

Order MYLIOBATIFORMES

PLESIOBATIDAE

Giant stingaree

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

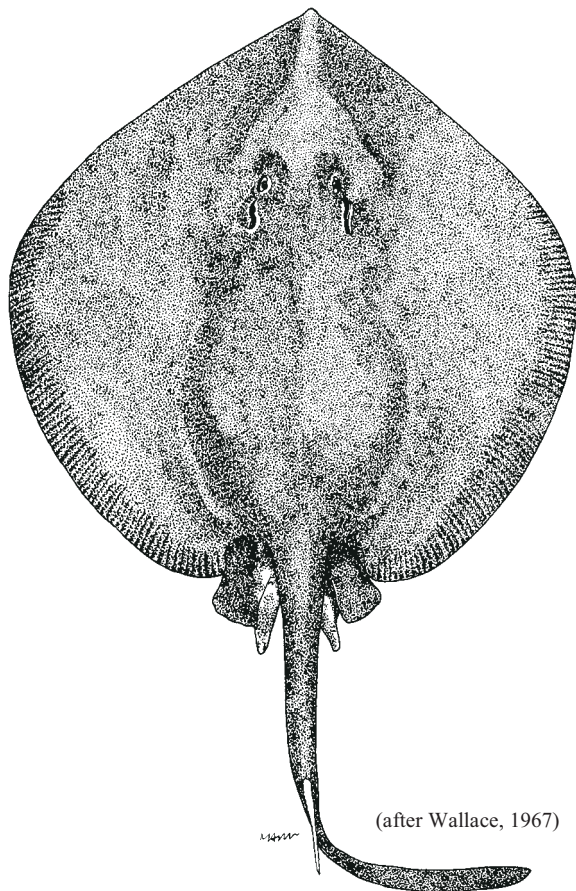
A single species in this family.

Plesiobatis daviesi (Wallace, 1967)

FAO names: En - Giant stingaree.

Frequent synonyms / misidentifications:*Urotrygon daviesi* Wallace, 1967; *U. marmoratus* Chu, Hu, and Li, in Chu, Meng, Hu, and Li, 1981 / None.

Diagnostic characters: Large heavy-bodied batoids with moderately stout short tails (not whip-like) about 0.9 times disc length, body with a fine covering of small denticles on the upper surface. Trunk depressed and flattened, not shark-like. Precaudal tail slightly depressed and subcylindrical, without lateral folds on sides, tail abruptly narrower than trunk, a prominent barbed sting (stinger or stinging spine) on dorsal surface of tail well behind pelvic fins; no electric organs in tail. Head broad and depressed; snout moderately elongated (over 6 times orbit diameter), broadly angular; snout supported entirely by pectoral-fin skeleton, no rostral cartilage; snout 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 or rakers on internal gill slits. Eyes small and dorsolateral on head, just anteromedial to spiracles. Mouth transverse, straight and moderately broad, without prominent knobs, depressions or labial folds; no oral papillae on floor of mouth. Nostrils very wide and just anterior to mouth, separated from it by much less than their own widths and connected by broad nasoral grooves with mouth; anterior nasal flaps short and medially expanded and fused into a very broad, short nasal curtain that ends just anterior to mouth. Oral teeth small, rounded-oval in shape and with short cusps on their crowns, not laterally expanded and plate-like, similar in shape and between 30 to 62 rows in either jaw (more rows present in adults than in young). Pectoral fins very large and forming a nearly circular disc, originating at anterior tip of snout and ending posterior to pelvic-fin origins; disc not subdivided at eyes by a notch; disc width 0.9 to 1.1 times disc length. No electric organs at bases of pectoral fins. Pelvic fins low, rounded-angular, and not divided into anterior and posterior lobes. No dorsal fin. Caudal fin moderately large, not shark-like, nearly symmetrical and very elongated (about 1/2 length of tail) and leaf-shaped, with vertebral axis not raised above body axis; lower caudal-fin lobe absent. **Colour:** purplish brown or purplish-grey on dorsal surface when alive (dark brown or grey in preservative), sometimes with irregular dusky blotches or spots; white below with dusky margin on disc, underside of tail dark.



(after Wallace, 1967)

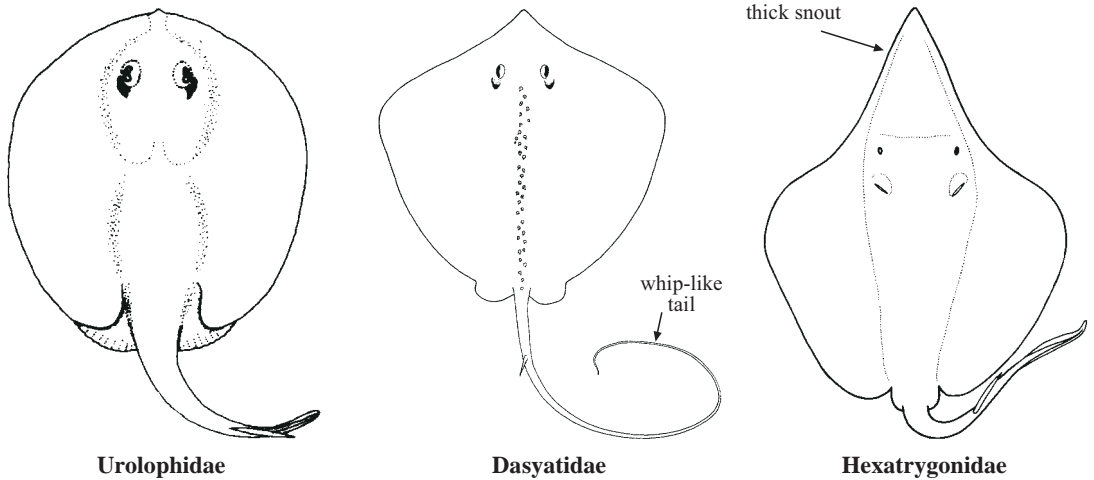
Similar families occurring in the area

Urolophidae: dorsal surface either naked (most species) or covered with coarse denticles (*Urolophus armatus*); nostrils not greatly expanded; nasal curtain narrower and reaching mouth; oral papillae present in mouth; caudal fin usually less than 1/2 tail length; adults much smaller, less than 90 cm in length.

Dasyatidae: tail usually long and whip-like, without a caudal fin but with longitudinal fin-folds variably developed or absent.

Hexatrygonidae: greatly elongated thick snout in adults; 6 pairs of gill openings; spiracles well behind eyes.

No other batoids in the area combine short tails with a large round pectoral disc, no dorsal fin, a long leaf-like caudal fin, and a stinger on the tail.



Urolophidae

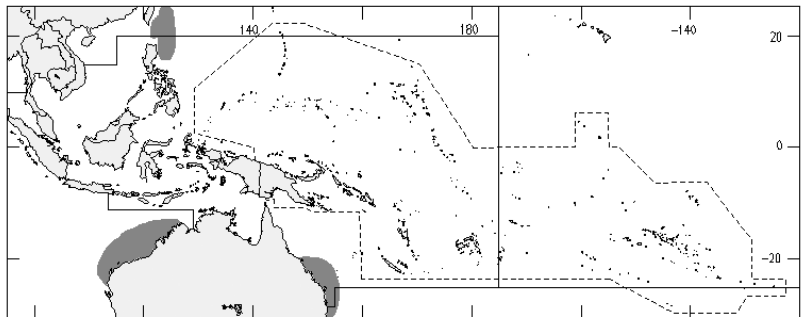
Dasyatidae

Hexatrygonidae

Size: Maximum total length at least 270 cm, females immature at 189 cm and adolescent at 201 cm, males adult at about 172 cm total length.

Habitat, biology, and fisheries: A locally common deep-water ray that occurs mostly on the upper continental slopes at depths of 275 to 680 m, but with a single shelf record from 44 m off Mozambique. Biology poorly known: found on soft bottoms. Probably viviparous but details of reproduction unknown; size at birth uncertain but a young freelifving specimen had an umbilical scar at 50 cm long. Feeds on fishes, crabs, shrimp, lobsters, and cephalopods. When caught on deep longlines, this ray will lash its tail vigorously when landed and should be treated with caution because of its long sting and powerful tail. Utilization in area unknown, collected in bottom trawls and on deepset longlines.

Distribution, Indo-West and Central Pacific from the east coast of South Africa (Natal), Mozambique, southern India, the South China Sea off China, the Kyushu-Palau Ridge, Japan (Ryu-Kyu Islands), Australia (from off Western Australia off Shark Bay and Rowley Shoals, and from off Townsville, Queensland, and Woolli, New South Wales), and Hawaii.



References

- Last, P.R. and J.D. Stevens. 1994. *Sharks and rays of Australia*. Australia, CSIRO, 512 p.
- Nishida, K. 1990. Phylogeny of the suborder Myliobatoidei. *Mem. Fac. Fish Hokkaido Univ.*, 37(1,2):1-108.

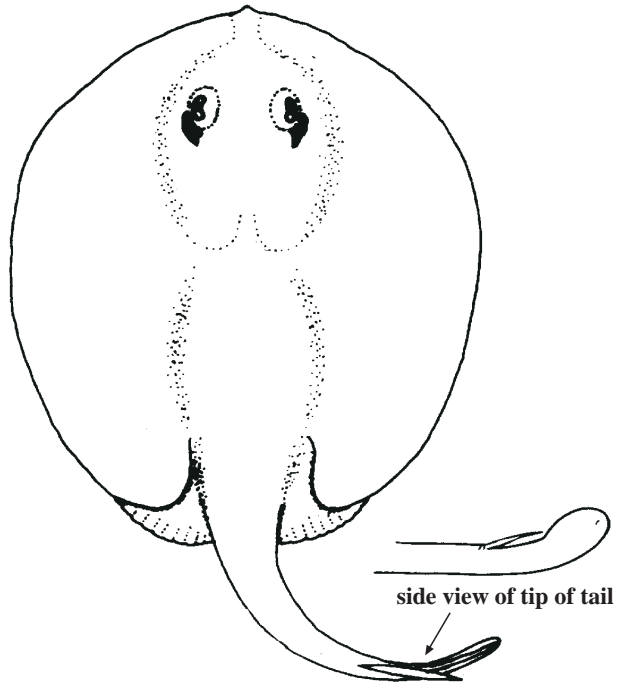
UROLOPHIDAE

Stingarees

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

Diagnostic characters: Small to moderate-sized batoids (adults between 15 and 80 cm total length) with **large, oval, circular, or rounded-rhomboidal pectoral discs and moderately stout, short tails (not whip-like)** about 0.6 to 1.2 times disc length. Body either entirely naked above and below or with a coarse covering of small dermal denticles and sometimes small thorns on the upper surface. **Trunk depressed and flattened, not shark-like.** Precaudal tail moderately depressed or cylindrical, with or without lateral folds on sides, tail abruptly narrower than trunk, a **prominent barbed sting (stinger or stinging spine) on dorsal surface of tail well behind pelvic fins;** no electric organs in tail. Head broad and depressed; **snout short or moderately elongated (less than 6 times orbit diameter in species in the area), broadly angular or rounded;** snout without a rostral cartilage, entirely supported by pectoral-fin skeleton; 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 or rakers on internal gill slits.** Eyes dorsolateral on head and just anteromedial to spiracles, usually moderately large but small in some western hemisphere species. Mouth transverse, straight or broadly arched, and narrow, without prominent knobs, depressions or labial folds, but some species with prominent papillae on lower lip; lobate 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 long and medially expanded and fused into a broad, elongated nasal curtain that overlaps mouth.** **Oral teeth small, rounded-oval in shape and with short cusps or keels on their crowns, not laterally expanded and plate-like,** similar in shape and in less than 50 rows in either jaw. Pectoral fins very large, originating at anterior tip of snout and ending posterior to pelvic-fin origins; disc width 0.9 to 1.3 times length; **disc not subdivided at eyes.** No electric organs at bases of pectoral fins. Pelvic fins low, rounded or rounded-angular, and not divided into anterior and posterior lobes. **A single small dorsal fin on the tail in front of the sting in some species; reduced to a low keel or absent in others.** Where present, dorsal fin low, rounded-angular, anterior and posterior margins either distinct or confluent; dorsal-fin base behind anterior half of total length and pelvic-fin bases and anterior, about opposite, or slightly posterior to midlength of tail. **Caudal fin small, not shark-like, nearly symmetrical and leaf-shaped,** with vertebral axis not raised above body axis; lower caudal-fin lobe absent. **Colour:** dorsal surface varies from uniform green, brown, grey, or yellowish, generally whitish below; dorsal surface either unspotted or variegated with light or dark spots, stripes, blotches, ocelli, or complex shapes or reticulations.

Habitat, biology, and fisheries: Stingarees are a moderately large and diverse group of inshore to deep-water batoids with a peculiar and disjunct distribution in temperate and tropical continental seas. In the eastern hemisphere they are absent from the eastern Atlantic, Mediterranean Sea, and western and northern Indian Ocean (including the Red Sea and Persian Gulf), but are very diverse in the eastern Indian Ocean and western Pacific off Australia. A few species occur in Indonesia and New Caledonia and a single outlying temperate species occurs off Japan and Korea. None occur in the Central Pacific. They are again highly diverse in the tropical eastern Pacific, with outlying species reaching temperate waters off northern California and Chile; a few related species occur in the western Atlantic from the east coast of the USA to Trinidad, Venezuela, and Brazil. These often common batoids range from the intertidal to the upper slope on soft bottom down to 420 m. Some inshore species occur in estuaries and enclosed bays but are apparently unable to penetrate fresh water to any extent and are absent from rivers and lakes. They are slow-swimming bottom-dwellers, often found on soft mud or sand or partially buried in 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 lining. Some species breed in the intertidal fringe off beaches or in shallow bays and lagoons. Litters are of 1 to 6 young that are born after approximately 3 months gestation. Stingarees feed on bottom crustaceans, worms, and small bottom fishes. Inshore species can be a hazard to bathers, swimmers, fishermen, and divers, as they can densely cover the bottom in favored shallow-water places such as beaches and coastal lagoons that are also frequented by people. They will strike out with their short but strong tails when stepped on or touched, and can inflict a painful injury with their relatively large, toxic, barbed stings. They are otherwise inoffensive to people. Utilization of these rays varies in different areas; most are too small for human consumption, but may be made into fish meal. Utilization in the area is uncertain; these rays are mostly rare in the area, except for northern Australia. As most of the tropical Australian species occur in deeper water on the outer continental shelf and upper slope, it is possible that further deep-water trawling within other parts of the area will reveal additional new species and records of poorly known described species (i.e. *Urolophus armatus*, *U. javanicus*, and *U. kaianus*).

Remarks: Western Hemisphere members of this family have been recently placed in their own family Urotrygonidae. These include western hemisphere species of *Urolophus* (now placed in the genus *Urobatis*) and the genus *Urotrygon*.

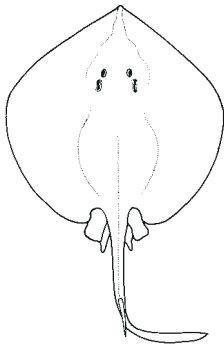
Similar families occurring in the area

Plesiobatidae: dorsal surface uniformly covered with fine denticles; long angular snout; nostrils greatly elongated; size much larger.

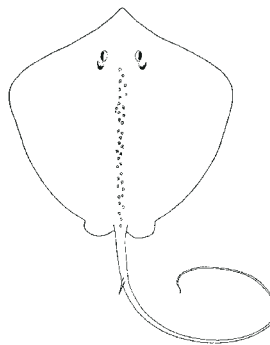
Dasyatidae: tail usually long and whip-like; without a caudal fin.

Hexatrygonidae: greatly elongated thick snout in adults; 6 pairs of gill openings; caudal fin greatly elongated.

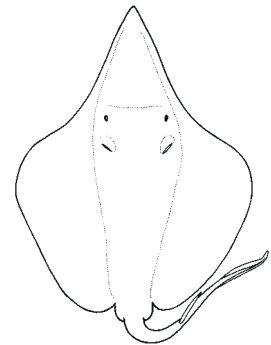
No other batoids in the area combine short slender tails with a large round or subangular pectoral disc, a small dorsal fin or none, a small well-defined caudal fin, and a stinger on the tail.



Plesiobatidae



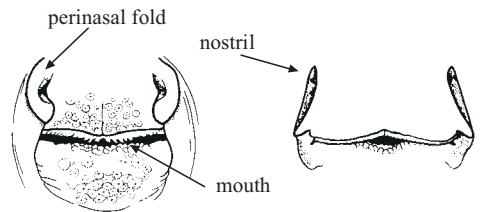
Dasyatidae



Hexatrygonidae

Key to the species of Urolophidae occurring in the area

- 1a. Nostrils with lateral perinasal fold (Fig. 1a) *Trygonoptera testacea*
- 1b. No lateral perinasal fold (Fig. 1b) . . (*Urolophus*) → 2
- 2a. Dorsal disc rough, covered with small denticles, and with thorn on shoulder girdle *Urolophus armatus*
- 2b. Dorsal disc smooth, no thorn on shoulder girdle → 3



a) *Trygonoptera testacea* b) *Urolophus*

Fig. 1 region of nostrils and mouth

(after Last and Stevens, 1994)

- 3a. A prominent dorsal fin present → 4
- 3b. Dorsal fin absent → 7

- 4a. Disc rounded, somewhat longer than wide; 3 oral papillae on floor of mouth . . . *Urolophus javanicus*
- 4b. Disc rhomboidal, wider than long; 7 to 16 papillae on floor of mouth . . . → 5
- 5a. Upper surface of disc and tail plain or with numerous fine brown spots; tail longer than 76% of disc length *Urolophus* sp. B
- 5b. Upper surface of disc and tail with pattern of white spots or reticulations; tail shorter than 76% of disc length → 6
- 6a. Fine light spots and reticulations on disc, those on centre not larger and more wide-spaced than those on margin of disc *Urolophus bucculentus*
- 6b. Large light spots forming a honeycomb pattern on disc, those on centre larger and more wide-spaced than those on margin of disc *Urolophus flavomosaicus*
- 7a. Nasal curtain bell-shaped, bulging near incurrent apertures (Fig. 2a) *Urolophus paucimaculatus*
- 7b. Nasal curtain skirt-shaped, tapering posterolaterally (Fig. 2b) → 8
- 8a. Disc subcircular, apices broadly rounded, disc about as wide as long; nasal curtain without distinct extended lateral lobes on posterior corners; tail oval to almost circular in section near base, without lateral folds, tail shorter, 64 to 76% of disc length. *Urolophus sufflavus*
- 8b. Disc rhomboidal, apices narrowly rounded, slightly wider than long; nasal curtain with distinct extended lateral lobes on posterior corners; tail depressed in section near base, with lateral folds, tail slightly longer, 75 to 91% of disc length. → 9
- 9a. Snout broadly angular, tip slightly projecting; upper surface uniform light green with paler edges, dorsal surface of eyeballs not abruptly darker *Urolophus viridis*
- 9b. Snout not angular, almost subcircular, tip not projecting; upper surface uniform yellowish brown, dorsal surface of eyeballs abruptly blackish *Urolophus kaianus*

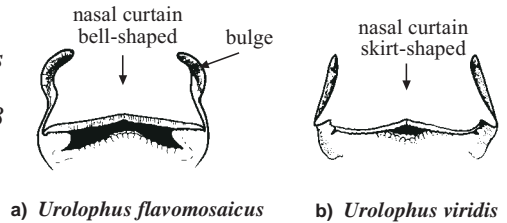


Fig. 2 region of nostrils and mouth
(after Last and Stevens, 1994)

List of species occurring in the area

The symbol ♠ is given when species accounts are included.

- ♠ *Trygonoptera testacea* Banks in Müller and Henle, 1841
- ♠ *Urolophus armatus* Valenciennes in Müller and Henle, 1841
- ♠ *Urolophus bucculentus* Macleay, 1884
- ♠ *Urolophus flavomosaicus* Last and Gomon, 1987
- ♠ *Urolophus javanicus* (Martens, 1864)
- ♠ *Urolophus kaianus* Günther, 1880
- ♠ *Urolophus sufflavus* Whitley, 1929
- ♠ *Urolophus viridis* McCulloch, 1916
- ♠ *Urolophus* sp. B [Last and Stevens, 1994]
- ♠ *Urolophus* sp. 1 [Seret] (New Caledonia)^{1/}
- ♠ *Urolophus* sp. 2 [Seret] (New Caledonia)^{1/}

References

Grant, E. M. 1978. *Guide to fishes*. Department of Harbours and Marine: Brisbane, 768 p.

Last, P.R. and J.D. Stevens. 1994. *Sharks and rays of Australia*. Australia, CSIRO, 512 p.

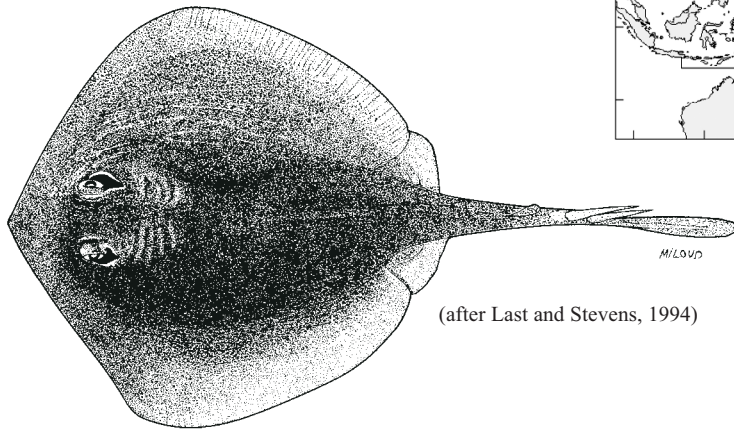
Whitley, G.P. 1940. *The fishes of Australia. Part I. The sharks, rays, devil-fish and other primitive fishes of Australia and New Zealand. Australian Zoological Handbook*. Sydney, Royal Zoological Society of New South Wales, 280 p.

^{1/} One of the unnamed New Caledonian species may be conspecific with *Urolophus* sp. B; these are omitted from the key at present.

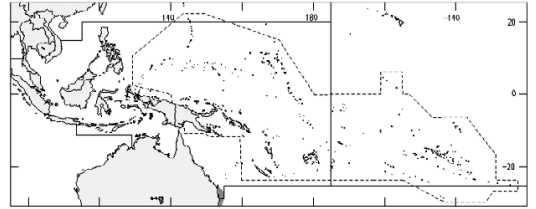
***Trygonoptera testacea* Banks in Müller and Henle, 1841**

En - Common stingaree.

Maximum total length at least 47 cm; males mature at 31 cm. A locally common inshore and offshore stingaree endemic to the eastern continental shelf of Australia and reaching the southernmost part of the area. Found in estuaries, sandy beaches, and reefs but also well offshore, from the intertidal and brackish water in estuaries to a depth of 135 m, mostly less than 60 m. Seldom utilized in the area. Occurs off New South Wales (Cape Howe) to southern Queensland (Caloundra).



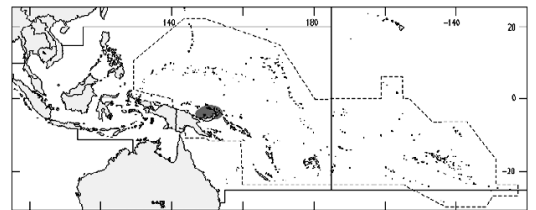
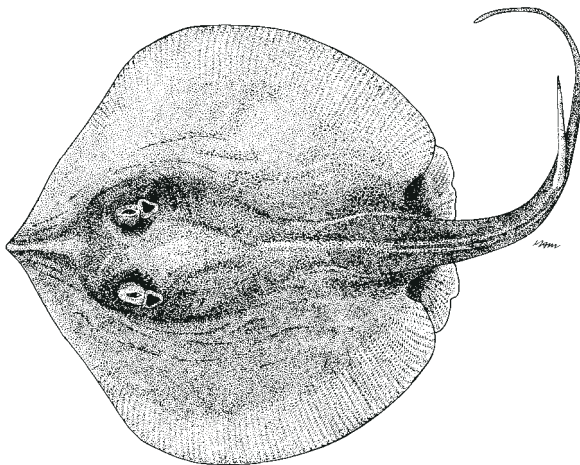
(after Last and Stevens, 1994)



***Urolophus armatus* Valenciennes in Müller and Henle, 1841**

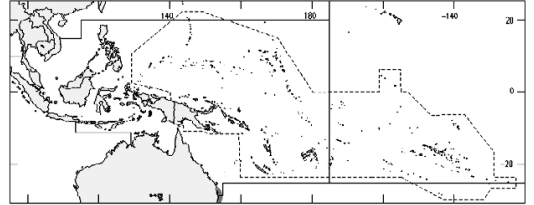
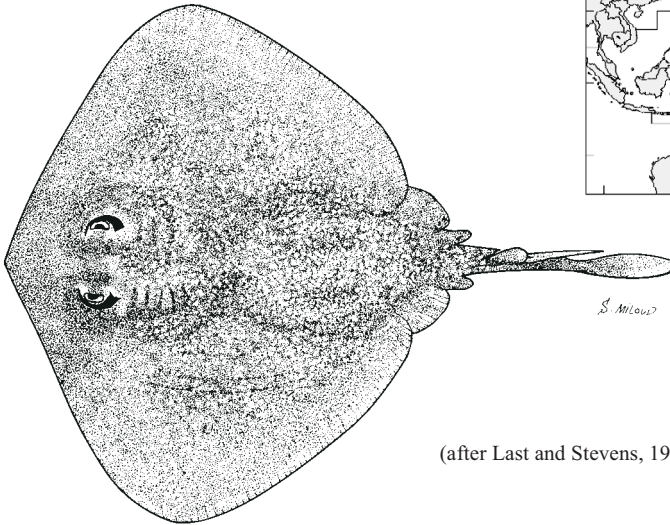
En - New Ireland stingaree.

Maximum total length about 17 cm for a juvenile male, probably attains a greater size. A rare distinctive stingaree that is endemic to the area. Biology little known, possibly not utilized in the area. Occurs off New Ireland, Bismark Archipelago, and possibly New Guinea.



Urolophus bucculentus* Macleay, 1884*En** - Sandyback stingaree.

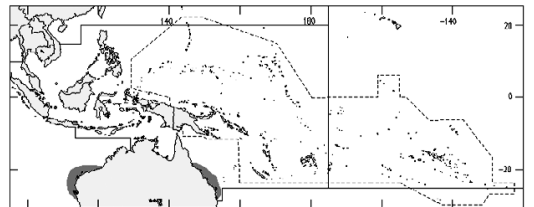
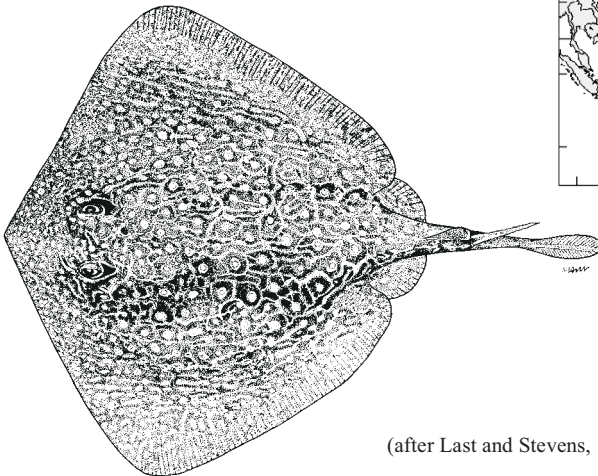
Maximum total length at least 80 cm, with males maturing at about 40 cm. A locally common large offshore bottom stingaree that occurs on the outer continental shelf and uppermost slope at depths of 100 to 230 m. Biology little known; edible, but seldom utilized in the area. Occurs off the southeastern coast of Australia, from South Australia (Beachport), Victoria, Tasmania (south to Hippolyte Rocks), New South Wales, and Queensland (Stradbroke Island).



(after Last and Stevens, 1994)

Urolophus flavomosaicus* Last and Gomon, 1987*En** - Patchwork stingaree.

Maximum total length at least 59 cm, with smallest mature male 38 cm. A distinctive offshore stingaree of tropical Australia, that occurs on the continental shelf and uppermost slope at 60 to 300 m. Biology little known, not utilized in the area. Occurs off the east and west coasts of tropical Australia, from off Western Australia (from Abrolhos Islands to Port Hedland) and Queensland (from Caloundra to Townsville), but so far not collected in the intervening area.

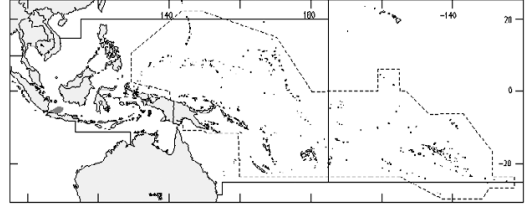
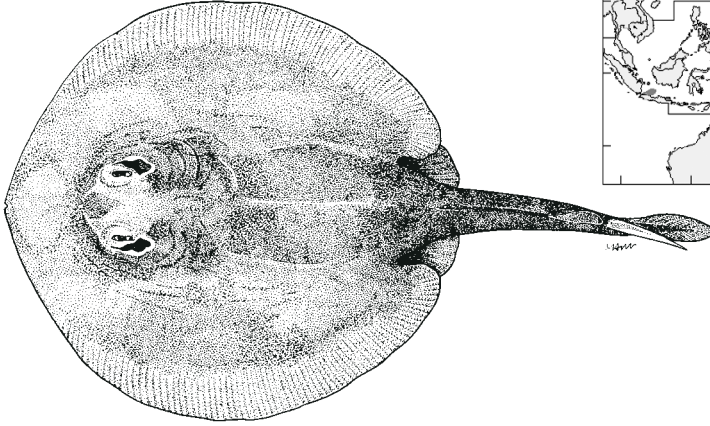


(after Last and Stevens, 1994)

***Urolophus javanicus* (Martens, 1864)**

En - Java stingaree.

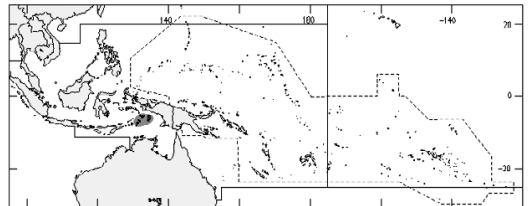
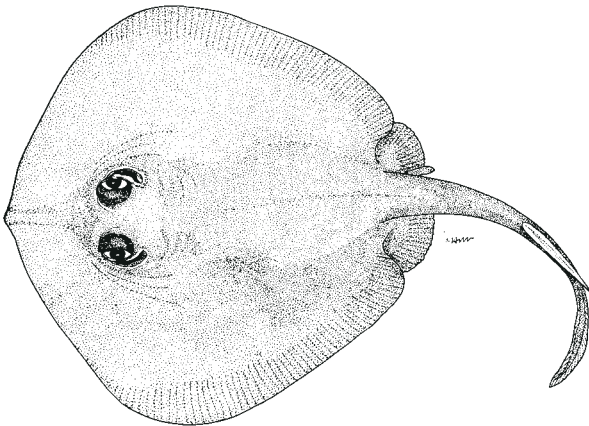
Maximum total length uncertain (data needed on types). A rare stingaree, with biology virtually unknown; utilization pattern unknown. Occurs off Java (Djakarta) in the area, but not known from elsewhere.



***Urolophus kaianus* Günther, 1880**

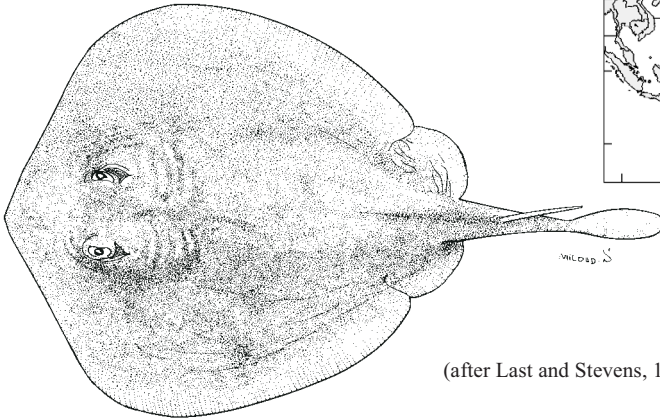
En - Kai stingaree.

Maximum known total length at least 23 cm (an immature male, possibly approaching adolescence), probably attains a larger size. A little-known deep-water stingaree that occurs off the Kai Islands, Indonesia in a depth of 236 m on blue mud bottom. Biology virtually unknown, possibly rare as only the 2 syntypes have been collected.

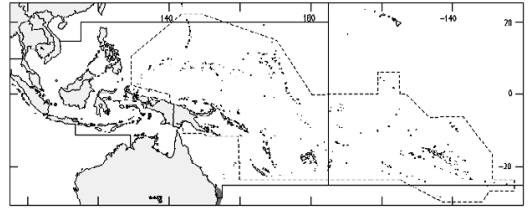


Urolophus sufflavus* Whitley, 1929*En** - Yellowback stingaree.

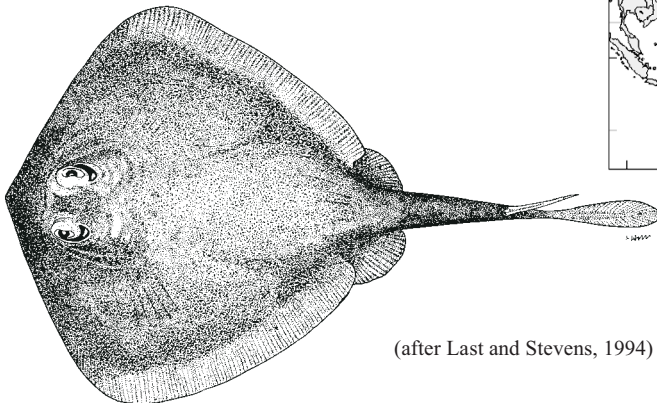
Maximum total length at least 42 cm, with males maturing at about 23 cm. A little-known but locally common offshore stingaree of the east coast of Australia. Found on the bottom at depths of 45 to 300 m, but mostly on the outer continental shelf at depths of 100 to 160 m. Biology little known, occasionally utilized in the area. Occurs off the east coast of Australia from New South Wales (Green Cape) and Queensland (Stradbroke Island). Possibly hybridizes with the largely allopatric banded stingaree, *Urolophus cruciatus* (a more southern species), and perhaps one of the few known cases of chondrichthyan hybridization.



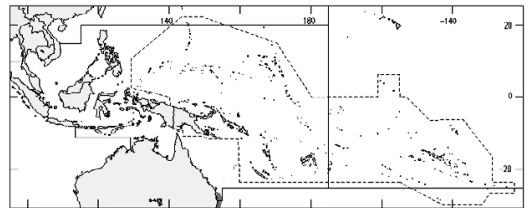
(after Last and Stevens, 1994)

***Urolophus viridis* McCulloch, 1916****En** - Greenback stingaree.

Maximum total length at least 44 cm, with males mature at 27 cm. A common offshore benthic stingaree of the southeastern coast of Australia that occurs on the continental shelf at depths of 20 to 200 m, but with most individuals between 80 and 180 m. Biology little known, occasionally utilized in the area. Occurs off southeastern Australia from Victoria (Portland), Tasmania, and New South Wales to southern Queensland (Stradbroke Island) and barely into the present area. Also, a related or identical species is found off southern Western Australia in deep water.

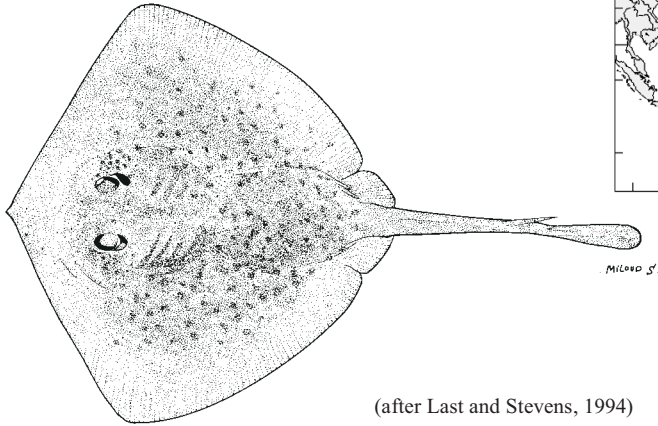


(after Last and Stevens, 1994)



***Urolophus* sp. B** [Last and Stevens, 1994]**En** - Coral Sea stingaree.

Maximum total length at least 48 cm; males maturing at 23 cm; born at about 10 cm. A little-known deep-water stingaree of the upper continental slope of northeastern Queensland, in depths of 280 to 350 m. Biology little known, not utilized in the area. Occurs in the Coral Sea off Queensland from Makay to Cairns.



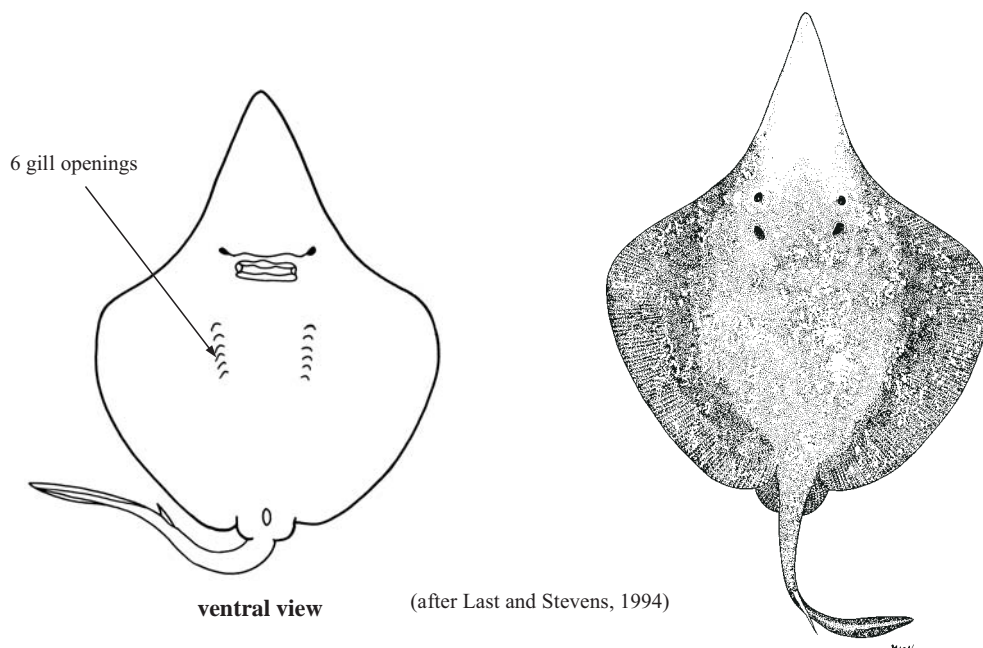
(after Last and Stevens, 1994)

HEXATRYGONIDAE**Sixgill stingray**

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

Possibly only a single species in this family.***Hexatrygon bickelii*** Heemstra and Smith, 1980

Frequent synonyms / misidentifications: ? *Hexatrematobatis longirostrum* Chu and Meng, in Chu, Meng, Hu, and Li, 1981; ? *Hexatrygon yangi* Shen and Liu, 1984; ? *Hexatrygon taiwanensis* Shen, 1986; ? *Hexatrygon brevirostra* Shen, 1986 / None.

FAO names: En - Sixgill stingray.

Diagnostic characters: Large heavy-bodied batoid with **large, heart-shaped disc with rounded apex and with moderately stout short tail (not whip-like)**, about 0.5 to 0.7 times disc length (longer in young). Body without denticles or thorns. **Trunk depressed and flattened, not shark-like.** Precaudal tail moderately depressed or cylindrical, without lateral folds on sides, tail abruptly narrower than trunk, **a prominent barbed sting (stinger or stinging spine) on dorsal surface of tail well behind pelvic fins;** no electric organs in tail. Head broad and depressed; **snout greatly elongated (over 6 times orbit diameter) but lengthening with growth, broadly angular,** without a rostral cartilage and supported entirely by pectoral fin skeleton not formed into a rostral saw and without lateral saw teeth. **Six small gill openings** on underside of front half of pectoral disc, not visible in lateral view; no gill sieves or rakers on internal gill slits. Eyes small and dorsolateral on head, well anterior to spiracles. Mouth transverse, straight and moderately broad, without prominent knobs, depressions or labial folds; no oral papillae on floor of mouth. Nostrils very wide and just anterior to mouth, separated from it by much less than their own widths and not connected by broad nasoral grooves with mouth; **anterior nasal flaps very short and medially expanded and fused into a very broad, very short nasal curtain that ends just anterior to mouth.** **Oral teeth small, rounded-oval in shape** and with low ridges on their crowns, **not laterally expanded and plate-like, similar in shape** and between 44 to 102 rows in either jaw (more rows present in adults than in young). Pectoral fins very large and forming a heart-shaped disc originating at anterior tip of snout and ending posterior to pelvic-fin origins; **disc not subdivided by notch at eyes** but with the snout base distinct from the rest of the disc; disc width 0.7 to 1.0 times disc length. No electric organs as bases of pectoral fins. Pelvic fins low, rounded, and not divided into anterior and posterior lobes. **No dorsal fin. Caudal fin moderately large, not shark-like, nearly symmetrical and very elongated** (about half length of tail) and leaf-shaped, with vertebral axis not raised above body axis; lower caudal-fin lobe absent. **Colour:** purplish brown on dorsal surface when alive (dark brown in preservative); white below with dusky margin on disc and pelvic fins, underside of tail dark.

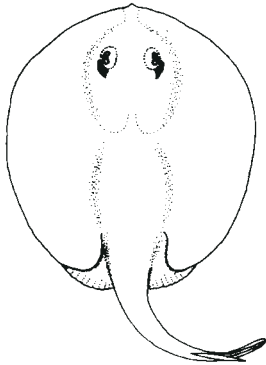
Similar families occurring in the area

Urolophidae: 5 pairs of gill openings; snout not greatly elongated; spiracles just behind eyes; nasal curtain narrower and reaching mouth; oral papillae present in mouth; adults much smaller, less than 90 cm long.

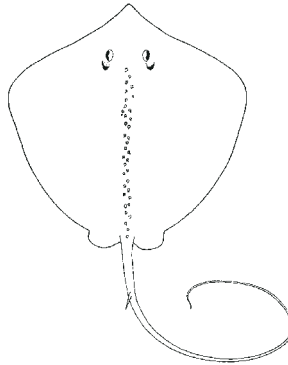
Dasyatidae: 5 pairs of gill openings; spiracles just behind eyes; oral papillae present in mouth; tail usually long and whip-like, without a caudal fin but with longitudinal fin-folds variably developed or absent.

Plesiотrygonidae: snout less elongated and not thickened in adults; 5 pairs of gill openings; spiracles just behind eyes (rather than well behind eyes).

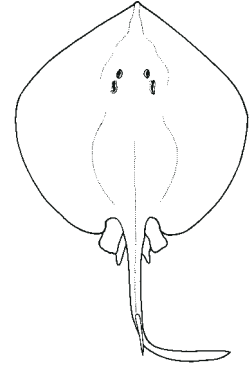
No other batoids in the area or elsewhere combine 6 pairs of gill slits, short tails with a long, leaf-like caudal fin, large rounded-rhomboidal pectoral disc, a greatly elongated, thick snout, no dorsal fin, and a sting on the tail.



Urolophidae



Dasyatidae

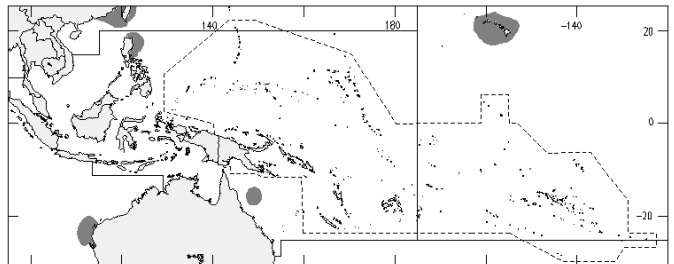


Plesiотrygonidae

Size: Maximum total length to at least 168 cm (adult female); females immature at about 103 cm; males late-adolescent at 104 cm and mature at an estimated 110 cm; size at birth about 48 cm long (size of term fetuses from South Africa and Hawaii).

Habitat, biology, and fisheries: A rare deep-water ray that has been collected mostly on the upper continental slopes at depths of 362 to 1 120 m, but with 2 specimens (including a live pregnant female with term fetuses) stranding on sandy beaches off South Africa and 1 photographed feeding in shallow water off Japan by divers. Biology poorly known; found on soft bottoms. Ovoviviparous, with 3 term fetuses known from a single South African female. Feeding habits unknown, although the strongly protractile mouth is likely to be used for removing prey from the substrate. The snout tip is prehensile and is presumably used to poke about on the bottom in search of food. A single specimen examined had a wound from a "cookiecutter shark" (*Isistius brasiliensis*). Utilization in area unknown, infrequently caught in bottom trawls.

Distribution: Indo-West and Central Pacific from the east coast of South Africa (eastern Cape off Port Elizabeth and Port Alfred, possibly western Cape near Cape Agulhas), the South China Sea off China, Taiwan Province of China, Philippines, Japan (Tokara Islands and the Okinawa Trough), Philippines, Australia (Western Australia off Exmouth Plateau to Shark Bay; also from Queensland off Flinders Reef), and Hawaii.



Remarks: Several species of sixgill stingrays have been named from the western Pacific mostly on snout length and shape. However, these forms may be based on variation with growth (the snout is much longer in adults than young, with term fetuses having much shorter snouts than their mothers) and state of preservation (the snout is very soft and gelatinous and can shrink greatly while exposed to air as well as in fixatives and preservatives). Arrangement of these within a single species is provisional.

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