**TURBINIDAE**

**Turban shells**

Diagnostic characters: Shell thick, often heavy, turbanate to conical (occasionally flattened) in shape. Outer sculpture very variable, often spiral to nodular. Periostracum well developed to absent. Aperture variously rounded, without a siphonal canal, nacreous inside. Inner lip smooth. Umbilicus present, at least at juvenile stages. Operculum strongly calcified externally, its inner layer corneous, usually showing spiral coiling with a subterminal or central nucleus. Head with a short, mid-ventrally split snout, and a pair of long tentacles, the eyes on stalks at their outer bases. Foot large and ovate, sometimes anteriorly truncate, with a fleshy ridge on either side bearing tentaculate processes.

Habitat, biology, and fisheries: Mainly living in shallow waters of warm temperate and tropical seas, especially on rocky and coral reef habitats. Herbivorous animals, feeding on small epibenthic algae and vegetable detritus. Sexes separate, fertilization external. Eggs generally released in gelatinous masses, hatching as free-swimming planktonic larvae. Turbans (especially the larger species) are commonly collected in the Indo-West Pacific, both for their edible flesh and nacreous shell. They are locally valued for food and some are sought for mother-of-pearl or for carving ornaments. In recent years, heavy commercial exploitations have locally depleted populations. Efforts are expected in the future to produce juveniles in hatcheries and introduce turbans in areas in which they have become extinct or areas currently poor in fisheries resources.

Similar families occurring in the area

Phasianellidae: shell rather thin, mostly small and smooth, without periostracum; aperture pear-shaped, not nacreous inside.

Trochidae: appearance of the shell sometimes strongly convergent with Turbinidae, but easily distinguishable by the entirely corneous operculum.
Key to species of interest to fisheries occurring in the area

1a. Periphery of whorls sharply angulated, with a series of flattened spines (Fig. 1); operculum ovate, with a subterminal nucleus .................................................. Astralium calcar

1b. Periphery of whorls not sharply angulated, without flattened spines; operculum nearly circular, with a subcentral nucleus .......................................................... ⇒ 2

2a. Surface of shell smooth and highly polished (Fig. 2) .................................. Turbo petholatus

2b. Surface of shell with a distinct sculpture, not polished ................................ ⇒ 3

3a. Spire low, dome-shaped .................................................................................. ⇒ 4

3b. Spire well developed, pointed .......................................................................... ⇒ 5

4a. Surface of shell covered with fine nodulose spiral threads (Fig. 3) ............... Turbo cinereus

4b. Surface of shell covered with spiral rows of coarse nodules and granules (Fig. 4) . Turbo coronatus

5a. Outside of operculum with a spiral ridge and central perforation (Fig. 5) ........ Turbo bruneus

5b. Outside of operculum without a spiral ridge and central perforation .......... ⇒ 6

6a. Shell very large (up to 22 cm in length); spiral sculpture poorly developed, apart from 3 ribs bearing blunt tubercules on body whorl (Fig. 6) ........................................ Turbo marmoratus

6b. Shell moderately large (up to 10 cm in length); spiral sculpture well developed, with numerous ribs and grooves throughout ...................................................... ⇒ 7

7a. Axial sculpture of threads, spines or scales ...................................................... ⇒ 8

7b. Axial sculpture of fine striae only .................................................................... ⇒ 9

8a. Outside of operculum approximately smooth, with oblique marginal grooves; colour of the aperture mostly orange-yellow (Fig. 7) ........................................ Turbo chrysostomus

8b. Outside of operculum prominently pustulose, with oblique marginal grooves; colour of the aperture mostly silvery white (Fig. 8) ........................................ Turbo argyrorostomus

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Fig. 1 Astralium calcar (basal view)  
Fig. 2 Turbo petholatus (ventral view)  
Fig. 3 Turbo cinereus (ventral view)  
Fig. 4 Turbo coronatus (ventral view)  
Fig. 5 Turbo bruneus (ventral view)  
Fig. 6 Turbo marmoratus (ventral view)  
Fig. 7 Turbo chrysostomus (ventral view)  
Fig. 8 Turbo argyrorostomus (ventral view)
9a. Spire relatively long (Fig. 9); operculum deep brown at the centre .............. *Turbo crassus*

9b. Spire relatively short (Fig. 10); operculum whitish at the centre .............. *Turbo setosus*

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**Fig. 9 Turbo crassus (ventral view)**

**Fig. 10 Turbo setosus (ventral view)**

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**List of species of interest to fisheries occurring in the area**

The symbol ☉ is given when species accounts are included.

☉ *Astrodium calcar* (Linnaeus, 1758)
☉ *Turbo argyrostomus* Linnaeus, 1758
☉ *Turbo bruneus* (Röding, 1798)
☉ *Turbo chrysostomus* Linnaeus, 1758
☉ *Turbo cinereus* Born, 1778
☉ *Turbo coronatus* Gmelin, 1791
☉ *Turbo crassus* Wood, 1828
☉ *Turbo marmoratus* Linnaeus, 1758
☉ *Turbo petholatus* Linnaeus, 1758
☉ *Turbo setosus* Gmelin, 1791

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**References**


**Turbo argyrostomus** Linnaeus, 1758

**Frequent synonyms / misidentifications:** *Marmarostoma argyrostoma* (Linnaeus, 1758) / None.

**FAO names:** En - Silvermouth turban; Fr - Turbo bouche-d’argent.

**Diagnostic characters:** Shell large (up to 10 cm long), solid and heavy, **turbinate** in shape with length about equal to or slightly greater than width. Spire well developed, pointed, **whorls strongly convex with shoulder keel weak or lacking and deeply impressed sutures**. Outer **sculpture variable**, with rounded **spiral cords** of unequal size which are wider than their interstices and **which may bear small prickles**, and with fine, overriding axial threads. Body whorl usually with a more prominent spiral cord near the suture and 1 or 2 other ones towards periphery. **Aperture rounded ovate**, extending on about half of the total length of shell, with a thick, serrate outer lip. **Columella smooth, not flaring anteriorly**, slightly grooved under the **umbilicus** which is **generally deeply open**. Operculum more or less circular in outline, with a subcentral nucleus. **Exterior of operculum convex, prominently pustulose**, with fine oblique marginal wrinkles. **Colour:** outside of shell either whitish or irregularly marbled with green and brown, or uniformly greenish. **Aperture glossy white, becoming silvery white inside**. **Exterior of operculum white**, often with a greenish centre and brown to orange outer margin.

**Size:** Maximum shell length 10 cm, commonly to 7.5 cm.

**Habitat, biology, and fisheries:** Coral reef areas, in moderately exposed habitats and in lagoons of atolls. One of the most frequently collected species of turban shells in the tropical Southwest Pacific. Mainly used as food, but the shell locally serves also for making buttons.

**Distribution:** Widespread in the Indo-West Pacific, from East and Southeast Africa to eastern Polynesia; north to southern Japan and south to northern Queensland.
**Turbo chrysostomus** Linnaeus, 1758

**Frequent synonyms / misidentifications:** *Marmorostoma chrysostoma* (Linnaeus, 1758) / None.

**FAO names:** En - Goldmouth turban; Fr - Turbo bouche-d’or.

**Diagnostic characters:** Shell moderately large, solid and heavy, turbinate in shape with length usually greater than width. Spire well developed, pointed, whorls strongly convex and with angular shoulders. Outer sculpture variable, with rounded, unequal spiral cords and many fine scaly axial threads, most developed on the interstices of cords. **Body whorl biangulate, with stronger spiral cords at shoulder and periphery, each bearing a row of short open spines or nodules. Aperture roughly rounded-ovate, about half the total length of shell, forming a blunt angle at the slightly flaring anterior end of smooth columella. Outer lip marginally serrate, smoothish inside. Umbilicus closed or reduced to a slight chink. Operculum nearly circular in outline, with a subcentral nucleus. Exterior of operculum very convex, approximately smooth, with fine oblique grooves on its outer margin.** Colour: outside of shell brownish or cream-coloured, often marbled with irregular axial stripes of darker brown and/or green. Aperture mostly bright orange to golden yellow, with white margins. **Exterior of operculum brown or dark green, becoming whitish at periphery.**

**Size:** Maximum shell length 8 cm, commonly to 6 cm.

**Habitat, biology, and fisheries:** In coral reef areas. Intertidal and shallow sublittoral zones, to a depth of about 20 m. Exploited in Fiji Islands, and frequently collected for food locally by coastal people, where abundant. Shell used in shellcraft.

**Distribution:** Widespread in the Indo-West Pacific, from southeastern Africa to Melanesia; north to southern Japan and south to southern Queensland and New Caledonia.
**Turbo marmoratus** Linnaeus, 1758

**Frequent synonyms / misidentifications:** *Lunatica marmorata* (Linnaeus, 1758); *Turbo regenfussi* Deshayes, 1843 / None.

**FAO names:** En - Green turban; Fr - Turbo vert.

**Diagnostic characters:** Shell reaching a very large size (up to 22 cm long), sturdy, roughly turbinate in shape with a rather small, pointed spire and a strongly developed, massive body whorl. Length of shell about equal to or slightly smaller than width. Spire whorls rounded, becoming angular on shoulder in later stages of growth. Outer surface of shell densely set with numerous fine axial marks of growth. **Spiral sculpture poorly developed, apart from 3 ribs on shoulder, periphery, and base of body whorl, bearing blunt tubercles.** Aperture rounded and very large, extending on about 2/3 of total length of shell. **Outer lip thick-walled, smooth inside, somewhat angular at shoulder and flaring outward at anterior end,** forming with the columella a broad, flattened projection. Inner lip strongly concave and extensively calloused. **Umbilicus narrow in large adults (closed in small specimens), encircled by a heavy oblique ridge.** Opeculum massive, circular in outline, with a subcentral nucleus. **Exterior of operculum smooth to finely granular.** **Colour:** outside of shell dull-coloured, uniformly greenish or with spiral bands of alternating chestnut brown and grey spots. Interior of aperture silvery white. **Exterior of operculum whitish.**

**Size:** Maximum shell length 22 cm, commonly to 18 cm.

**Habitat, biology, and fisheries:** In subtidal, coral reef areas open to a constant flow of clean oceanic water. Juveniles mainly living on reefs crests, at depths of 1 to 5 m; adults also occurring deeper on slopes, to about 20 m or more. Extensively used for food, shell jewellery, inlay, and button making. It is the most important commercial species of Turbinidae in the tropical Indo-West Pacific, with a total production of 1 000 t in 1988 (FAO, 1990). Intensive fishing for the mother-of-pearl trade has drastically reduced many turban populations in recent years. In order to protect existing resources and to increase the possibilities of long-term exploitations, attempts of juvenile production, reintroduction, translocation, and commercial legislation are under way in the area.

**Distribution:** Widespread in the Indo-West Pacific, from East Africa, including Madagascar, to eastern Melanesia; north to southern Japan and south to northern Queensland and Fiji Islands. Successfully introduced in French Polynesia since the 1960s.
**Turbo petholatus** Linnaeus, 1758

**Frequent synonyms / misidentifications:** *Turbo elegans* Philippi, 1847; *T. reevei* Philippi, 1847 / None.

**FAO names:** En - Tapestry turban; Fr - Turbo tapisserie.

**Diagnostic characters:** Shell moderately large, thick and heavy, **turbinate** in shape with length equal to or slightly greater than width. Spire well developed, pointed, **whorls strongly convex with a rounded outline** becoming somewhat flattened beneath the **impressed sutures.** Outer **surface of shell smooth and highly polished.** Aperture rounded-ovate, extending on about half the total length of shell. Outer lip thin, smooth inside. **Columella smooth, without an umbilicus.** **Oперкулум** nearly circular in outline, with a subcentral nucleus and a **convex, smooth external surface.** **Colour:** outside of shell **variable in colour and pattern,** usually brown, red, orange, or greenish, **often ornamented with dark spiral bands and/or thin, chevron-shaped, pale-coloured axial stripes.** Aperture silvery white inside, often suffused with yellow, orange or green on margins, especially on inner-lip margin. Exterior of operculum shiny, bluish green in the centre, becoming brown towards the margins.

**Size:** Maximum shell length 8.5 cm, commonly to 6 cm.

**Habitat, biology, and fisheries:** Shallow coral reefs and rocky shores, in relatively protected habitats. Sublittoral, to depths of about 40 m. Collected for food and for its highly polished, colourful shell. The operculum is well known in shell jewellery under the name “cat’s eye”.

**Distribution:** Widespread in the Indo-West Pacific, from East and Southeast Africa, including Madagascar and the Red Sea, to eastern Polynesia; north to Japan and south to southern Queensland and New Caledonia.
**Turbo setosus** Gmelin, 1791


FAO names: En - Rough turban; Fr - Turbo soyeux.

![ventral view](after Salvat and Rives, 1975)

![dorsal view](after Salvat and Rives, 1975)

Diagnostic characters: Shell moderately large, thick and heavy, turbinate in shape with length usually greater than width. Spire pointed, well developed but relatively short, whorls strongly convex, regularly rounded, with moderately impressed sutures. Outer sculpture of strong, unequal spiral cords, with groove-like interstices and very fine axial striae. Aperture large and oval, exceeding half of the total length of shell, somewhat flaring at the anterior end of the smooth columella. Outer lip crenulated at margin and spirally fluted inside. Umbilicus closed or nearly so. Operculum almost circular in outline, with a subcentral nucleus. Exterior of operculum smoothly convex, finely granulated in the centre and striated at the outer margin. **Colour:** outside of shell whitish or light fawn, irregularly maculated with dark brown or greyish green along the spiral cords. Aperture silvery white inside, the outer lip sometimes with a green hue. Columella glossy white. Operculum whitish externally.

**Size:** Maximum shell length 8 cm, commonly to 5 cm.

**Habitat, biology, and fisheries:** In exposed areas of coral reefs. Sublittoral zone, in shallow water. Like *Turbo argyrostomus*, one of the most frequently collected Turbinidae in the area, mainly for food. Shell also used as material for making buttons.

**Distribution:** Widespread in the Indo-West Pacific, from Madagascar and the Mascareign Islands to eastern Polynesia; north to southern Japan and south to Papua New Guinea and New Caledonia.
**Astraliurn calcar** (Linnaeus, 1758)

**Frequent synonyms / misidentifications:** *Astrea calcar* (Linnaeus, 1758) / None.

En - Spurred turban; Fr - Turbo éperonné.

Maximum shell length 6 cm, commonly to 4 cm. On rocky shores and coral reefs. Intertidal and shallow subtidal waters. Occasionally appearing on local markets of the northern Philippines. Eastern Indian Ocean and the tropical West Pacific, from the Andaman Sea to Melanesia; north to southern Japan and south to New Caledonia.

![basal view](after Pilsbry, 1988)

![dorsal view](after Pilsbry, 1988)

**Turbo bruneus** (Röding, 1798)

**Frequent synonyms / misidentifications:** *Marmarostoma bruneus* (Röding, 1798); *Turbo ticaonicus* Reeve, 1848 / *Turbo intercostalis* Menke, 1843 (= *Turbo pulcher* Reeve, 1842).

En - Brown Pacific turban; Fr - Turbo brun.

Maximum shell length 6 cm, commonly to 4 cm. Rocky shores and coral reefs, in shallow subtidal waters to a depth of about 20 m. Collected mainly for food by coastal populations. Widespread in the Indo-West Pacific, from Madagascar and India to eastern Indonesia; north to the Philippines and south to northern Australia.

![ventral view](after Wilson, 1993)
**Turbo cinereus** Born, 1778

**Frequent synonyms / misidentifications:** *Lunella cirenea* (Born, 1778); *Turbo lugubris* Reeve, 1848; *T. picta* Röding, 1798; *T. porphyres* Gmelin, 1791; *T. versicolor* Gmelin, 1798 / None.

**En** - Smooth moon turban; **Fr** - Turbo cendré.

Maximum shell length 4 cm, commonly to 3 cm. Common among rocks or gravel. Intertidal. Collected locally for food and shellcraft. Eastern Indian Ocean and tropical West Pacific, from eastern India to Melanesia; north to southern Japan and south to southern Queensland and New Caledonia.

**Turbo coronatus** Gmelin, 1791

**Frequent synonyms / misidentifications:** *Lunella coronata* (Gmelin, 1791); *Turbo coreensis* Récluz, 1844 / None.

**En** - Coronate moon turban; **Fr** - Turbo couronné.

Maximum shell length 5.5 cm, commonly to 3.5 cm. Among rocks and gravel, or in crevices. Intertidal. Collected locally for food and shellcraft on the Indochinese peninsula. In seaside villages of Japan, children put the operculum in vinegar because it makes a circular movement as it gradually dissolves. Widespread in the Indo-West Pacific, from East and South Africa to Melanesia; north to southern Japan and south to Indonesia.
**Turbo crassus** Wood, 1828

**Frequent synonyms / misidentifications:** *Marmarostoma crassa* (Wood, 1828) / *Turbo setosus* Gmelin, 1791.

**En** - Crass turban; **Fr** - Turbo épais.

Maximum shell length 8.5 cm, commonly to 6 cm. Near reefs, in shallow subtidal water, mainly at depths of 1 to 5 m. Collected where common with other *Turbo* species for subsistence or bait. Tropical West Pacific, from Indonesia to Papua New Guinea; north to the Philippines and south to northern Queensland.

*ventral view* (after Short and Potter, 1987)