)

Material Examined

- None

This species is commonly called broadfin shark. It is known as "Bhussa" in Sindh and "Gussi"or "Gusso"in Balochistan. It was reported from Pakistan by Bianchi (1985), Compagno (1984b, 1984d), Froese and Pauly (2002),

Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Mould (1997), Psomadakis, *et al.*, (2015) and Talwar and Jhingran (1991).

This species is known from Northern Indian Ocean including India east to Myanmar (Eschmeyer, 2021). According to Notarbartolo-di-Sciara and Jabado (2021) it is a rarely occurring, medium-sized and inshore shark possibly endemic to the northwest Indian Ocean including Arabian Sea.

Loxodon macrorhinus Muller and Henle, 1839

Material Examined

- None

This species is commonly knonw as sliteye shark. It is called "Gorrait"or "Khant"in Sindh and "Tailago"in Balochistan. It was reported from Pakistan by Bianchi (1985), Compagno (1984b, 1984d), Froese and Pauly (2002), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015) and Psomadakis, *et al.*, (2015).

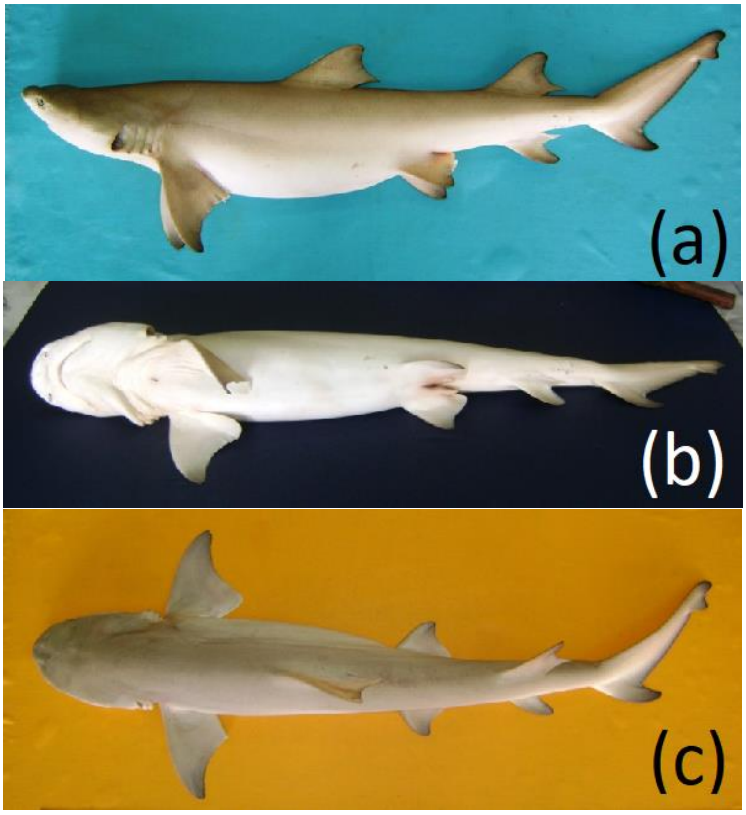
It is known from Indo-West Pacific area including Red Sea, East Africa, South Africa, Seychelles, Madagascar, western Mascarenes and Persian Gulf east to New Ireland (Papua New Guinea), north to southern Japan, south to northern Australia (Eschmeyer, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a small coastal shark widely occurring across the Indo-West Pacific including Arabian Sea.

Negaprion acutidens (Ruppell, 1837)

(Fig.32)

Material Examined

- 1 specimen collected on 06 November 2008 from Karachi Fish Harbour (78 cm TL)
- 1 specimen collected on 17 May 2013 from Karachi Fish Harbour (76 cm TL)
- 1term foetus collected on 25 May 2013 from Karachi Fish Harbour (52 cm TL)
- 1 specimen collected on 30 May 2013 from Karachi Fish Harbour (70 cm TL)
-



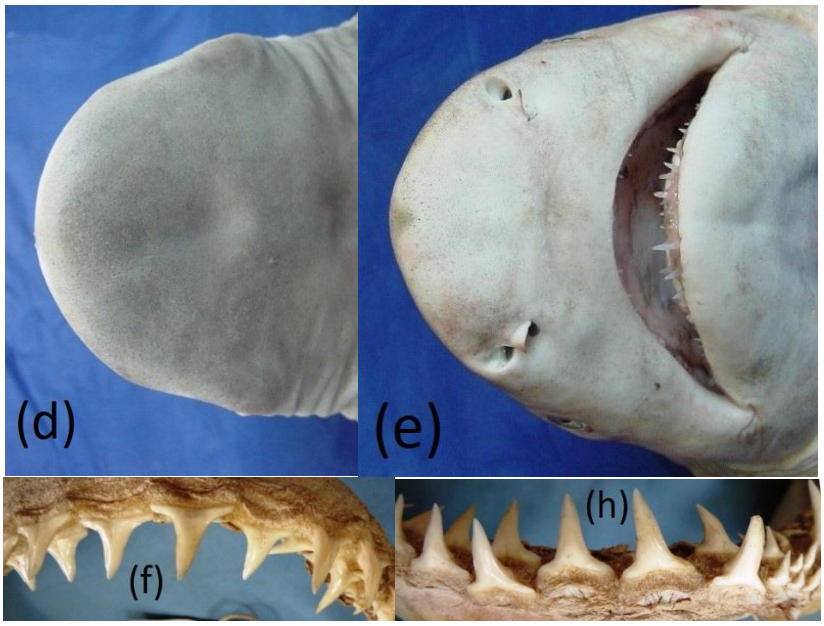


Fig. 32. *Negaprion acutidens.* (a) lateral view; (b) ventral view; (c) dorsal view; (d) head (dorsal view); (e) head (ventral view); (f) teeth (upper jaw); (g) teeth (lower jaw).

This species is commonly known as sicklefin lemon shark. It is locally known as "Ham"or "Safaid Ham" in Sindh and "Jagri ham"in Balochistan. It was reported from Sindh by Anonymous (1955), Compagno (1984b, 1984d) and Day (1878, 1889), from Karachi by Anonymous(1955, 1999), from Balochistan by Compagno (1984b, 1984d), from Gwader by Zugmayer (1913) and from Makran coast by Anonymous (1955), Qureshi (1952) and Zugmayer (1913).).It was reported from Pakistan without mentioning any specific location by Ahmad and Niazi (1975), Bianchi (1985), Day (1876, 1889), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.*, (2015), Qureshi (1953) and Siddiqi (1956).

This species is known from Indo-West Pacific area including Red Sea, East Africa, South Africa, Seychelles, Madagascar, Mauritius (Mascarenes) and Persian Gulf east to Marshall Islands and Society Islands, north to Ryukyu Islands, south to Rottnest Island (Western Australia), Queensland (Australia), Chesterfield Islands and New Caledonia (Eschmeyer, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a large inshore shark which is widely distributed across the Indian and West/Central Pacific Oceans including Arabian Sea.

Prionace glauca (Linnaeus, 1758)
(Fig. 33)

Material Examined

- 1 specimen collected on 05 November 2014 from Karachi Fish Harbour (324 cm TL)

This species is commonly known as blue shark and locally known as "Naqli aar" in Sindh and "Nar manger"in Balochistan. It was reported from Pakistan byAhmad and Niazi (1975), Compagno (1984b, 1984d), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986) and Psomadakis, *et al.*, (2015).

This species has circumglobal distribution in temperate and tropical waters. In the Indo-West Pacific are it is known from East Africa to Indonesia, Japan, Australia, New Caledonia, and New Zealand (Froese and Pauly 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a large pelagic shark having a cosmopolitan distributionin temperate andtropic latitudes including Arabian Sea. It is considered to be the widest ranging chondrichthyian (Froese and Pauly, 2020). It is considered as a highly migratory species and included in the Annex I of the 1982 Convention on the Law of the Sea. It is one of rarely occurring shark in Pakistan.

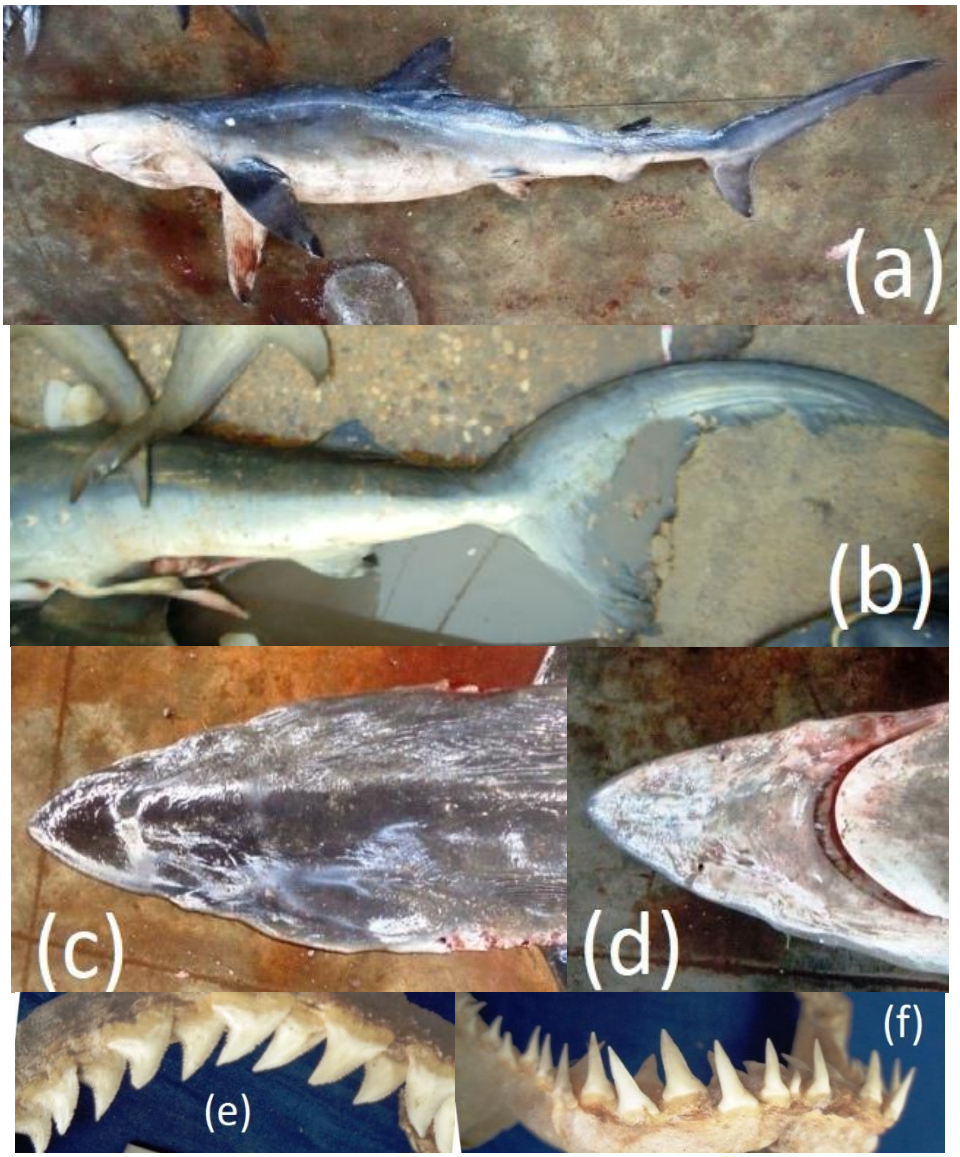


Fig. 33. *Prionace glauca.* (a) lateral view; (b) tail (lateral view); (c) head (dorsal view); (d) head (ventral view); (e) teeth (upper jaw); (f) teeth (lower jaw).

Rhizoprionodon acutus (Ruppell, 1837)
(Fig. 34)

Material Examined

- 1 specimen collected on 19 November 2013 from Karachi Fish Harbour (57 cm TL)
- 1 specimen collected on 07June 2014 from Karachi Fish Harbour (61 cm TL)
- 1 specimen collected on 24August 2015 from Karachi Fish Harbour (59 cm TL)
- 1 specimen collected on 11January 2019 from Karachi Fish Harbour (69 cm TL)

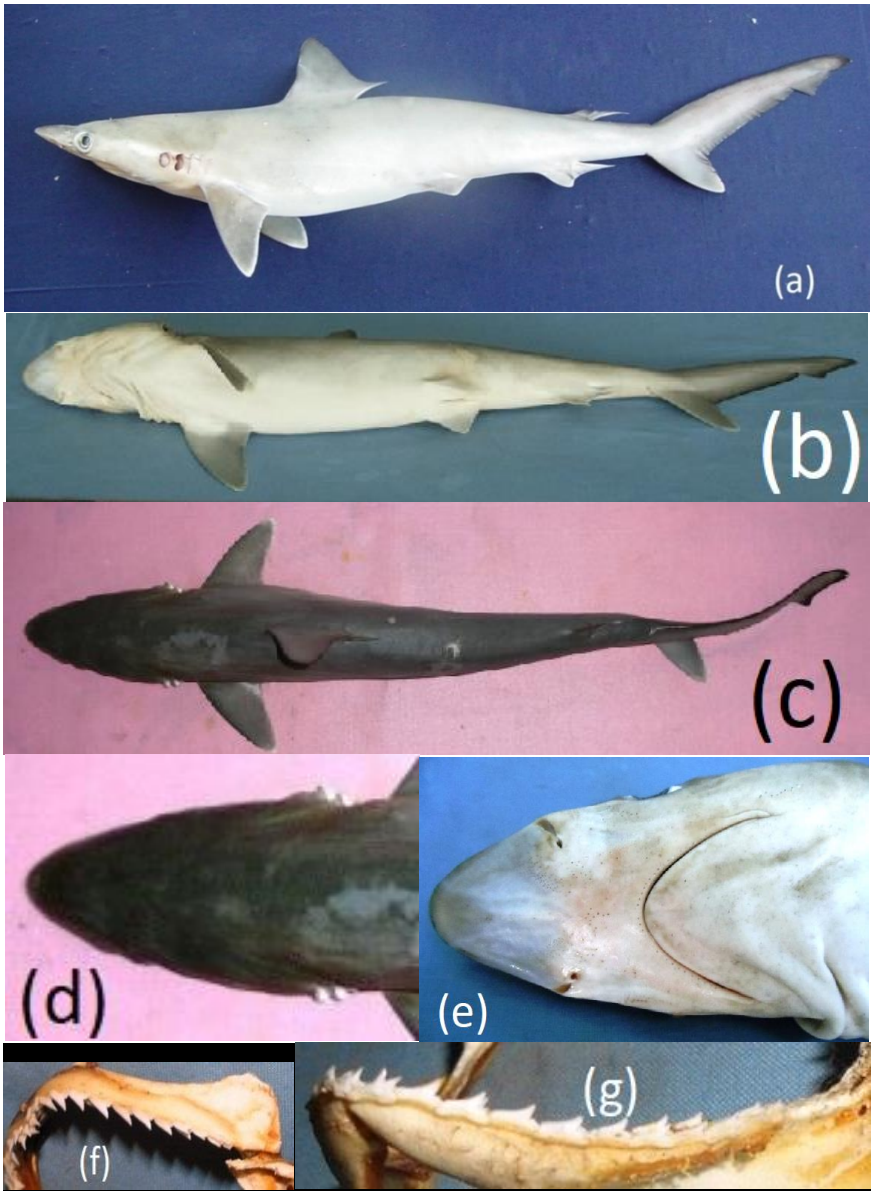


Fig. 34.*Rhizoprionodon acutus*.(a) lateral view; (b) ventral view; (c) dorsal view; (d) head (dorsal view); (e) head (ventral view); (f) teeth (upper jaw); (g) teeth (lower jaw).

This species is commonly known as milk shark and locally known as "Saik" and "Gole" in Sindh and "Sorapi pishik" in Balochistan. It was reported from Sindh by Ahmad *et al* (1973), Compagno (1984b, 1984d), Misra (1962) and Sorley (1932), from Karachi by Anonymous (1999), Ahmad *et al.* (1973) and Niazi, 2001), from Balochistan by Compagno (1984b, 1984d) and Niazi (1994), from Makran coast by Ahmad *et al.*(1973), Fowler (1941) and Zugmeyer (1913). It was reported from Pakistan without mentioning any specific location byAhmad and Niazi (1988), Ali (2002), Bianchi (1985), Froese and Pauly (2002), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Psomadakis, *et al.*, (2015) and Qureshi (1953, 1972).

Sorley (1932) and Zugmayer (1913) reported this species as *Carcharias acutus* whereas Fowler (1941), Hussain (2003), Qureshi (1953, 1972) listed it as *Scoliodon palasorrah* andAhmad and Niazi (1975), Ahmad *et al* (1973), Hoda (1985), Hussain (2003), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1962) and Qureshi (1972) referred this species as *Scoliodon walbeehmi*.

This is circumglobal species which is found in tropical through warm temperate seas. From Indo-West Pacific area it is known from Persian Gulf, Red Sea and East Africa to Indonesia, north to Japan, south to Australia. According to Notarbartolo-di-Sciara and Jabado (2021) it is a medium-sized inshore shark widely distributed throughout the tropical Indian Ocean and West Pacific area including Arabian Sea. It is a commercially important species is usually market alongwith other small sharks such as *Scoliodon laticaudus*, *Rhizoprionodon oligolinx* and *Iago spp.*

Rhizoprionodon oligolinx Springer, 1964
(Fig.35)

Material Examined

- 1 specimen collected on 19 November 2013 from Karachi Fish Harbour (57 cm TL)
- 1 specimen collected on 07 June 2014 from Karachi Fish Harbour (61 cm TL)

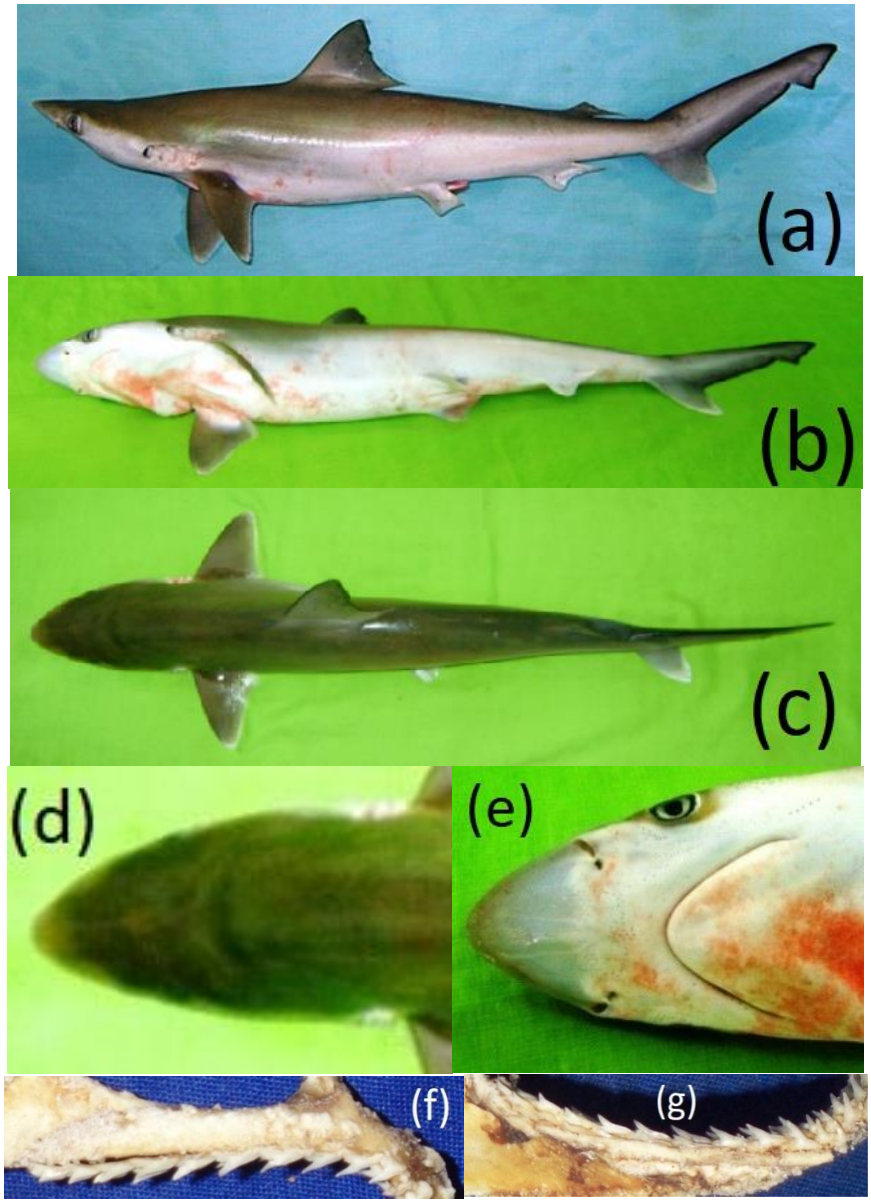


Fig. 35. *Rhizoprionodon oligolinx*. (a) lateral view; (b) ventral view; (c) dorsal view; (d) head (dorsal view); (e) head (ventral view); (f) teeth (upper jaw); (g) teeth (lower jaw).

This species is commonly known as grey sharpnose shark and locally know as "Golden" in Sindh and "Tailago pishik" in Balochistan. It was reported from Sindh by Ahmad *et al.* (1973), Compagno (1984b, 1984d) and Misra (1962) It was reported from Hawksbay, Karachi by Anonymous (1993), from Karachi by Ahmad *et al.*(1973) and Anonymous(1993), from Paradise Point, Karachi by Moazzam and Rizvi (1980), from Balochistan by Compagno (1984b, 1984d) and Niazi (1994) and from Makran by Ahmad *et al,* (1973) and Fowler (1941). It was reported from Pakistan without mentioning any specific location byAhmad and Niazi (1975, 1988), Bianchi (1985), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.,* (2015) and Qureshi (1953, 1972).

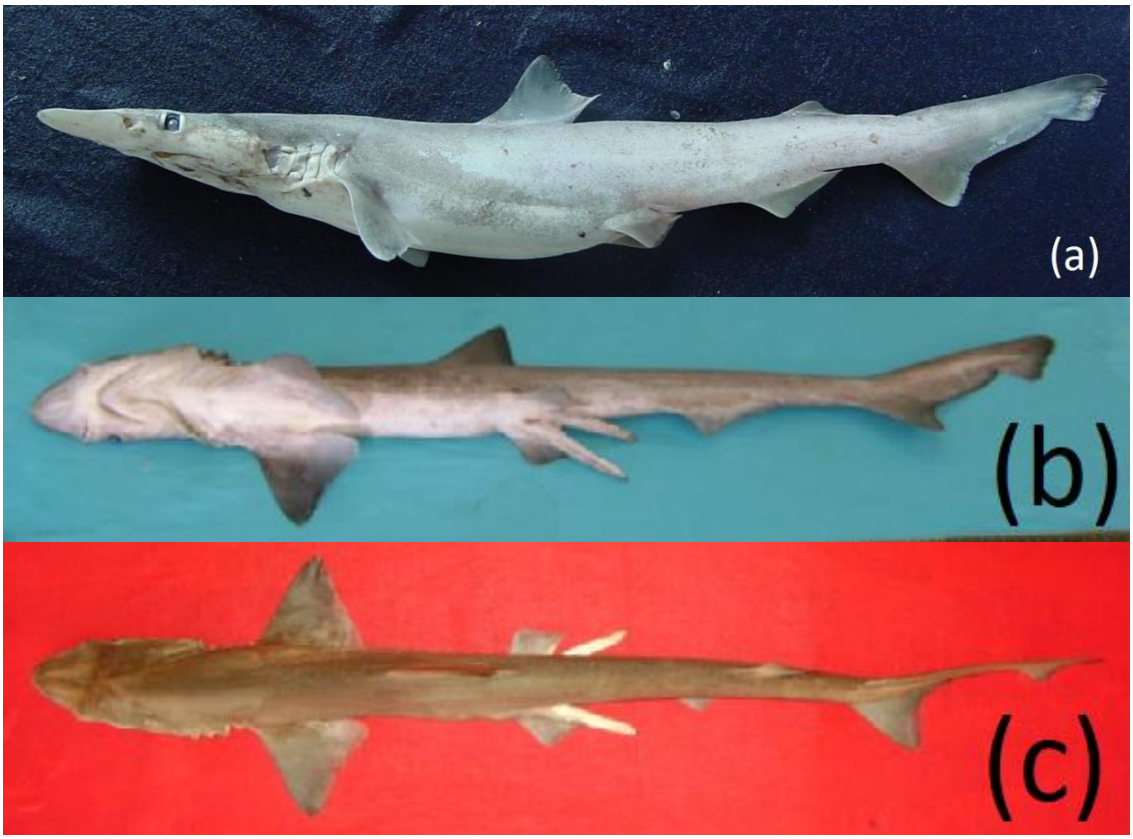
Ahmad and Niazi (1975), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Moazzam and Rizvi (1980), Niazi (1994) and Qureshi (1953, 1972) reported this species as *Scoliodon palasorrah* whereas Ahmad and Niazi (1975), Ahmad *et al.* (1973), Fowler (1941), Hussain (2003), Jalil and Khaliluddin (1971, 1981), Khan and Quadri (1986) and Misra (1962, 1969) listed this species as *Scoliodon sorrakowah.*

This species is reported from Indo-West Pacific including Persian Gulf east to Gulf of Thailand, Indonesia, China, and Japan; south to AustraliaGulf of Carpentaria and Palau (Eschmeyer, 2020; Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a small inshore shark widespreadin the Indo-WestPacific area including Arabian Sea. It is a commercially important species is usually market alongwith other small sharks such as *Scoliodon laticaudus, Rhizoprionodon acutus* and *Iago spp.*

Scoliodon laticaudus Muller and Henle, 1838
(Fig. 36)

Material Examined

- 1 specimen collected on 20 May 2013 from Karachi Fish Harbour (50 cm TL)
- 1 specimen collected on 11 April 2017 from Karachi Fish Harbour (49 cm TL)



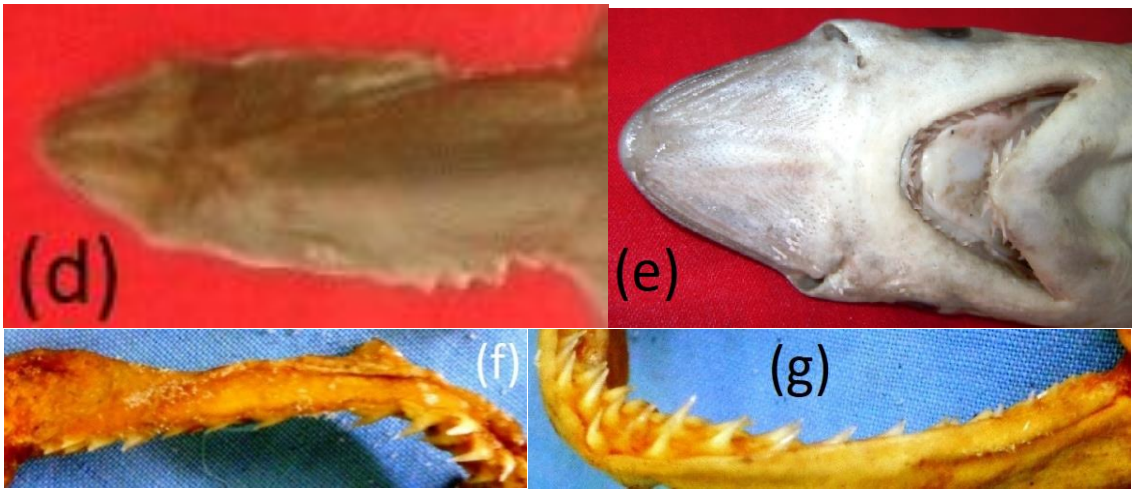


Fig. 36. *Scoliodon laticaudus.* (a) lateral view; (b) ventral view; (c) dorsal view; (d) head (dorsal view); (e) head (ventral view); (f) teeth (upper jaw); (g) teeth (lower jaw).

This species is commonly known as spadenose shark and it is locally known as "Bamboli","Pambi","Bambi", "Dun-da-nee" in Sindh and "Bambhol" in Balochistan. It was reported from Sindh by Compagno (1984b, 1984d), Day (1878, 1889) and Sorley (1933), from Goth Jafar near Karachi by Anonymous (1993), from Hawksbay Karachi by Anonymous (1993), from off Karachi by Anonymous (1993) and Niazi (2001), from Balochistan by Compagno (1984b, 1984d) and Niazi (1994) and from Mekran by Fowler (1941) and Zugmeyer, 1913). It was reported from Pakistan without mentioning any specific location byAhmad and Niazi (1975), Bianchi (1985), Froese and Pauly (2002), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1981), Khan and Quadri (1986), Psomadakis, *et al.*, (2015) and Qureshi (1972).

Day (1878, 1889), Sorley (1933) and Zugmayer (1913) reported this species as *Carcharias laticaudus* whereas Ahmad and Niazi (1975), Fowler (1941), Jalil and Khaliluddin (1981), Khan and Quadri (1986) and Qureshi (1972) listed it as *Physodon mulleri* and Hoda (1985) and Zugmayer (1913) also referred it as *Carcharias mulleri.*

It is knonw from Indo-West Pacific area including Red Sea, East Africa, Somalia, Madagascar,Tanzania, Mozambique and Persian Gulf east to Pakistan to Java in Indonesia; then Japan, China, Taiwan, Japan and Australia (Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a small inshore shark widespread in the Indo-West Pacific including in the Arabian Sea. It is a commercially important species and is usually market alongwith other small sharks such as *Rhizoprionodon oligolinx*, *R. acutus* and *Iago spp.*

***Triaenodon obesus* (Ruppell, 1837)**

Material Examined

- None

This species is commonly known as white reef shark and locally called "Loan" in Sindh and Balochistan. It was reported from Sindh byAnonymous (1955), Compagno (1984b, 1984d), from Karachi by Anonymous (1955), Day (1878, 1889) and Qureshi (1952), from Balochistan by Compagno (1984b, 1984d) and Niazi (1994) and from Makran coast by Anonymous(1955). It was reported from Pakistan without mentioning any specific location byAhmad and Niazi (1975), Bianchi (1985), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.* (2015) and Qureshi (1952, 1953, 1972).

This species is reported from Indo-Pacific area including from Red Sea, East Africa, South Africa, Seychelles, Madagascar, Mascarenes and Persian Gulf east to Hawaiian Islands, north to Ryukyu Islands and Ogasawara Islands, south to New South Wales (Australia), Kermadec, Austral islands throughout Micronesia and eastern Pacific (Eschmeyer, 2020; Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a medium-sized reef shark widely distributed across the tropical Indian (including Arabian Sea), and Pacific Oceans usually associated with coral reef habitats.

Family Sphyrnidae

Members of family Sphyrnidae are known as hammerhead sharks and represented in Pakistan by 4 species - *Eusphyra blochii* (Cuvier, 1816), *Sphyrna lewini* (Griffith and Smith, 1834), *Sphyrna mokarran* (Ruppell, 1837) and *Sphyrna zygaena* (Linnaeus, 1758). Another species *Sphyrna tudes* (Valenciennes, 1822) has uncertain occurrence report from Pakistan.

Eusphyra blochii (Cuvier, 1816)
(Fig. 37)

Material Examined

- 1 specimen collected on 18 May 2014 from Karachi Fish Harbour (42 cm TL)

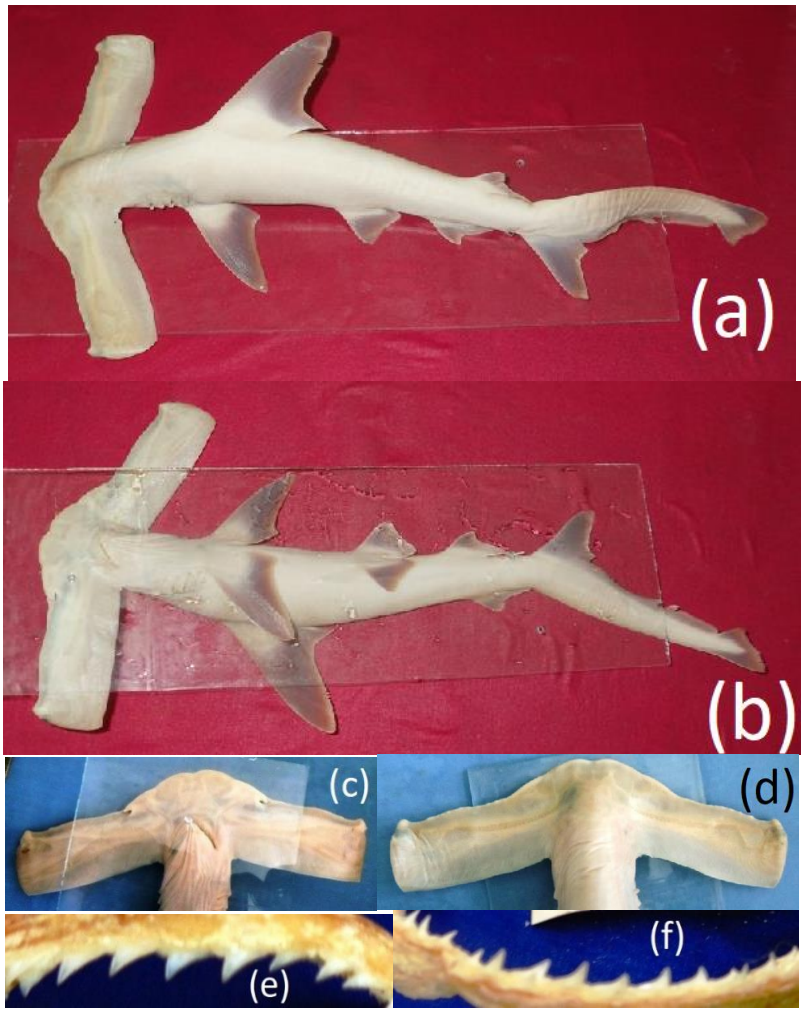


Fig. 37. *Eusphyra blochii*.(a) lateral view; (b) ventral view; (c) head (ventral view); (d) head (dorsal view); (e) teeth (upper jaw); (f) teeth (lower jaw).

This species is commonly known as winghead shark and locally called "Doka", "Dokan" or "bhuthri" in Sindh and "Alwandi", "Katial" (large size) or "Dokzi" in Balochistan. It was known from Sindh byAhmad *et al* (1973), Anonymous (1955), Compagno (1984b, 1984o, 1998), Misra (1962) and Sorley (1932), from Karachi by Ahmad *et al*..(1973), Anonymous (1955) and Misra, 1962) from Balochistan by Anonymous (1953) and Compagno (1984b, 1984o, 1998) and from Makran coast by Ahmad *et al*..(1973), Anonymous (1955), Misra (1962) and Qureshi (1952).It was reported from Pakistan without mentioning any specific location by Ahmad and Niazi (1975, 1988),

Ali (2002), Bianchi (1985), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1962), Psomadakis, *et al.,* (2015), Qureshi (1953, 1972) and Siddiqi (1956).

Eusphyra blochii has one of the most unique cranial morphologies of all the sphyrnids because their hammer has immensely board and narrow lateral blades that are nearly half of its total length (Brennan, 2020). This species is reported from Indo-West Pacific area Persian Gulf east to Philippines, north to China, south to northern Australia (Eschmeyer, 2020; Froese and Pauly, 2020; Bewnnan, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a medium-sized shark which is found over shelf habitat in the Indo-WestPacific including Arabian Sea. It is known to inhabit tropical shallow waters over the continental and insular shelf (Brennan, 2020; Gilbert 1967).

Sphyrna lewini (Griffith and Smith, 1834)
(Fig. 38)

Material Examined

- 1 specimen collected on 31 December 2012 from Karachi Fish Harbour (136 cm TL)
- 1 specimen collected on 17 April 2014 from Karachi Fish Harbour (220 cm TL)
- 1 specimen collected on 23 may 2014 from Karachi Fish Harbour (270 cm TL)
- 1 specimen collected on 16 June 2015 from Karachi Fish Harbour (60 cm TL)

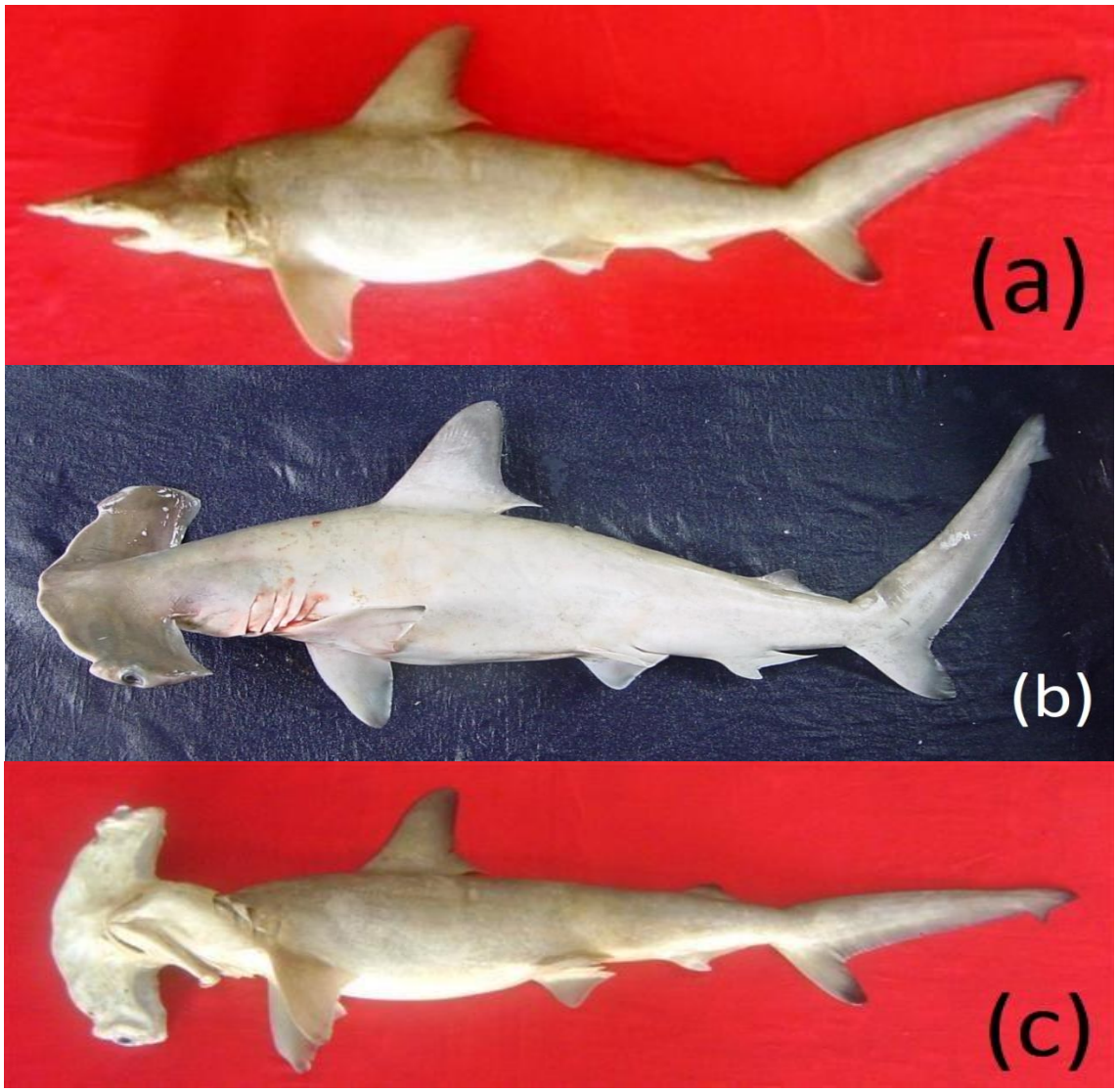


Fig. 38. *Sphyrna lewini*. (a) lateral view; (b) dorsal view; (c) ventral view; (d) teeth (upper jaw); (e) teeth (lower jaw).

This species is commonly known as scalloped hammerhead and locally it is called "Buthar", "Katiar" (large size) or "Rocket" (large size) in Sindh and"Bhuthar", "Alwandi", "Katial" (large size), "Maish" (large size) and "Kanti" (Juveniles) in Balochistan. It was reported from Sindh by Compagno (1984b, 1984o) and Sorley (1932) and from Balochistan by Compagno (1984b, 1984o) and Zugmayer (1913). It was also reported from Pakistan without mentioning any specific location by Ahmad and Niazi (1975), Bianchi (1985), Brandhorst and Crockett (1994), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986) and Psomadakis, *et al.* (2015). Sorley (1933) and Zugmayer (1913) reported this species as *Zygaena malleus* which is a synonym of this species.

It is circumglobal species known from tropical and warm temperate seas. In the Indo-Pacific area it is known from Persian Gulf, Red Sea, East Africa and throughout the Indian Ocean; Japan to New Caledonia, Hawaii and Tahiti (Eschmeyer, 2020; Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a large circumtropical shark found from shelf to deep slope habitat including in the Arabian Sea.

It is caught mainly by tuna gillnet vessel and considering its dwindling stocks it is included in Appendices-II of CITES (restriction on trade) and CMS (migratory species conserved through agreements. It is considered as a highly migratory species and included in the Annex I of the 1982 Convention on the Law of the Sea.

Sphyrna mokarran (Ruppell, 1837)
(Fig. 39)

Material Examined

- 1 specimen collected on 08May 2013 from Karachi Fish Harbour (258 cm TL)
- 1 specimen collected on 18 April 2014 from Karachi Fish Harbour (220 cm TL

This species is commonly known as great hammerhead and locally it is called "Buthar", "Katiar" (large size) or "Rocket" (large size) in Sindh and "Bhuthar", "Alwandi", "Katial" (large size), "Maish" (large size) and "Kanti" (juveniles) in Balochistan. It was reported from Sindh by Compagno (1984b, 1984d), from Karachi by Day (1878, 1889), Fowler (1941), Gilbert (1967), Murray (1887b) and Punwani (1934) and from Balochistan by Compagno (1984b, 1984d), Fowler (1941) and Zygmayer (1913). It was also reported from Pakistan without mentioning any specific location by Ahmad (1988), Ahmad and Niazi (1975), Bianchi (1985), Brandhorst and Crockett (1994), Froese and Pauly (2020), Hoda (1985, 1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Mould (1997) and Psomadakis, *et al.* (2015). *Zyganea dissimilis* was described by Murray (1887a) from Karachi which is considered to be synonym of this species (Gilbert, 1967; Mould, 1997).

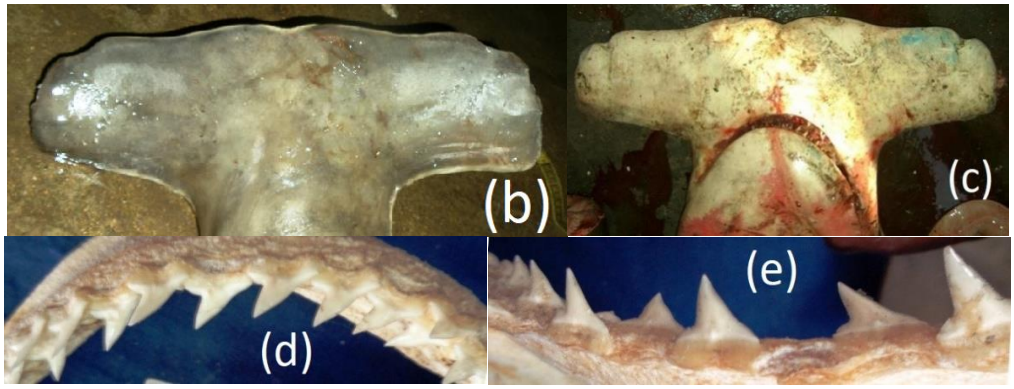


Fig. 39. *Sphyrna mokarran*. (a) lateral view; (b) head (dorsal view); (c) head (ventral view); (d) teeth (upper jaw); (e) teeth (lower jaw).

This species has circumglobal distribution in coastal warm temperate and tropical seas. In the Indo-Pacific area it is distributed throughout the Indian Ocean; Ryukyu Islands to New Caledonia and French Polynesia (Eschmeyer, 2020; Froese and Pauly, 2020). According to Notarbartolo-di-Sciara and Jabado (2021) it is a one of the world's largest predatory shark, circumtropical (including in the Arabian Sea),mostly limited to shelf habitat

It is caught mainly by tuna gillnet vessel and considering its dwindling stocks it is included in Appendices-II of CITES (restriction on trade) and CMS (migratory species conserved through agreements. It is considered as a highly migratory species and included in the Annex I of the 1982 Convention on the Law of the Sea.

Sphyrna tudes (Valenciennes, 1822)

Material Exmined

- None

This species which is commonly known as amalleye hammerhead was recorded from Sindh byAhmad *et al.* (1973), Anonymous (1955), Misra (1962) and Sorley (1932), from Karachi by Ahmad *et al.*.(1973), Anonymous (1955) and Misra (1962), from Balochistan by Zugmayer (1913) and from Makran coast by Ahmad *et al.*(1973), Anonymous (1955), Fowler (1941), Misra (1962) and Qureshi (1952). It was reported from Pakistan without mentioning any specific location byAhmad and Niazi (1975), Ahmad *et al.* (1973), Hoda (1985, 1988), Hussain (2003), Khan and Quadri (1986), Misra (1962) and Qureshi (1953, 1972).

Records of occurrence of *Sphyrna tudes* in Pakistan seems erroneous and possibly these are based on misidentification of *Sphyrna mokarran*. This species can typically be found throughout the Caribbean and South American coastal oceans. This species is extant to Brazil, French Guiana, Guyana, Suriname, Trinidad and Tobago, Uruguay, Venezuela and Mediterranean Sea (Brennan, 2020; Eschmeyer, 2020). There is no authentic record of this species from Arabian Sea including Pakistan coast.

Sphyrna zygaena (Linnaeus, 1758)
(Fig. 40)

Material Examined

- 1 specimen collected on 18 May 2014 from Karachi Fish Harbour (44 cm TL)
- 1 specimen collected on 11August 2017 from Karachi Fish Harbour (76 cm TL)

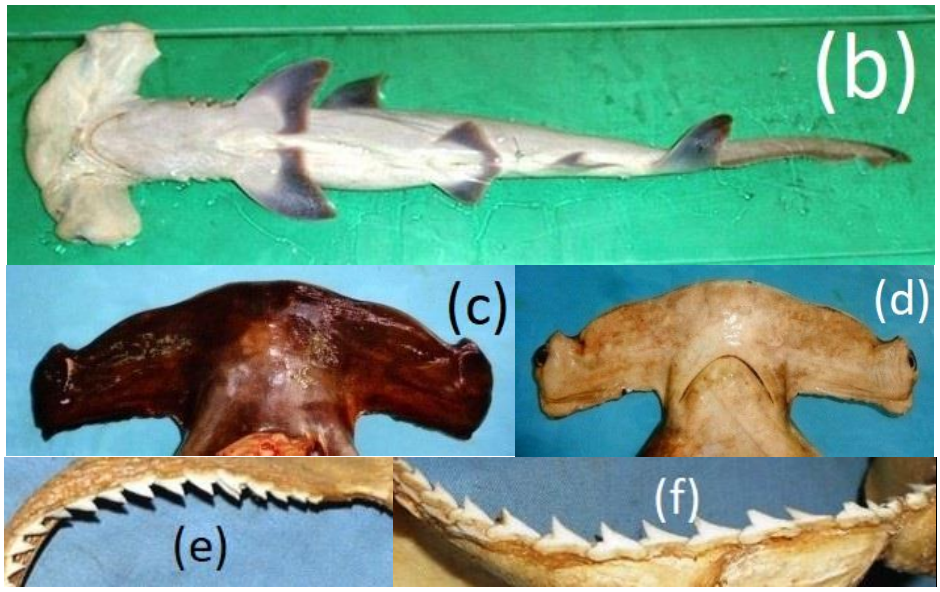


Fig. 40. *Sphyrna zygaena*.(a) lateral view; (b) ventral view; (c) head (dorsal view); (d) head (ventral view); (e) teeth (upper jaw); (f) teeth (lower jaw).

This species is commonly known as smooth hammerhead and locally it is called "Buthar", "Katiar" (large size) or "Rocket" (large size) in Sindh and"Bhuthar", "Alwandi", "Katial" (large size), "Maish" (large size) and "Kanti" (juveniles) in Balochistan. It was recorded from Sindh by Anonymous (1955) and Murray (1880), from Karachi by Anonymous (1955) and Misra (1962). It was also reported from Pakistan without mentioning any specific location byAhmad and Niazi (1975), Hoda (1988), Hussain (2003), Jabado and Ebert (2015), Jalil and Khaliluddin (1972, 1981), Khan and Quadri (1986), Misra (1969), Psomadakis, *et al.*, (2015), Qureshi (1953, 1972) and Siddiqi (1956).

This species has a circumglobal distribution in warm temperate seas and occasionally in tropical seas. From Indo-Pacific area it is known from South Africa to Sri Lanka; southern Siberia to Vietnam, southern Australia, New Zealand, and Hawaii. According to Notarbartolo-di-Sciara and Jabado (2021) it is a large shark widely spread intropical and warm temperate waters worldwide including Arabian Sea. It is not uncommon from on shelf to deep slope habitat.

It is caught rarely by tuna gillnet vessel and considering its dwindling stocks it is included in Appendix-II of CITES (restriction on trade).

DISCUSSION

Sharks are important component of the coastal and offshore fisheries of Pakistan. A total of 79 species of sharks belonging to Infraclass Selachii (Subclass: Elasmobranchii) and 6 orders are recorded from Pakistan. Order Carcharhiniformes was observed to be most prolific taxon represented by 48 species belonging to 6 families (Table 1). Commercially important genus *Carcharhinus* is represented 18 species whereas genus *Chiloscyllium* by 5 species, genus *Sphyrna* by 4 species and genus *Alopias* by 3 species whereas other genera are represented by either 2 or 1 species.

Table 1. Species of sharks occurring in Pakistan.

Order	Family	Species
Squaliformes (8)	Echinorhinidae (1)	*Echinorhinus brucus*
	Dalatiidae (3)	*Centroscyllium ornatum*
		Heteroscymnoides marleyi
		Squaliolus laticaudus
	Squalidae (1)	*Squalus mitsukurii*
	Somniosidae (1)	*Centroscymmus crepidater*
	Centrophoridae (2)	*Centrophorus atromarginatus*

		Deania profundorum
	Etmopteridae (1)	*Etmopterus pusillus*
Pristiophoriformes (2)	Pristiophoridae (2)	*Pristiophorus japonicas*
		Pristiophorus sp. D
Heterodontiformes (2)	Heterodontidae (2)	*Heterodontus omanensis*
		Heterodontus ramalheira
Orectolobiformes (13)	Hemiscyliidae (6)	*Chiloscyllium arabicum*
		Chiloscyllium griseum
		Chiloscyllium indicum
		Chiloscyllium plagiosum
		Chiloscyllium punctatum
		Chiloscyllium sp. A.
	Stegostomatidae (1)	*Stegostoma fasciatum*
	Gingymostomatidae (1)	*Nebrius ferrugineus*
	Rhicodontidae (1)	*Rhincodon typus*
	Odontaspidae (3)	*Odontaspis ferox*
		Carcharias taurus
		Carcharias tricuspidatus
	Pseudocarcharidae (1)	*Pseudocarcharias kamoharai*
Lamniformes (6)	Alopiidae (3)	*Alopias pelagicus*
		Alopias superciliosus
		Alopias vulpinus
	Laminidae (3)	*Carcharodon carcharias*
		Isurus oxyrinchus
		Isurus paucus
Carcharhiniformes (48)	Scyliorhinidae (5)	*Apristurus indicus*
		Atelomycterus marmoratus
		Bythaelurus alcocki
		Bythaelurus tenuicephalus
		Scyliorhinus capensis
	Proscylliidae (1)	*Eridacnis radcliffei*
	Triakidae (5)	*Hypogaleus hyugaensis*
		Iago omanensis
		Iagosp. A.
		Mustelus manazo
		Mustelus mosis
	Hemigaleidae (4)	*Chaenogaleus macrostoma*
		Hemigaleus microstoma
		Hemipristis elongatus
		Paragaleus randalli
	Caracharinidae (28)	*Carcharhinus altimus*
		Carcharhinus albimarginatus
		Carcharhinus amblyrhynchoides
		Carcharhinus amblyrhynchos
		Carcharhinus amboinensis
		Carcharhinus brevipinna

		Carcharhinus dussumieri
		Carcharhinus falciformis
		Carcharhinus hemiodon
		Carcharhinus humani
		Carcharhinus leucas
		Carcharhinus limbatus
		Carcharhinus longimanus
		Carcharhinus macloti
		Carcharhinus melanopterus
		Carcharhinus obscurus
		Carcahrhinus plumbeus
		Carcharhinus sorrah
		Galeocerdo cuvier
		Glyphis gangeticus
		Lamiopsis temmincki
		Loxodon macrorhinus
		Negaprion acutidens
		Prionace glauca
		Rhizoprionodon acutus
		Rhizoprionodon oligolinx
		Scoliodon laticaudus
		Triaenodon obesus
	Sphyrnidae (5)	*Eusphyra blochii*
		Sphyrna lewini
		Sphyrna mokarran
		Sphyrna zygaena
		Sphyrna tudes

Number in parenthesis are number of species of the taxon

Although diversified shark fauna is now known from Pakistan but there are a number of shark species who used to be commonly occurring in Pakistan but now extremely rare or may be locally extinct. Pondicherry shark (*Carcharhinus hemiodon*), Ganges shark (*Glyphis gangeticus*) and Indian sand tiger (*Carcharias tricuspidatus*) used to be common in Pakistan but now seem to be locally extinct as no confirmed record of their occurrence is available far the last about 40 years. The paper reviewed the historical records of shark species occurring in Pakistan resolving some of the issues in their taxonomy. *Carcharhinus melanopterus* used to be of common occurrence about 30 years back but no specimen was observed in commercial landings at Karachi Fish Harbour in last 15 years. Recently (July 8, 2021) posted a photograph of this species swimming at Churna Island on facebook (Fig. 41).

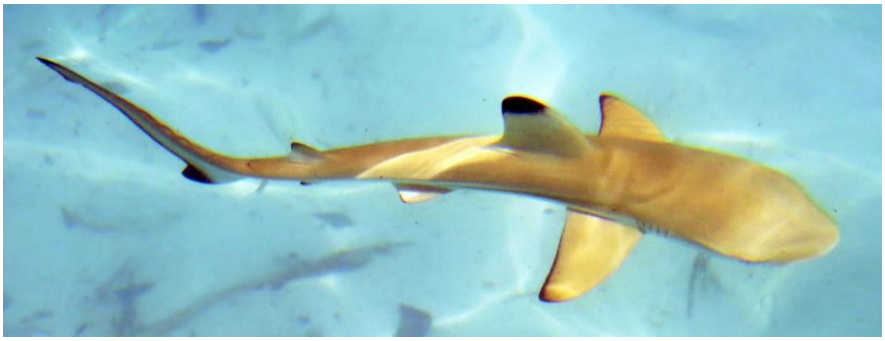


Fig. 41. Blacktip reef shark (*Carcharhinus melanopterus*) (July 8, 2021) posted a photograph of this species swimming at Churna Island on facebook by Akbar Ali Asif (published through courtesy of Akbar Ali Asif).

Notarbartolo-di-Sciara and Jabado (2021) has reviewed the species occurring of the Arabian Sea including Pakistan coast. They observed that a large number of shark species especially those found in deep sea waters have not been reported from Pakistan which is mainly because of limited surveys of the deep oceanic waters along Pakistan. Sharpnose seven gill shark *Heptranchias perlo* (Bonnaterre,1788) belonging to Order Hexanchiformes and Family Hexanchidae is one such species which is a small deepwater demersal shark known to be widely occuring in the Indo-Pacific region and Atlantic Ocean but not reported from Pakistan. This species may be occuring in Pakistan but no authentic record is avaiable.

Another species belong to same order and family *Hexanchus griseus* (Bonnaterre,1788) commonly known as bluntnose six gill shark which is a large deepwater demersal shark, in widely but disjunctly distributedin the world's temperate and tropical seas down to 2000 m of depth may occur in Pakistan. According to Notarbartolo-di-Sciara and Jabado (2021) it may occur in the Arabian Sea. Jabado and Ebert (2015) shown its distribution to the Sindh Coast. Present paper reviews almost all previus record of sharks from Pakistan and provided information about commercially important as well as rarely occurring species.

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