

FISHES OF FAMILY DIODONTIDAE, OSTRACIIDAE AND MOLIDAE FROM PAKISTAN COAST

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ABSTRACT

The occurrence of fishes of families Diodontidae (porcupinefishes), Ostraciidae (boxfishes) and Molidae (oceanic sunfishes) belonging to order Tetraodoniformes is reviewed. A total of 12 species were reported of which 4 species belonging to 2 genera belonged to Family Diodontidae, 6 species belonging to 3 genera belonged to Family Ostraciidae and 2 species belonging to 2 genera belonged to Family Molidae. Two species *Cylichthys spilostylus* (spotbase burrfish) and *Ostracion rhinorhynchos* (horn-nosed boxfish) are reported for the first time from Pakistan.

Keywords: Pakistan, Tetraodoniformes, porcupinefishes, boxfishes, oceanic sunfishes, *Cylichthys spilostylus*, *Ostracion rhinorhynchos*

INTRODUCTION

Families Diodontidae, Ostraciidae and Molidae belong to order Tetraodontiformes which comprises of approximately 350 species worldwide. The fishes of this order are known for their exceptional degree of diversity in morphological structure, shape, size, and the way of life. They are found in temperate and tropical marine waters in Atlantic, Indian and Pacific Oceans. Most members of this order have bodies and the gill plates covered over with skin, the only gill opening a small slit above the pectoral fin. This order have nine families of which members of three families i.e. Diodontidae, Ostraciidae and Molidae reported from Pakistan have been dealt with. Members of two other families i.e. Tricanthidae and Monacanthidae have already been described from Pakistan by Moazzam *et al.*, 2005 and Moazzam and Osmany (in press) respectively. Khaliluddin (1975) have reported some of the species of porcupine fishes occurring in Pakistan.

Family Ostraciidae includes fishes commonly known as boxfishes because they have a bony carapace enclosing body. The species of this family have non-protrusible upper jaw. Some species of family Ostraciidae were reported from Pakistan by Bano and Qureshi (1973). Members of family Diodontidae commonly known as porcupine fishes have inflatable body which is covered with well-developed sharp spines covering body. Their jaws have 2 fused teeth and opposite premaxillaries and dentaries entirely united at midline. Molidae includes oceanic sunfishes which are characterized with large bodies and 2 fused teeth as well as having a small gill openings which is located in front of pectoral fins.

Although many authors have reported members of the families Diodontidae, Ostraciidae and Molidae from Pakistan but these records are mere repetition of the names from previously published lists of fishes reported from the area. In the present paper a review of the published literature on the occurrence of member of these three families in Pakistan is made as well as comments on identification and distribution of the known species are made.

MATERIAL AND METHODS

Published scientific literature was examined for the record the occurrence of various species of families Diodontidae, Ostraciidae and Molidae from Pakistan. There occurrence record was separated for two maritime provinces of Pakistan i.e. Sindh and Balochistan, A few unpublished records of recent occurrence of fishes of these families from Pakistan were also included and comments on their status is made. Specimens available in the collection of Marine Fisheries Department, Karachi, Pakistan were also examined.

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RESULTS

Species Records

Family Diodontidae

Five species of family Diodontidae are reported from Pakistan. These fishes are locally known as Kako or Kookhin Sindh and Tooru or Toora in Balochistan. These species are found in shallow coastal waters as well as in the offshore areas.

Cyclichthys spilostylus (Leis & Randall, 1982) (Fig.1)

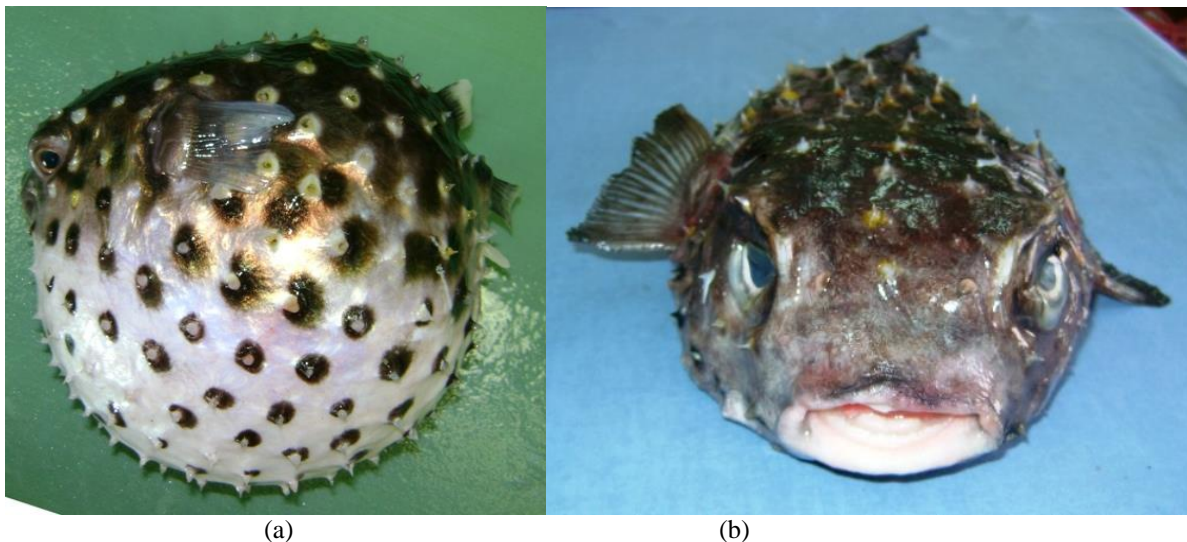


Fig. 1(a-b). *Cyclichthys spilostylus* (a) lateral view (specimen collected from off Ghora Bari Station 78); (b) front view (specimen collected from Karachi Fish Harbour)

This species has not been previously reported from Pakistan. Commonly known as spotbase burrfish. This species is characterized with black spots on sides and belly. These spots are associated with spine bases. There is no spines on caudal peduncle and fins are unspotted. Originally this species was described as *Chilomycterus spilostylus* from Eilat, Israel, Gulf of Aqaba, Red Sea by Leis and Randall (1982). Its holotype (BPBM 13896) is housed in Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A. (Eschmeyer, 1998). It is known from Indo-Pacific area (Red Sea to South Africa and east to southern Japan, the Philippines, Australia and New Caledonia), Eastern Pacific (Galapagos Islands) and Israel in the Mediterranean Sea (Froese and Pauly, 2014).

Although two specimens were examined during the present study, however, this species has been observed on a number of occasions. It is mainly caught as by catch of shrimp trawlers operating in coastal waters. Some specimens were observed in the rock pools in the intertidal areas on rocky shores at Hawksbay, Karachi.

Specimens Examined:

One specimens collected from off Ghora Bari Station 78 (23°39.89N; 66°36.67E) Depth 105 m - RV Dr. Fridtj of Nansen Cruise 1) in 18 November 2010. Total length 37 cm

One specimens collected from Karachi Fish Harbour on 26 January, 2014, Total length 33 cm

Cyclichthys orbicularis (Bloch, 1785) – Fig. 2

This species which is commonly known as birdbeak burrfish is reported from Pakistan by Hoda (1985, 1988) and Leis (1984) as *Chilomycterus orbicularis*. It is species widely distributed in Atlantic Ocean and indo-Pacific

areas extending from Pacific: Red Sea and East Africa to the Philippines, north to southern Japan, south to Australia and New Caledonia (Froese and Pauly, 2014). Along the coast of Pakistan this species is also caught as bycatch of shrimp trawlers operating in coastal waters.

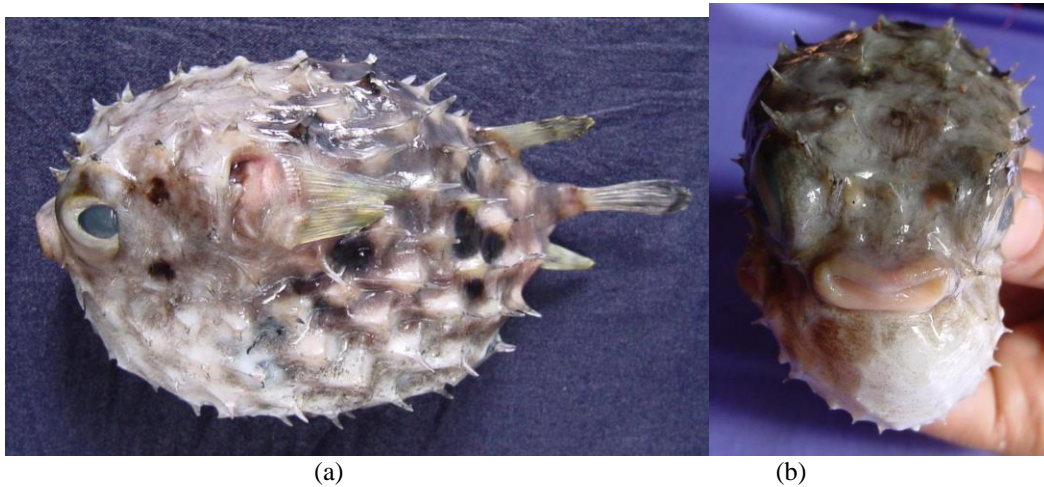


Fig. 2 (a-b). *Cyclichthysorbicularis* collected from Karachi Fish Harbour (a) lateral view (b) front view

Specimens Examined:

1 One specimen collected from off Malan Station 24 (25°02.34N; 65°41.11E) Depth 28 m - RV Dr. Fridtjof Nansen Cruise 1) in 07 November 2010. Total length 37 cm

Three specimens collected from Karachi Fish Harbour on 13 March 2005; 11 October, 2010 and 12 May, 2013 Total length 31, 34, 36 cm respectively

Diodon holocanthus Linnaeus, 1758 – Fig. 3

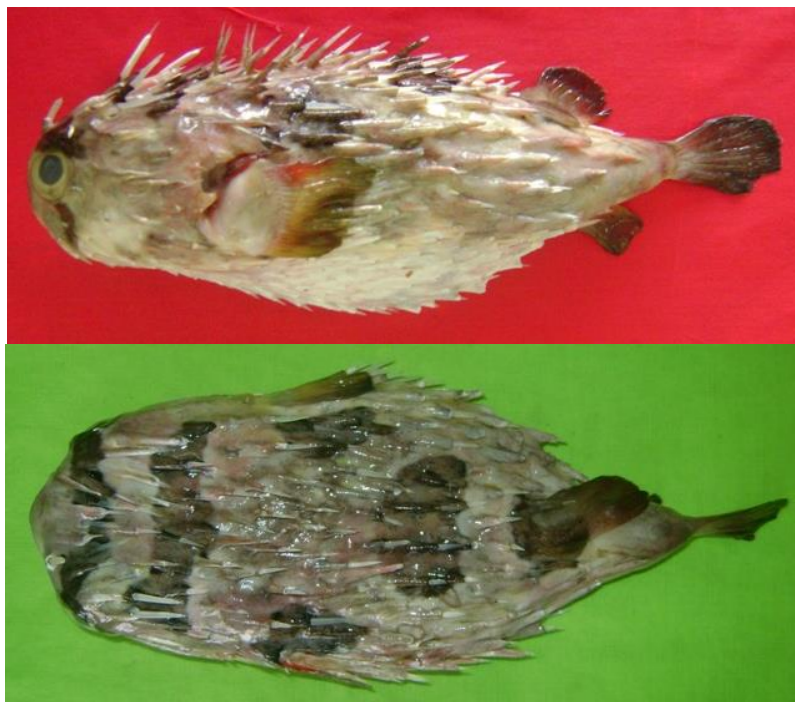


Fig. 3. *Diodon holocanthus*. Specimen collected from Karachi Fish Harbour.

This species which is commonly known as longspined porcupine fish is characterized by having 14 to 16 spines in an approximate row between snout and origin of dorsal fin. It has dark blotches across back and spots between the blotches. There is a large brown bar above and below each eye and also a broad transverse brown bar present on occipital region of head.

It is commonly known, is reported from Pakistan coast as *Diodon maculifer*. by Ahmad *et al* (1973), Hoda (1985, 1988), Hussain (2003), Jalil and Khaliluddin (1972, 1981) and Khaliuddin (1975). Leis (1984) has also shown its distribution along Pakistan coast (both Sindh and Balochistan). Froese and Pauly (2014) considered this species to be circumtropical in distribution and known from Atlantic (Canada, USA, the Bahamas to Brazil, west and south African coast), Indian (southern Red Sea to Madagascar and Reunion and Mauritius Islands) and Pacific Ocean(southern Japan south to Lord Howe Island and east to the Hawaiian and Easter islands; southern California to Colombia and the Galapagos Islands).

Specimens Examined:

One specimens collected from Karachi Fish Harbour on 14 September 2011 Total length 27 cm

Diodon hystrix Linnaeus, 1758 Fig. 4.



Fig.4(a-b). *Diodon hystrix* collected from offshore waters (a) lateral view); (b) dorsal view (a cymotid isopod parasite attached to tail).

This species which is commonly known as spot-fin porcupine fish reported from Pakistan by Ahmad *et al.*, (1973), Anonymous (1955), Hoda (1985, 1988), Hussain (2003), Jalil and Khaliluddin (1972, 1981), Khaliluddin (1975), Siddiqi (1956). It was reported from Balochistan coast by Zugmayer (1913) and Qureshi (1952).

Anonymous (1955), Qureshi (1952) and Siddiqi (1956) reported this species as *Chilomycterus hystrix*. This species is circumtropical in distribution. Froese and Pauly (2014) reported this species from Pacific (San Diego,

California, USA to Chile, including the Galapagos Islands), Atlantic Ocean (Bermuda, USA and northern Gulf of Mexico to Brazil, western African coast) and Indian Oceans (Red Sea to Madagascar, Reunion and Mauritius)

Its body is covered with long, sharp spines which are folded backwards when body is not inflated. There are 16 to 20 spines between snout and dorsal fin. Body is grayish tan, with small black spots, but no large dark blotches.

Specimens Examined:

One specimen collected from off Swatch, Sindh Coast on board commercial fish trawler (FT Hu Yu 616) on 09 July 2004. Total length 37 cm

One specimens collected from Karachi Fish Harbour on 16 June, 2010, Total length 33 cm

Family Ostraciidae

Six species of family Ostraciidae are reported from Pakistan. These fishes are locally known as Bund khook, Jabal khook, Tidda in Sindh and Tooru or Toora in Balochistan. These species are found in shallow coastal waters as well as in the offshore areas.

Lactoria cornuta (Linnaeus, 1758)

Commonly known as longhorn cowfish, this species is characterized by a pair of strong and sharp projecting 'horns' protruding anteriorly in front of the head. The second pair of horns extends posteriorly from the postero-ventral corner of the carapace (Khan *et al.*, 2013). The tail fin is very long, sometimes almost as long as the body. Its colour ranges from green and olive to orange with blue spots.

It was reported from Pakistan coast by Hoda (1985, 1988) and Hussain (2003) without specifying any specific location. Sorley (1933) reported this species from Sindh as *Ostracion cornutus*. Hutchins (1984) has also shown its distribution along Pakistan coast (both Sindh and Balochistan). This species is known from Indo-Pacific area including Red Sea and East Africa to the Marquesan and Tuamoto islands, north to southern Japan, south to Lord Howe Island (<http://www.fishbase.org/references/FBRefSummary.php?ID=9710> Froese and Pauly, 2014). There is no recent record of its occurrence in Pakistan and no specimen was examined during the present study.

Ostracion cubicus Linnaeus, 1758

It is commonly known as yellow boxfish which is reported from Pakistan by Bano and Qureshi (1973) as *Ostracion tuberculatus*. It was reported by Murray (1880) from Sindh as *Ostracion tetragonus*. It is reported from to be widely distributed in the Indo-Pacific area extending from Red Sea and East Africa to the Hawaiian and Tuamoto islands, north to Ryukyu Islands, south to Lord Howe Island (Froese and Pauly, 2014).

This species is known for its characteristic colour pattern. Body is usually bright yellow with black spots whereas with age these spots decrease proportionately and the bright yellow becomes a dirty mustard. There is no recent record of its occurrence in Pakistan and no specimen was examined during the present study.

Ostracion meleagris Shaw, 1796

White spotted boxfish, as it is commonly known is reported from Pakistan by Ahmed (1996), Bano and Qureshi (1973) and Hoda (1985, 1988) without mentioning any particular location. It was reported by Ahmed and Wazarat (1993) from Pasha Bunder. It is also widely distributed in Indo-Pacific and Eastern Pacific extending from East Africa to the Mexico, north to southern Japan and the Hawaiian Islands, south to New Caledonia, the Tuamoto Islands and Hawaiian waters (Froese and Pauly, 2014).

This species is easily distinguishable from its congeners in having distinct colouration. Its females are browner green with white spots whereas large males have orange bands and spots on side of body. There is no recent record of its occurrence in Pakistan and no specimen was examined during the present study.

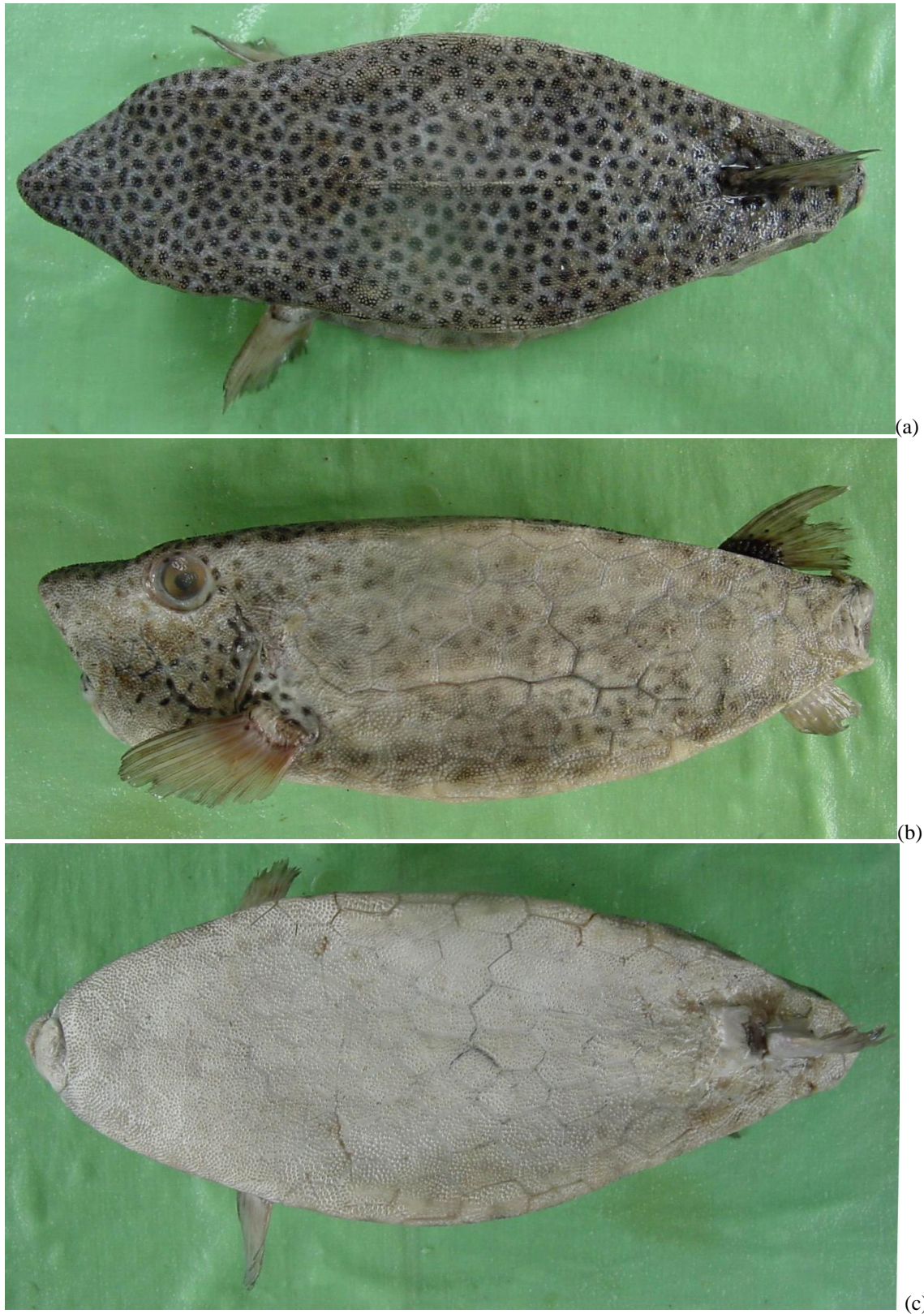


Fig.5 (a-c).



Fig.5(a-d). *Ostracion rhinorhynchus* (a) dorsal view; (b) lateral view; (c) ventral view; (d) front view.

***Ostracion rhinorhynchus* Bleeker, 1852 – Fig. 5**

Horn-nosed boxfish, as it is commonly known, is a new record from Pakistan. Previously, it was reported from East Africa to Indonesia, north to southern Japan, south to northern Australia (Froese and Pauly, 2014). It was originally described Jakarta (Batavia), Java, Indonesia by Bleeker (1852), however, no holotype is known (Eschmeyer, 1998).

This species is characterized in having a dorsal ridge which is almost flat and low but well developed (Fig. 5a). Lateral and pelvic ridges are sharp but lack any spines. Snout is produced into a conical prominence. Gill opening oblique (Fig. 5b). Lips are thick (Fig. 5d). Body colour (when live) grayish-oyster grey on sides and bottom and stone grey on dorsal view. Scales with 3 to 9 dark spots. This species can be distinguished from *Rhynchostracion nasus* by presence on a bump on snout.

Specimens Examined:

One specimen collected from Karachi Fish Harbour on 01 December 2004. Total length 17 cm

***Rhynchostracion nasus* (Bloch, 1785)**

This species which is commonly known as short nose boxfish, is reported from Pakistan by Bano and Qureshi (1973) and Hoda (1985, 1988). This species is Sri Lanka and India and extended distribution in eastern Pacific Ocean from Sumatra to Fiji, north to the Philippines; Palau and Truk in Micronesia (Froese and Pauly, 2014). It has a characteristic small protuberance above the mouth with a distinctly concave snout profile. There is no recent record of its occurrence in Pakistan and no specimen was examined during the present study.

***Tetrosomus gibbosus* (Linnaeus, 1758) – Fig. 6**

This species which is commonly known as humpback turret fish, has a deep body that is very wide ventrally. There is a flat spine on dorsal ridge which is usually with an acute tip. There is a small upward and backward-directed spine above each eye and 4 or 5 acute, flat spines along each ventro-lateral ridge. There is a small bony

projection above mouth. Its colour is olive brown, with several ill-defined dark blotches and scattered blue spots on sides.

This species is reported from Pakistan by Hoda (1985, 1988), Hussain (2003), Hutchins (1984), Jalil and Khaliluddin (1972, 1981), Bano and Qureshi (1973) without specifying any particular location. Ahmad *et al* (1973) reported this species from Karachi and Mekran coast whereas Sorley (1933) reported it as *Ostracion gibbosus* from Sindh coast whereas Zugmayer (1913) reported it as *Ostracion turritus* from Balochistan.

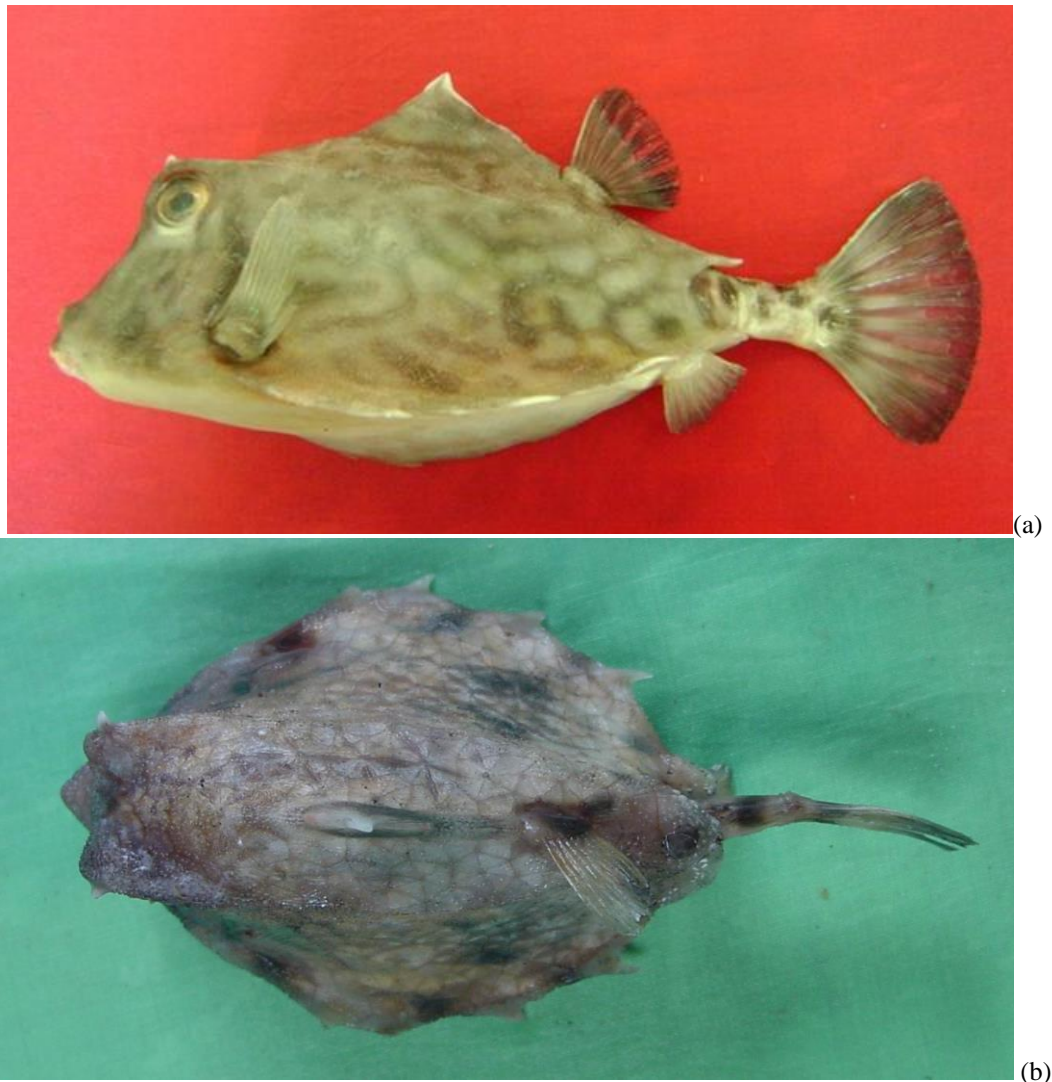


Fig. 6 (a-b). *Tetrosomus gibbosus* (a) lateral view; (b) dorsal view.

The humpback turretfish as it is commonly known, is distributed from East Africa to Indonesia, north to Japan, and south to Australia. The distribution of this species includes the Red Sea. It has also spread to the Mediterranean, via the Suez Canal (Matsuura, 2010). It is common occurrence along Pakistan coast mainly on the continental shelf area but also in the shrimp trawling grounds.

Specimens Examined:

One specimens collected from Karachi Fish Harbour on 16 January, 2004, Total length 17 cm

One specimens collected from Karachi Fish Harbour on 29 March, 2013, Total length 15 cm

Family Moliidae

Two species of family Molidae are reported from Pakistan. These fishes are locally known as Adhi manger in Sindh and Kup-e-paggasin Balochistan. These species are found in shallow coastal waters as well as in the offshore areas.

***Mola mola* (Linnaeus, 1758)-Fig. 7**

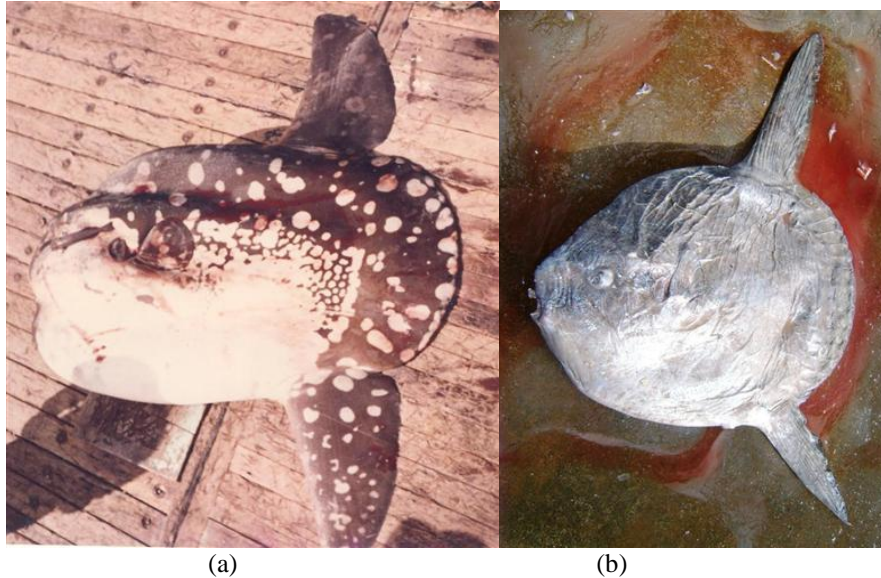


Fig. 7 (a-b). *Mola mola*(a) Specimen from offshore waters, (b) Specimen collected from Karachi Fish Harbour in June 2013.

Commonly known as ocean sunfish was reported from Pakistan by Froese and Pauly (2014), Hoda (1985, 1988) and Muus and Dahlström (1978). This species is found throughout warm and temperate zones of all oceans including Pacific Ocean, (British Columbia, Canada to Peru and Chile and Japan to Australia), Atlantic Ocean (Scandinavia to South Africa Newfoundland, Canada) to Argentina) and Indian Ocean South Africa to Japan, Indonesia and Philippines.

Ocean sunfishes can be distinguished by the presence of scaleless body which is covered with extremely thick and, elastic skin. It has reduced/fused caudal elements forming a rudder-like structure called 'clavus'. Dorsal and anal fins are very high with short base. Mouth very small; teeth fused to form a parrot-like beak. Gill openings is reduced to a small hole at the base of the pectoral fins.

Specimens Examined:

One specimen collected from offshore waters of Pakistan on board tuna longliner FV Chien Chung 307 on 21 January, 1993, Total length 65 cm

One specimens collected from Karachi Fish Harbour on 13 February, 2010, Total length 84 cm

One specimens collected from Karachi Fish Harbour on 14 March, 2011, Total length 109 cm

One specimens collected from Karachi Fish Harbour on 19 June, 2013, Total length 112 cm

***Ranzania laevis* (Pennant, 1776) - Fig. 8**

This species is reported from Pakistan by Hoda (1985, 1988), Hussain (2003) and Jalil and Khaliluddin (1972, 1981). It has cosmopolitan distribution and known from Atlantic Ocean (Florida, Martinique, Venezuela, Brazil, Madeira to Scandinavia, Dakar, Senegambie, and Sierra Leone and South Africa), Pacific Ocean (central California

to Chile, Mexico, Japan, China, Taiwan and New Zealand) and Indian Ocean (Madagascar, Mauritius, Reunion, Iran, Australia).

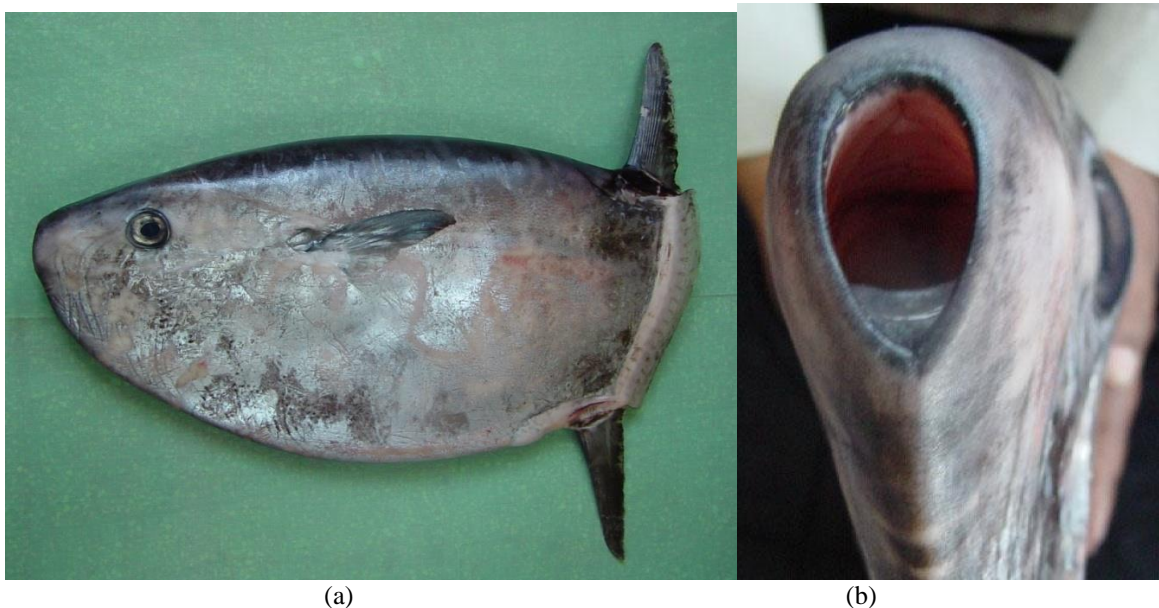


Fig.8 (a-b). *Ranzania laevis* (a) Lateral View; (b) Front View.

This species is known as slender sunfish. It has a clavus which has replaced caudal fin. It's body is much elongated and mouth slit vertical.

One specimens collected from Karachi Fish Harbour on 22 February, 2007, Total length 82 cm

One specimens collected from Karachi Fish Harbour on 17 April, 2013, Total length 60 cm

One specimens collected from Karachi Fish Harbour on 26 April, 2014, Total length 65 cm

DISCUSSION

A review of the occurrence of fishes of families Diodontidae (porcupine fishes), Ostraciidae (boxfishes) and Molidae (oceanic sunfishes) belonging to order Tetraodoniformes is made. A total of 12 species were reported of which 4 species belonging to 2 genera belonged to Family Diodontidae, 6 species belonging to 3 genera belonged to Family Ostraciidae and 2 species belonging to 2 genera belonged to Family Molidae. Two species *Cylichthys spilostylus* (spotbase burrfish) and *Ostracion rhinorhynchus* (horn-nosed boxfish) are reported for the first time from Pakistan.

The members of the three families Diodontidae, Ostraciidae and Molidae are not of any economic importance in Pakistan. Sunfishes are consumed in some countries as food whereas some members of these families are traded as aquarium fishes. Members of family Ostraciidae are liked by aquarists but keeping them in aquarium can be problematic as some of the members secrete toxins, if cornered which may affect other fishes in aquaria.

The information about species of families Diodontidae, Ostraciidae and Molidae will add to the knowledge about diversity of marine life in Pakistan. It may be added that instances of occurrence (both *Mola mola* and *Ranzania laevis*) have increased in recent past. Previously these species were very rarely caught by the fishing boats but since 2008, a noticeable increase in the landings of two species was noticed in Pakistan. No specific reason is known for this unprecedented increase.

REFERENCES

- Ahmad, M. F., M. S. Niazi, S. F. A. Zaidi and A. Ahmad (1973). Marine fauna supplement, Pisces. *Rec. Zool. Surv. Pakistan*. 4: 22-44.
- Ahmed, N. (1996). *Extraction, exploration and demand forecasting for aquarium fishes from Pakistan*. Ph. D. Dissertation, Department of Economics, University of Karachi, 242p.
- Ahmed, N. and S. Wazarat (1993). *Seawater aquarium fishes of Pakistan*. p. 73-119. In: *Proceedings of a National Seminar on Study and Management in Coastal Zones in Pakistan* (Tirmizi, N. M. and Q. B. Kazmi eds.) Marine Reference Collection and Resource Centre, University of Karachi, Karachi.
- Anonymous (1955). *Marine Fishes of Karachi and the coast of Sind and Mekran*. Government of Pakistan, Ministry of Food and Agriculture (Central Fisheries Department), Karachi. 80p
- Bano, A. and M. R. Qureshi (1973). Fishes of the order Plectognathi, family Ostracionidae found in Pakistan waters. *Agric. Pakistan* 24: 291-295.
- Eschmeyer, W. N. (Ed.) (1998). *Catalog of fishes*. Special Publication, California Academy of Sciences, San Francisco. 3 vols. 2905 p. (online version 26 June, 2014)
- Froese, R. and D. Pauly (Eds.). (2014). *Fish Base. World Wide Web electronic publication*. www.fishbase.org, version (06/2014).
- Hoda, S. M. S. (1985). Identification of coastal fish varieties of Pakistan. *Pakistan Agric.* 7:38-44.
- Hoda, S. M. S. (1988). Fishes from the coast of Pakistan. *Biologia (Lahore)* 34: 1-38.
- Hussain, S. M. (2003). *Brief Report on Biodiversity in the Coastal Areas of Pakistan*. Reg. Tech. Assist. (RETA) ADB/IUCN.113p (Draft).
- Hutchins, J. B. (1984). *Ostraciidae*. p. var. In: Fischer W. and G. Bianchi (eds.). FAO species identification sheets for fishery purposes. Western Indian Ocean (Fishing Area 51).Vol. 3.FAO, Rome.
- Jalil, S. A., and M. Khaliluddin (1972). *A checklist of marine fishes of Pakistan*. Government of Pakistan: 1-16.
- Jalil, S. A., and M. Khaliluddin (1981). *A checklist of marine fishes of Pakistan*. Government of Pakistan: 1-18.
- Khaliluddin, M. (1975). Blow and porcupine fishes of Pakistan waters. *Agric. Pakistan* 26:355-368.
- Khan, M. S. K., M. A. M. Siddique and M. A. Haque (2013). New record of the longhorn cowfish *Lactoria cornuta* (Linnaeus 1758) from inshore waters of the Bay of Bengal, Bangladesh. *Zool. Ecol.* 23: 88-90.
- Leis, J.M. (1984). *Diodontidae*. p. var. In: Fischer W. and G. Bianchi (eds.). FAO species identification sheets for fishery purposes. Western Indian Ocean (Fishing Area 51).Vol. 3.FAO, Rome.
- Leis, J. M. and J. E. Randall (1982). *Chilomycterus pilostylus*, a new species of Indo-Pacific burrfish (Pisces, Tetraodontiformes, Diodontidae). *Rec. Australian Mus.* 34: 363-371.
- Matsuura, K. (2010). *Tetrosomus gibbosus*. In: IUCN 2014. IUCN Red List of Threatened Species. Version 2014.1. <www.iucnredlist.org>. Downloaded on 19 June 2014. (<http://www.iucnredlist.org/details/154933/0>).
- Moazzam, M. and H. B. Osmany (2014). Fishes of family Monacanthidae (Pisces) from Pakistan with comments on fishery of *Alutera monoceros* (Linnaeus, 1758). *Rec. Zool. Surv. Pakistan* (In press).
- Moazzam, M., K. Zohra and H. B. Osmany (2005). A review of family Triacanthidae (Pisces) occurring in Pakistan. *Rec. Zool. Surv. Pakistan* 16: 52-57.
- Murray, J. A. (1880). *A Hand-book to the Geology, Botany and Zoology of Sind*. Beacon Press, Kurruchee. 310p.
- Muus, B. and P. Dahlström (1978). *Meeresfische der Ostsee, der Nordsee, des Atlantiks*. BLV Verlagsgesellschaft, München. 244 p.
- Qureshi, M. R., (1952). Fishes of Makran coast. *Agric. Pakistan*, 3: 237-256.
- Siddiqi, M. I. (1956). The fishermen's settlements on the coast of West Pakistan. *Sch. Geogr. Inst. Univ. Kiel.* 14: 1-92.
- Sorley, H. T. (1932). *Marine Fisheries of the Bombay Presidency*. Govt. Press, Bombay.
- Zugmayer, E. (1913). Die Fische von Balutschistan. *Abh.Akad.Wiss.Munchen* 26: 1-35.

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