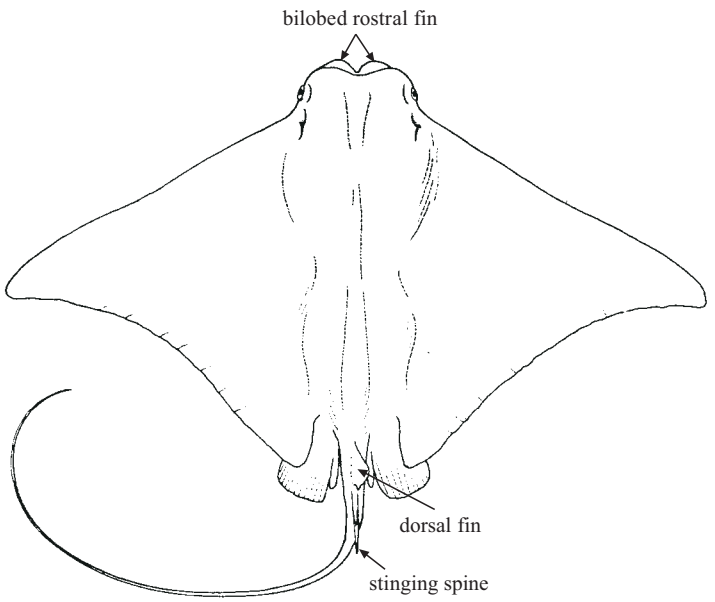
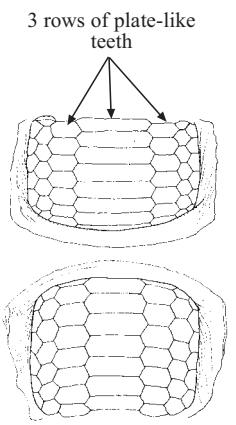
# RHINOPTERIDAE

## Cownose rays

by L.J.V. Compagno and P.R. Last

**Diagnostic characters:** Moderate-sized to large batoids (adults with disc widths of 61 to 210 cm, but with most species less than 150 cm wide) with a **broad, rhomboidal, wing-like pectoral disc. Tail slender and whip-like**, 1 to 3 or more times disc length. Body either entirely naked above and below or with small denticles covering the dorsal surface. **Trunk broad, depressed and thick, not shark-like.** Precaudal tail cylindrical, attenuated, and without lateral folds on sides, tail abruptly narrower than trunk, **a prominent barbed sting (stinger or stinging spine) on dorsal surface of tail close behind pelvic fins;** no electric organs in tail. Head narrow and elevated; snout short, notched medially and forming a pair of low rounded lobes; without a rostral cartilage but entirely supported by pectoral-fin skeleton and by anterior projections of cranium; not formed into a rostral saw and without lateral saw teeth. **Five small gill openings on underside of front half of pectoral disc**, not visible in lateral view; **no gill sieves on internal gill slits**, but with low ridges on gill arches. Eyes lateral on head and just anteromedial to spiracles, moderately large. Mouth transverse, straight, and narrow, without prominent knobs, depressions or labial folds; lobate oral papillae absent from floor of mouth. Nostrils just anterior to mouth and separated from it by much less than their own widths, connected by broad nasoral grooves with mouth; **anterior nasal flaps long and medially expanded and fused into a broad, elongated nasal curtain that overlaps mouth. Oral teeth large, flattened, laterally expanded, plate-like, and hexagonal, with 3 medial rows of broad teeth and 2 or 3 rows of narrower teeth on each side, without cusps or keels; teeth normally in 7 to 9 rows in either jaw but abnormally higher. Pectoral fins with angular falcate apices;** pectoral fins originating at anterior tip of snout and ending posterior to pelvic-fin origins; **disc subdivided laterally by notch at eyes into an anterior bilobate rostral fin** that forms the snout and the posterior pectoral disc proper; disc width 1.6 to 1.8 times length. No electric organs at bases of pectoral fins. Pelvic fins high, rounded-angular, and not divided into anterior and posterior lobes. **A single moderate-sized dorsal fin on tail base**, this relatively high, angular or rounded-angular, and with distinct anterior, posterior, and inner margins; dorsal-fin base in front of anterior half of total length, its origin over or just behind the pelvic-fin bases, and far anterior to midlength of tail. **Caudal fin absent**, vertebral axis of tail not raised above body axis. **Colour:** dorsal surface brown, greenish brown, or blackish above, generally white below; dorsal surface usually without markings, sometimes with obscure, fine dark lines.




**teeth on upper and lower jaws**

**Habitat, biology, and fisheries:** Cownose rays are a small and undiverse, but taxonomically perplexing group of inshore and offshore batoids with a circumglobal distribution in warm-temperate and tropical continental seas. These often common or abundant batoids range from the intertidal to a depth of at least 26 m. They occur in coastal waters in estuaries, lagoons, and enclosed and open bays on soft bottom; they may occur in brackish water but are apparently unable to penetrate fresh water to any extent and are absent from rivers and lakes. These rays are strong and active swimmers, found near or on the bottom but often swimming well above it. All species are ovoviviparous (live-bearing) as far as is known; the

developing embryos resorb their yolk sacks at an early stage and are fed by histotroph or "uterine milk" secreted by the uterine wall. Litters are of 2 to 6 young. The powerful jaws and plate-like teeth form a grinding mill that allows these rays to feed on hard-shelled molluscs including bivalves (oysters and clams) and gastropods as well as crabs and lobsters. They are also more active and less likely to be stepped upon than bottom-dwelling stingrays. The stinging spine, which is close to the tail base, is not particularly effective as a defensive weapon. They are otherwise inoffensive to people, and several species are readily kept in large aquaria and oceanaria. Use of these rays varies in different areas; all have large, meaty pectoral fins that are suitable for human consumption, but in some places they may be discarded or made into fish meal. Available data on distribution and fisheries suggests that cownose rays are widely used for human consumption throughout the area.

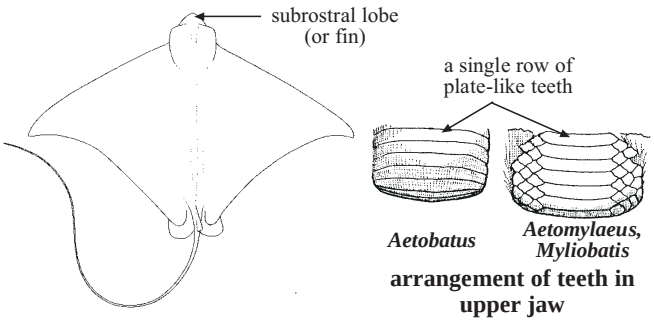
**Remarks:** Species of cownose rays are very similar to one another and mostly have been separated on tooth morphology; dentition is very variable in some species and the family is in urgent need of revision.

### Similar families occurring in the area

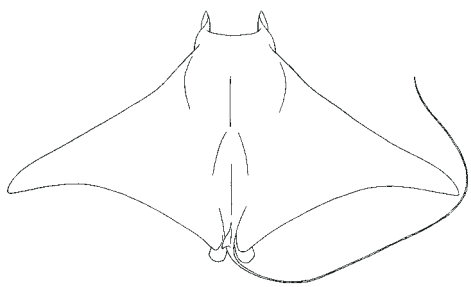
Myliobatidae: snout not notched medially, formed as a single rounded or rounded-angular lobe; 1 row of laterally expanded medial plate-like teeth (rather than 3 rows) on jaws.

Mobulidae: snout formed into paired elongated cephalic fins or "horns"; teeth very small, not plate-like; jaws weak, not forming a grinding mill; internal gill arches with large and complex filter plates.

No other batoids in the area have elevated heads and a angular rhomboidal disc subdivided into bilobate rostral and pectoral parts, a single angular dorsal fin, and a whip-like tail without a caudal fin.




**Myliobatidae**



**Mobulidae**

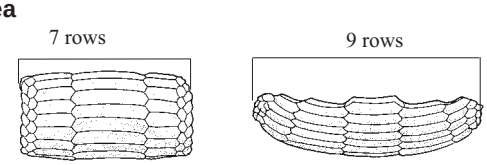
### Key to the species of Rhinopteridae occurring in the area

**1a.** Upper teeth in 7 rows (Fig. 1a) . . . ***Rhinoptera javanica***

**1b.** Upper teeth in 9 rows (Fig. 1b) . . . . . → ***2***

**2a.** Dorsal surface of disc rough, with small, stellate-based denticles; dorsal-fin origin just behind pelvic-fin insertions; tail over 3 times disc length . . . . . ***Rhinoptera adspersa***

**2b.** Dorsal surface of disc smooth; dorsal-fin origin in front of pelvic-fin insertions; tail about as long as disc length . . . ***Rhinoptera neglecta***




**a)** ***Rhinoptera javanica*** **b)** ***Rhinoptera adspersa, R. neglecta***

**Fig. 1 teeth of upper jaw**

### List of species occurring in the area

The symbol ✦ is given when species accounts are included.

- ✦ *Rhinoptera adspersa* Valenciennes in Müller and Henle, 1841
- ✦ *Rhinoptera javanica* Müller and Henle, 1841
- ✦ *Rhinoptera neglecta* Ogilby, 1912

### References

Annandale, N. 1909. Report on the fishes taken by the Bengal fisheries steamer "Golden Crown". Part I: Batoidei. *Mem. Ind. Mus.*, 2:1-60.

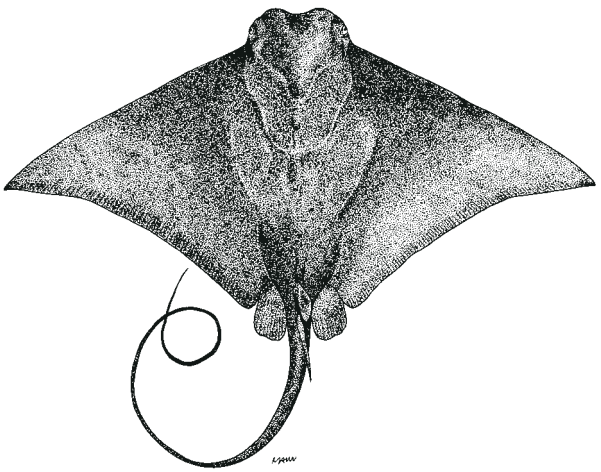
Rodgers, C., C. Roden, R. Lohoefener, K. Mullin, and W. Hoggard. 1990. Behaviour, distribution, and relative abundance of cownose ray schools, *Rhinoptera bonasus*, in the northern Gulf of Mexico. *N.E. Gulf Sci.*, 11:69-76.

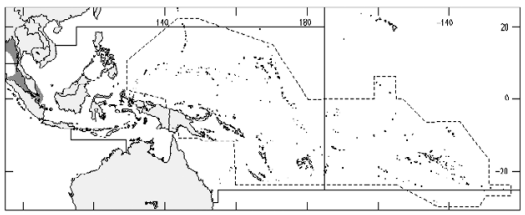
Michael, S.W. 1993. *Reef sharks and rays of the world: a guide to their identification, ecology and behaviour*. USA, Sea Challengers, 107 p.

***Rhinoptera adspersa*** Valenciennes in Müller and Henle, 1841

**En** - Rough cownose ray.

Maximum total length at least 99 cm. A rare cownose ray of the eastern Indian Ocean and western Pacific. Biology little known. Utilization pattern in the area not known. Occurs off India, Malaysia (Pinang), and probably Indonesia.

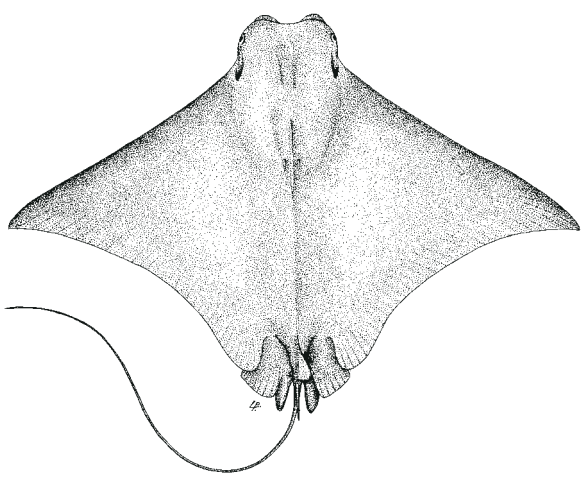


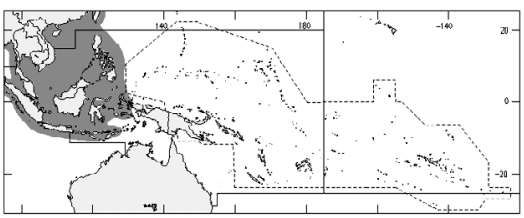



***Rhinoptera javanica*** Müller and Henle, 1841

**En** - Javanese cownose ray.

Maximum disc width to at least 1.5 m. A common but little-known cownose ray of the tropical Indo-West Pacific. Biology little known. Probably widely utilized in the area. Occurs off southern Africa (Mozambique and South Africa), Pakistan, India, Sri Lanka, Indonesia, Malaysia, Thailand, China, Japan, Philippines, and possibly tropical northern Australia.

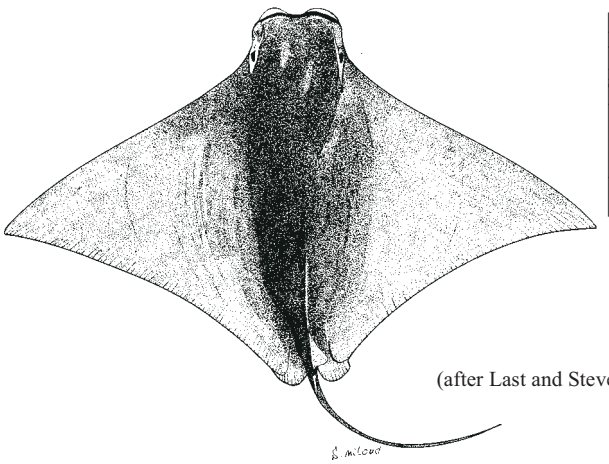


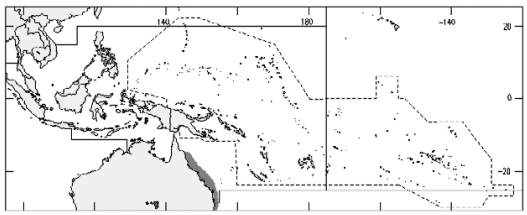


***Rhinoptera neglecta*** Ogilby, 1912

**En** - Australian cownose ray.

Maximum disc width at least 86 cm. An uncommon cownose ray of tropical Australia. Biology little known. Not utilized in the area. Occurs on the east coast of Australia from Queensland (Cairns and possibly Cape York) to New South Wales (Newcastle), possibly to Northern Territory and Western Australia, but uncertain due to confusion with *Rhinoptera javanica*.





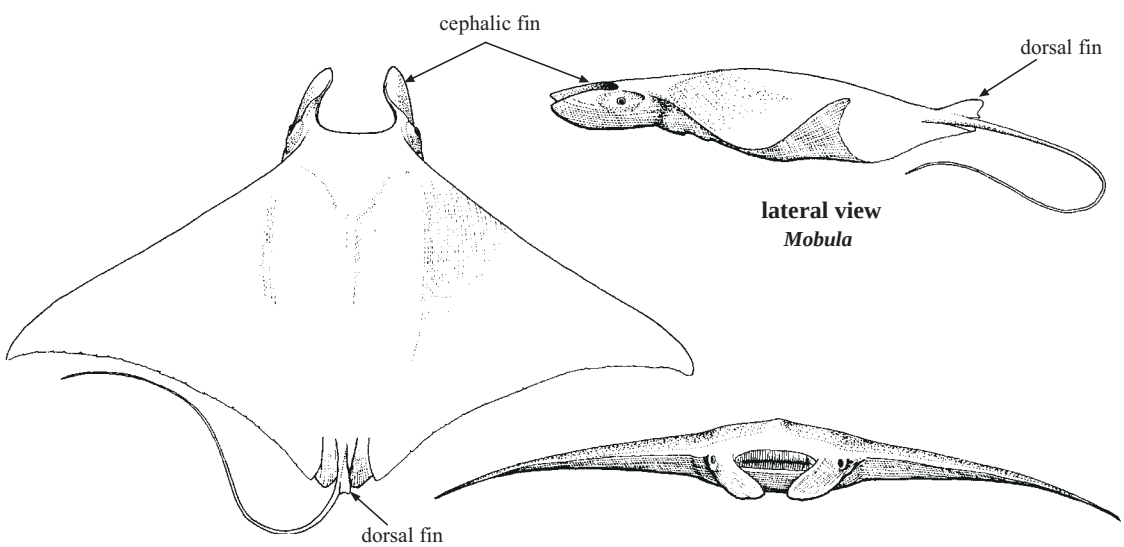

(after Last and Stevens, 1994)

# MOBULIDAE

## Devil rays

by L.J.V. Compagno and P.R. Last

**Diagnostic characters:** Moderately large to gigantic batoids (adults between 100 and at least 600 cm total length and with disc widths of 100 to 670 cm or more, but most species less than 200 cm wide); **with pectoral fins forming a large, rhomboidal wing-like disc. Tail slender, whip-like** and 0.5 to 1.3 times disc length. Body either almost entirely naked above and below or more or less covered with sparse or close-set denticles. **Trunk broad, depressed and thick, not shark-like.** Precaudal tail cylindrical or subquadrate, attenuated, and without lateral folds on sides; tail abruptly narrower than trunk; a small barbed sting (stinger or stinging spine) on dorsal surface of tail close behind pelvic fins in a few species, but absent in others; no electric organs in tail. Head broad and elevated; snout elongated, **formed as a compressed, straight or concave transverse edge with a large, flat, anteriorly extending rostral fin or cephalic "horn" on either side;** no rostral cartilage but snout supported by pectoral-fin skeleton and expanded anteriolateral lobes of chondrocranium; snout not formed into a rostral saw and without lateral saw teeth. Five moderately broad to very broad gill openings on underside of front half of pectoral disc, barely visible in lateral view; **complex, plate-like gill sieves** with leaf-like expanded edges **on internal gill slits**, serving to filter out food items from entering the gill slits. Eyes lateral on head and well anterior to reduced spiracles, moderately large. **Mouth transverse, straight, and broad,** without prominent knobs, depressions or labial folds; no oral papillae present on floor of mouth. Nostrils just anterior to mouth and separated from it by much less than their own widths, connected by broad nasoral grooves with mouth; **anterior nasal flaps short and medially expanded and fused into a very broad, short nasal curtain that overlaps mouth. Oral teeth reduced, small,** flattened or elevated, ovoid, hexagonal, with or without low cusps, in over 30 rows and in the largest species 230 to 270 rows in adults; entire dental band sometimes absent in upper or lower jaw. **Pectoral fins with angular falcate apices;** pectoral fins originating at anterior tips of rostral fins and snout and ending posterior to pelvic-fin origins; **disc subdivided laterally by notch at eyes into the paired rostral fins and the posterior pectoral disc proper**; disc width 1.5 to 1.8 times length. No electric organs at bases of pectoral fins. Pelvic fins low, rounded-angular, and not divided into anterior and posterior lobes. **A single moderate-sized dorsal fin on tail base,** this relatively high, angular or rounded-angular, and with distinct anterior, posterior, and inner margins; dorsal-fin base in front or just behind anterior half of total length, over pelvic-fin bases, and far anterior to midlength of tail. **Caudal fin absent**, vertebral axis of tail not raised above body axis. **Colour:** dorsal surface varies from uniform brown, brownish grey, blackish, blue, purplish, mauve-grey, or olive-green above, with or without lighter or blackish shoulder patches, white below sometimes with dark or silvery areas; no spots, lines or ocelli.




**lateral view**
***Mobula***

**front view**
***Mobula***

**dorsal view**
***Mobula***

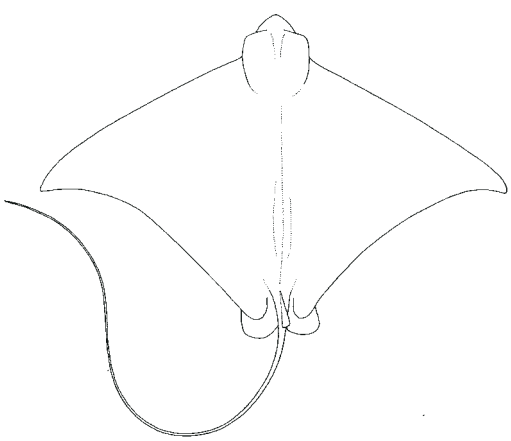
**Habitat, biology, and fisheries:** Devil rays are a small group of highly specialized, inshore, offshore and oceanic batoids with a circumglobal distribution in temperate and tropical continental and insular seas. These often common batoids range from the intertidal to the epipelagic zone, but are not recorded from deep water. They occur around coral and rocky reefs, in lagoons and enclosed and open bays but do not penetrate fresh water. The smaller (less than 1.4 m disc width) species are primarily coastal and continental with limited ranges, but larger species are virtually cosmopolitan, range into the epipelagic zone, and are found off oceanic islands. They are usually sighted at the surface and near coasts, but their movements in deeper water are unknown. These rays are very strong and active, agile swimmers, often found well off the bottom, but reported as occasionally resting on it. Even the largest devil rays (genus *Manta*) are highly mobile and readily leap completely out of the water. All species are ovoviviparous (live bearing) as far as is known; the developing embryos resorb their yolk sacks at an early stage and are fed by histotroph or "uterine milk" secreted by the uterine wall. Litters are of a single young. The relatively weak jaws and small teeth are not used for processing prey. Instead, these rays feed by filtering out planktonic animals and fishes that pass through their large mouths and are caught on the filter plates on their internal gill openings. The rostral fins may aid in directing prey into the mouth. These rays are inoffensive to people, except that large *Manta* sometimes foul boat lines or the air hoses of hardhat divers with their rostral fins and may drag off the boats or traumatize the divers. A few species have small stings on the tail bases, but have not been implicated in sting injuries to people. These rays are attractive and desirable as captives in large aquaria and oceanaria but seldom survive very long. There are now established viewing sites where *Manta* may be observed feeding on plankton blooms in the wilds by divers; the ecotouristic value of devil rays, as with whale sharks, may exceed any value the occasional catches may bring. Use of these rays varies in different areas but all have large, meaty pectoral fins that are suitable for human consumption. In some places they may be discarded or made into fish meal. Utilization in the Western Central Pacific is little known; *Mobula* species have been marketed in some numbers for human consumption in Thailand and possibly other parts of the area. Devil rays are probably particularly vulnerable to net gear, especially large gill nets. *Manta* is occasionally harpooned commercially and formerly was harpooned for "sport".

**Similar families occurring in the area**

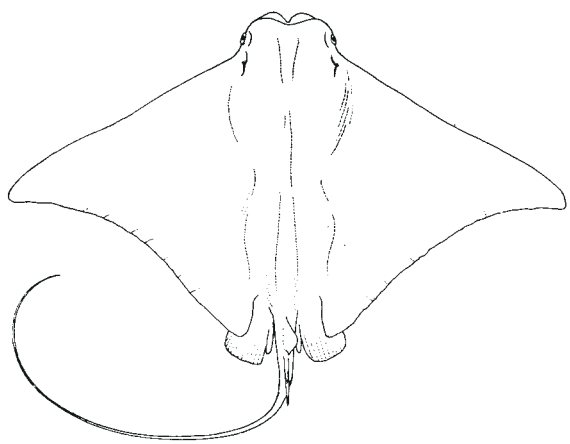
Myliobatidae: snout formed as a single rounded or rounded-angular lobe, without paired elongated cephalic fins; teeth enlarged, laterally expanded, and plate-like; no complex filter plates on inner gill openings.

Rhinopteridae: snout notched medially, formed as 2 low rounded lobes; teeth enlarged, laterally expanded, and plate-like; no complex filter plates on inner gill openings.

No other batoids in the area have elevated heads and a angular rhomboidal disc subdivided into bilobate rostral and pectoral parts, a single angular dorsal fin, and a whip-like tail without a caudal fin.



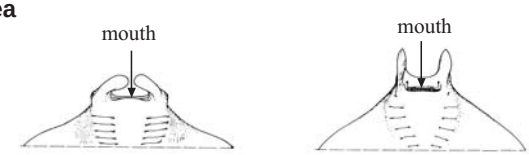
**Myliobatidae**



**Rhinopteridae**

### Key to the species of Mobulidae occurring in the area

**1a.** Mouth terminal on head; head very broad, width across level of spiracles about 1.7 in distance from median snout edge to free rear tips of pectoral fins; teeth usually in lower jaw only, abnormally present in both jaws; a gigantic species, reaching at least 6.7 m in width (Fig. 1a) . . . . . ***Manta birostris***




a) *Manta* b) *Mobula*

**Fig. 1 anterior part of body (ventral view)**

**1b.** Mouth subterminal on head; head narrower, width across level of spiracles about 2.5 to 2.7 in distance from median snout edge to free rear tips of pectoral fins; teeth usually in both jaws, abnormally absent from lower jaw; small to large species, reaching 1.0 to 3.7 m in width with larger records uncertain (Fig. 1b) . . . . . **(*Mobula*)** → ***2***

**2a.** Spiracles slit-like and dorsal to plane of pectoral disc; large species, reaching 3.1 to 3.7 m in width or more . . . . . → ***3***

**2b.** Spiracles small, subcircular, and slightly below plane of pectoral disc; small species, reaching 1.0 to 1.8 m in width . . . . . → ***4***

**3a.** A sting on tail base; head short, disc broader and less falcate; spiracles a short elliptical transverse slit; branchial filter plates not fused laterally; dorsal fin white-tipped; tail longer than disc when undamaged . . . . . ***Mobula japanica* (and *M. mobular*)**

**3b.** No sting on tail base; head longer, disc narrower and strongly falcate; spiracles an elongated longitudinal slit; branchial filter plates fused laterally; dorsal fin plain; tail much shorter than disc . . . . . ***Mobula tarapacana***

**4a.** Cephalic-fin length from fin tip to mouth corner more than 16% of disc width; dorsal fin entirely dark . . . . . ***Mobula eregoodootenkee***

**4b.** Cephalic-fin length less than 16% of disc width; dorsal fin with a white spot at apex . . . . . → ***5***

**5a.** Anterior margin of pectoral fins with a distinctive undulated profile, with a concavity separating proximal and distal convexities; teeth hexagonal with large rugosities on crown; base of tail depressed . . . . . ***Mobula thurstoni***

**5b.** Anterior margin of pectoral fins not undulated, slightly convex; teeth transversely elongated, lozenge-shaped, with fine rugosities on crown; base of tail quadrangular . . . . ***Mobula kuhlii***

### List of species occurring in the area[1/]

The symbol ✦ is given when species accounts are included.

✦ *Manta birostris* (Donndorff, 1798)

✦ *Mobula eregoodootenkee* (Bleeker, 1852)
✦ *Mobula japanica* (Müller and Henle, 1841)
✦ *Mobula kuhlii* (Valenciennes in Müller and Henle, 1841)
✦ *Mobula tarapacana* (Philippi, 1892)
✦ *Mobula thurstoni* (Lloyd, 1908)

### References

Compagno, L.J.V., D.A. Ebert, and M.J. Smale. 1989. *Guide to the sharks and rays of Southern Africa*. South Africa, Struik Publishers, 160 p.

Michael, S.W. 1993. *Reef sharks and rays of the world: a guide to their identification, ecology and behaviour*. USA, Sea Challengers, 107 p.

Notarbartolo-Di-Sciara, G. 1987. A revisionary study of the genus *Mobula* Rafinesque, 1910 (Chondrichthys, Mobulidae), with the description of a new species. *Zool. J. Linn. Soc.*, 91:1-91.

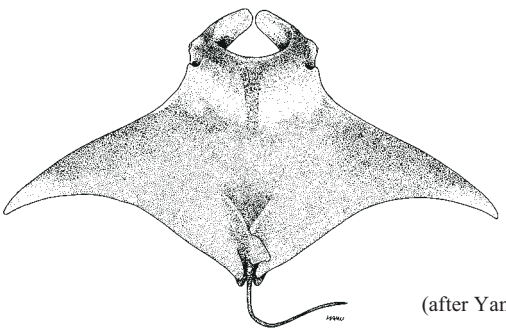
---

1/ Species of *Mobula* remain poorly known, and many nominal records of the species from localities within the area are impossible to verify from published accounts and need to be vouchered by specimens or photographs. On the other hand, diver-photographers have recorded these and other batoids from remote localities in the Indo-West Pacific that do not have geographic records in the ichthyological literature.

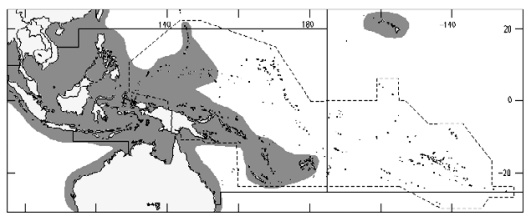
***Manta birostris*** (Donndorff, 1798)

**En** - Giant manta; **Fr** - Mante géante; **Sp** - Manta voladora.

Maximum disc width at least 670 cm, with unsupported citations to 763 cm and about 910 cm in width; possibly the largest living batoid and rivalled in size only by certain sawfishes. A locally common inshore and offshore giant devilray of all temperate and tropical seas, mostly seen coastally but with a wide range among oceanic islands and probably capable of readily crossing the epipelagic zone. Will penetrate shallow muddy bays and the intertidal and occuring off river mouths, but also found off coral reefs. Usually seen at or near the surface swimming actively and slowly or at high speed, said to rest on the bottom. Size at birth about 122 to 127 cm in width. Feeds on zooplankton and small to moderate-sized fishes, appears at seasonal plankton blooms off coral reefs to feed. Occurs individually, in pairs or in groups or schools. Utilization pattern in the area little known. Feared by hardhat pearl divers because it sometimes snags their air-lines, but otherwise harmless. Readily approached by divers and in turn readily investigates them. There are sites where divers view and even ride on these spectacular batoids underwater. Occurs circumglobally in all warm seas, wide-ranging in the area, possibly occuring off Thailand, Viet Nam, and the Philippines, known from Indonesia, New Guinea, New Caledonia, Vanuatu, Australia, and off island groups in the Western Central Pacific eastward to Hawaii. Recognition of a single species in the genus *Manta* is provisional, and needs to be critically examined.



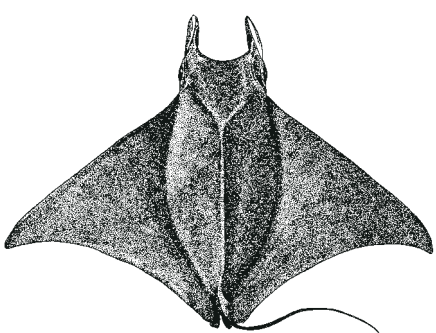
(after Yang, 1986)



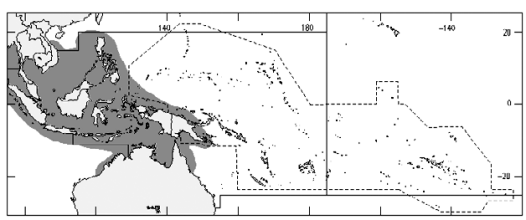
***Mobula eregoodootenkee*** (Bleeker, 1859)

**En** - Pygmy devilray.

Maximum disc width about 100 cm. A locally common small inshore and offshore devilray of the tropical Indo-West Pacific in continental coastal waters, not known to penetrate the epipelagic zone and not recorded from oceanic islands. Biology little known. Utilization pattern in the area poorly known, marketed in Thailand and probably elsewhere in the area. Occurs in the Indo-West Pacific from South Africa, the Red Sea, Arabian Sea, Persian Gulf, Pakistan, India, Sri Lanka, Myanmar, Malaysia, Singapore, Cambodia, Thailand, Viet Nam, Philippines, Indonesia, New Guinea, and tropical northern Australia (northern Queensland and Western Australia). Use of the species name is provisional, as Cuvier's original citation in 1829 was not a binomial but apparently a citation of an earlier vernacular name; use of *eregoodootenkee* as a valid binomial dates from Bleeker, 1859, with the first description as such from Garman, 1913. Also *Mobula diabolus* (Shaw, 1804) could be interpreted as the earliest valid name for this species rather than as a junior synonym of *M. mobular* (Bonnaterre, 1788).



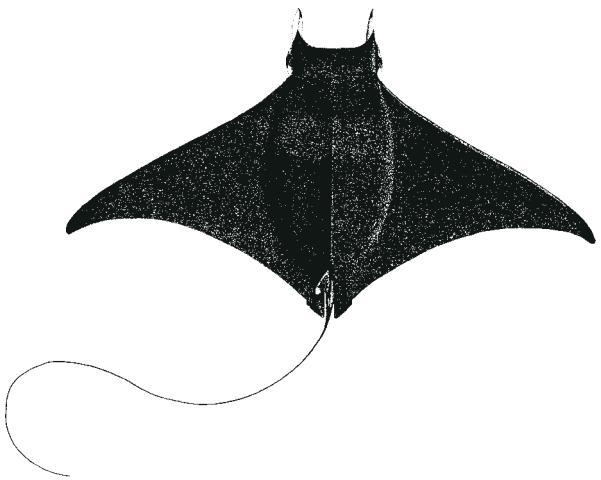
(after Notarbatolo di Sciara, 1987)

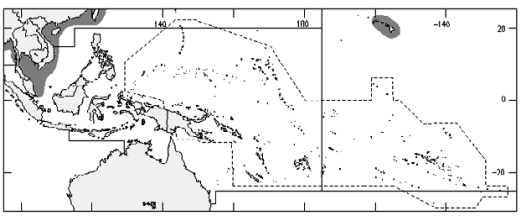


***Mobula japanica*** (Müller and Henle, 1841)

**En** - Spinetail mobula; **Fr** - Mante aiguillat; **Sp** - Manta de aguijón.

Maximum known disc width about 310 cm, possibly larger. A locally common large inshore, offshore, and possibly oceanic devilray of warm-temperate and tropical seas. Mostly seen or captured coastally, but apparently capable of crossing the epipelagic zone. Biology little known, size at birth about 85 cm, occurs singly or in groups. Utilization pattern in the area little known. Probably circumtropical in all temperate and tropical seas including the eastern Atlantic (Ivory Coast, probably more wide-ranging), the Indo-West Pacific from off South Africa, the Arabian Sea, Sri Lanka, and possibly India, Thailand (Gulf of Thailand), Viet Nam, Indonesia, Australia, New Zealand, Japan, Korea, China, and Taiwan Province of China; also Polynesia east to Hawaii, and the eastern Pacific (northern California to Peru). This species needs to be critically compared with *Mobula mobular* of the Mediterranean Sea and nominally elsewhere in the North Atlantic; this very similar spine-tailed *Mobula* is said to grow larger than the present species, but this may in part be a problem from confusion with *Manta* and also *Mobula tarapacana*, which grows larger than known *Mobula japanica*.

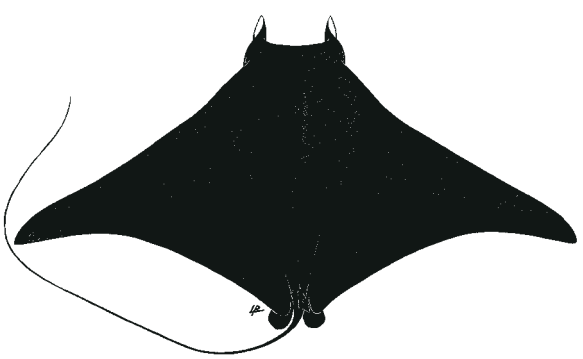


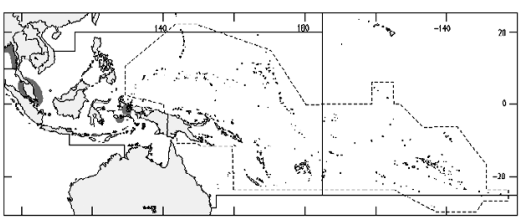


***Mobula kuhlii*** (Valenciennes in Müller and Henle, 1841)

**En** - Lesser devilray; **Fr** - Petit diable.

Maximum disc width about 110 cm. An uncommon small inshore devilray of the Indo-West Pacific, known from continental coastal areas and not extending into the epipelagic zone and off oceanic islands. Biology little known, born at about 31 cm width. Utilization pattern in the area unknown. Occurs in the Indo-West Pacific from off South Africa, Tanzania (Zanzibar), Seychelles, India, Sri Lanka, and Indonesia (Mysol); probably wider-ranging.

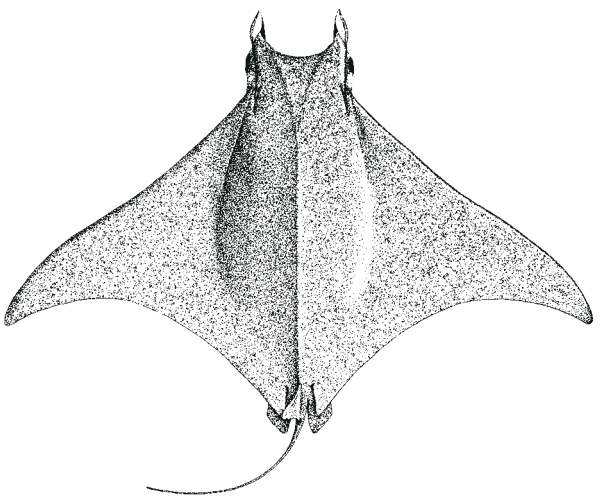


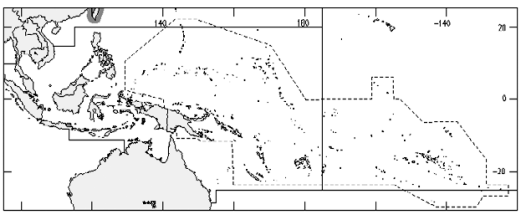


***Mobula tarapacana*** (Philippi, 1892)

**En** - Chilean devilray; **Fr** - Mante chilienne; **Sp** - Manta comuda.

Maximum disc width about 370 cm; size at birth over 105 cm. An uncommon large inshore and offshore devilray with a wide range in warm continental waters. Biology poorly known, feeds on planktonic crustaceans. Sometimes strands on beaches in temperate areas. Utilization pattern in the area little known. Probably circumtropical but recorded from scattered localities including the western Atlantic (off Venezuela), eastern Atlantic (Ivory Coast), Atlantic and Indian Ocean coasts of South Africa, the northwestern Red Sea, the western Pacific (Japan, Taiwan Province of China, and probably tropical Australia), and eastern Pacific (Gulf of California and Chile).

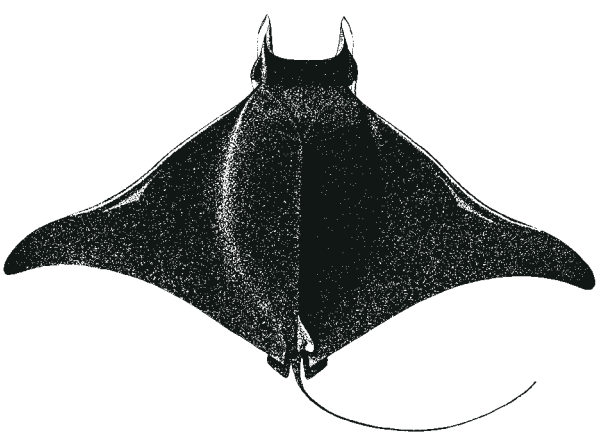


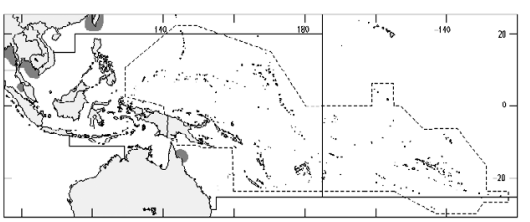


***Mobula thurstoni*** (Lloyd, 1908)

**En** - Smoothtail mobula; **Fr** - Mante vampire; **Sp** - Diablo chupasangre.

Maximum disc width at least 180 cm. An uncommon inshore and offshore devilray of coastal continental waters, not penetrating the epipelagic zone. Biology poorly known, size at birth about 65 to 85 cm. Utilization pattern in the area little known; apparently marketed in Thailand and probable elsewhere where it occurs. Probably circumtropical but known from scattered localities including the western Atlantic (Gulf of Tehuantepec), eastern Atlantic (Senegal), Indo-West Pacific Ocean off South Africa and India (Bay of Bengal), Thailand (Gulf of Thailand), probably Indonesia, and in the eastern Pacific. A possible earlier name for this species is *Mobula eregoodoo* (Cantor, 1849).





click for next page