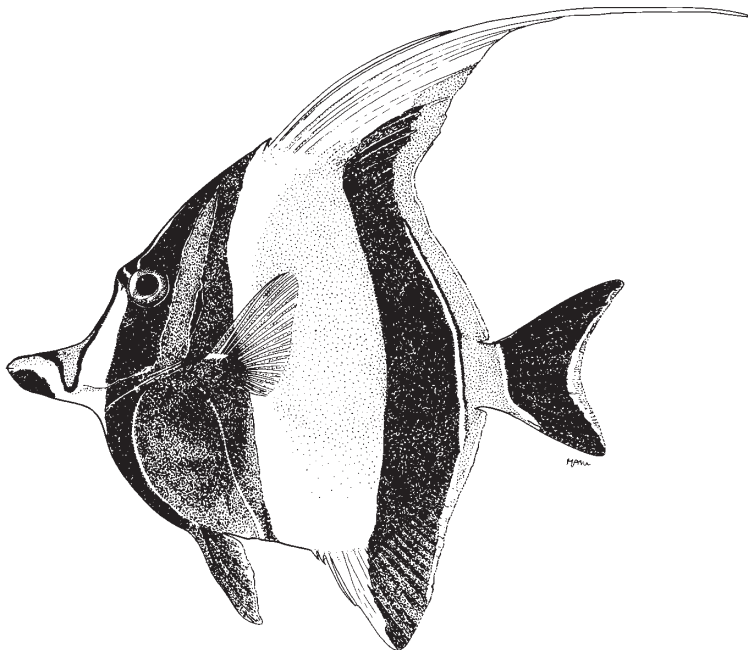
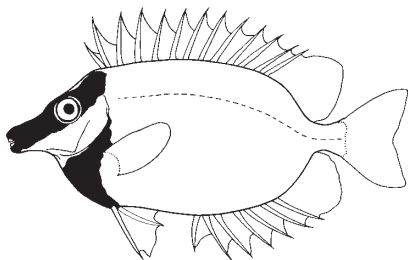
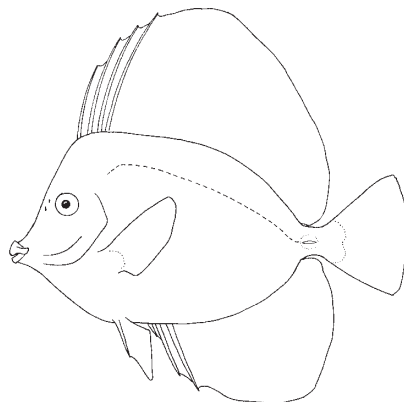


**ZANCLIDAE****Moorish idol**

by J.E. Randall

**A single species in this family.***Zanclus cornutus* Linnaeus, 1758**Frequent synonyms / misidentifications:** *Zanclus canescens* (Linnaeus, 1758) / None.**FAO names:** En - Moorish idol.**Diagnostic characters:** Body very deep, its depth 1 to 1.4 times in standard length, and very compressed; adults with a sharp bony projection in front of each eye (larger in males); snout narrow and strongly protruding;no spines or enlarged setae posteriorly on side of body. Mouth small; teeth slender, slightly incurved, and uniserial. First gill arch with 1 gill raker on upper limb, 10 rakers on lower limb. **Dorsal fin with VI or VII (usually VII) spines and 39 to 43 soft rays; third dorsal-fin spine extremely long and filamentous, usually longer than standard length; anal fin with III spines and 32 to 36 soft rays; caudal fin emarginate; pectoral-fin rays 18 or 19; pelvic fins with I spine and 5 soft rays.** Scales very small, each with a vertical row of erect ctenii which curve posteriorly, giving the skin a texture of fine sandpaper. **Colour:** white anteriorly, yellow posteriorly, with 2

broad black bars, the first nearly enclosing eye in its anterior part and broadening ventrally to include chest, pelvic fins, and half of abdomen; second black bar on posterior half of body, edged posteriorly with white and black lines, and extending into both dorsal and anal fins; a black-edged orange saddle-like marking on snout; chin black; caudal fin largely black; dorsal fin white except for intrusion of upper part of second black bar and a yellow zone posterior to it.

**Similar families occurring in the area****Acanthuridae:** 1 or more spines or keeled plates on side of caudal peduncle.**Siganidae:** pelvic fins with II spines and 3 soft rays between them; dorsal fin with XIII spines; anal fin with VII spines.**Siganidae****Acanthuridae**

Chaetodontidae (especially *Heniochus*): snout not strongly produced; no sharp bony projection in front of eyes; usually XV or XI dorsal-fin spines.

**Size:** Maximum reported total length 22 cm; commonly to 16 cm.

**Habitat, biology, and fisheries:** This species, the only member of the family, lives on coral reefs or rocky substrata from the shallows to depths as great as 180 m. It is omnivorous but feeds more on animal life than algae; sponges dominate the animal diet, but bryozoans, small molluscs, small crustaceans, hydroids, and tunicates have also been found in the stomach contents. Sometimes seen in pairs, occasionally in aggregations. The late postlarval stage, which may reach the unusual total length of 8 cm, has a stout, curved preorbital spine on each side of the head which is shed during transformation. It is this stage that was given a different scientific name, *Zanclus canescens*, also by Linnaeus (1758). *Z. cornutus* is the valid name for this species, in spite of *canescens* appearing on an earlier page, because Günther (1876), the first to conclude that *canescens* is the young of the species, used the name *cornutus*. The Moorish idol is important in the aquarium trade, but it does well only in large tanks. Aquarium fish collectors seek only the smaller individuals because adults are too large and do not adapt well to aquarium life. Aquarium fish feed well on chopped clams or mussels, brine shrimp, and tubifex worms. Individual fishes have been reported to survive as long as 10 years in an aquarium.

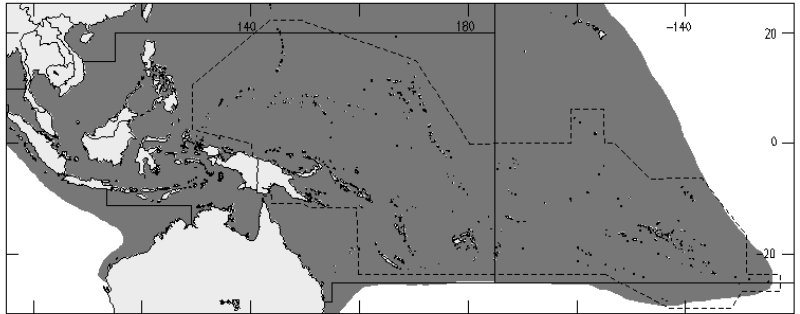
**Distribution:** Widely distributed in the Indo-Pacific region except the Red Sea and Persian Gulf; in the western Pacific it is reported as far north in Japan as Kominato, Chiba Prefecture, and as far south as southern New South Wales; these records are a result of the postlarvae being carried by warm currents to localities outside their breeding range. A single adult was sighted by the present author at Easter Island. Also ranges to the tropical eastern Pacific.

#### Reference

Randall, J.E. 1955. Fishes of the Gilbert Islands. *Atoll Res. Bull.*, (47):243 p. (Zanclidae, pp. 169-171).



*Heniochus* (Chaetodontidae)

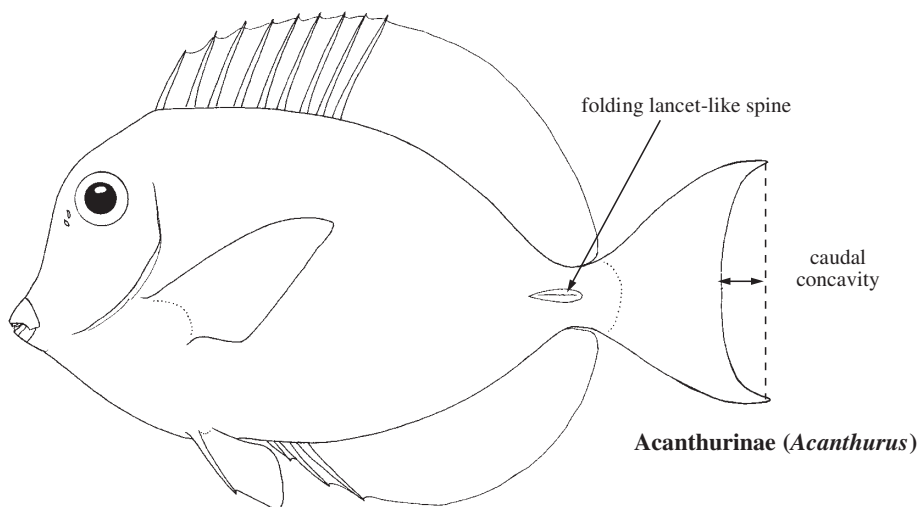


## ACANTHURIDAE

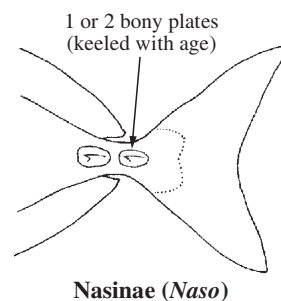
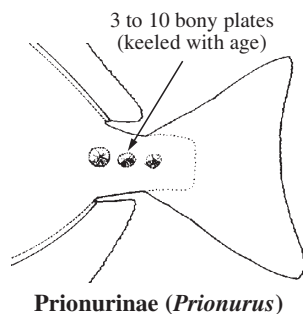
## Surgeonfishes (tangs, unicornfishes)

by J.E. Randall

**Diagnostic characters:** High-bodied, compressed fishes (size to about 75 cm) with **1 or more spines or keeled bony plates on each side of caudal peduncle** (in the following called peduncular spines and plates). Mouth small, low on head, terminal, the premaxilla not protractile; teeth in a single row, usually incisiform (never caniniform or molariform), none on roof of mouth. **A continuous unnotched dorsal fin with IV to IX spines and 22 to 33 soft rays; anal fin with II or III spines and 18 to 31 soft rays; caudal fin truncate to lunate, with 16 principal rays; pectoral fins with 14 to 18 rays, pelvic fins with I spine and 3 to 5 soft rays.** Scales very small and ctenoid. Vertebrae 22. Intestine long; stomach thin-walled or gizzard-like. **Colour:** usually predominately brown or grey, but some species very colourful.

**Habitat, biology, and fisheries:**

Acanthurid fishes occur on coral reefs or over rocky substrata, generally at depths less than 100 m. The species of *Zebrasoma*, all but 4 of the species of *Acanthurus*, and many of the species of *Naso* are herbivorous; they graze diurnally on benthic algae, sometimes on seagrasses. The species of *Ctenochaetus* feed primarily on detritus. These and a single group of *Acanthurus* have a thick-walled stomach; they tend to ingest more inorganic sediment with their food than species with thin-walled stomachs. Probably this serves to assist in the trituration of algal fragments in the stomach. Four species of *Acanthurus*, the single species of *Paracanthurus*, and the remaining species of *Naso* feed mainly on zooplankton. The zooplankton-feeding species of *Naso* and *Acanthurus* are capable of rapidly changing their ground colour from dark brown to pale bluish. *Acanthurus xanthopterus* and *Naso vlamingii* have been observed to feed in part on the faeces of other fishes. Surgeonfishes, tangs, and unicornfishes are not of great commercial importance, but they may form a significant part of the catch of artisanal fisheries in insular and coastal regions with coral reefs. A few of the more colourful species, such as *Acanthurus achilles*, *Zebrasoma flavescens*, *Paracanthurus hepatus*, and *Naso lituratus*, are of value as aquarium fishes. Acanthurid fishes are caught mainly by traps or nets, occasionally by trawling. From 1990 to 1995, the FAO Yearbook of Fisheries Statistics reports a range of yearly catch of around 2 970 to 6 420 t of Acanthuridae from the Western Central Pacific.



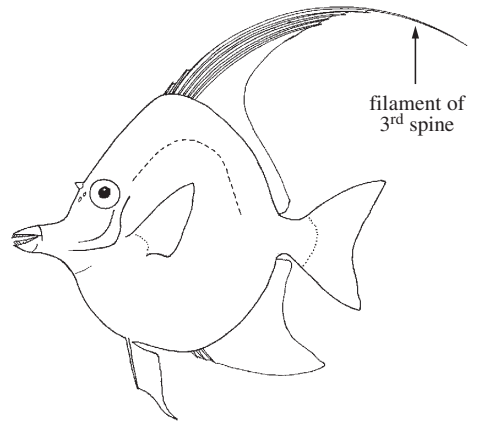
**Remarks:** The family is divisible into 3 subfamilies: the Acanthurinae with a single folding spine on each side of caudal peduncle; the Prionurinae with 3 to 10 fixed bony peduncular plates (becoming keeled with age); and the Nasinae with 1 or 2 fixed peduncular plates (also keeled with age).

**Similar families occurring in the area**

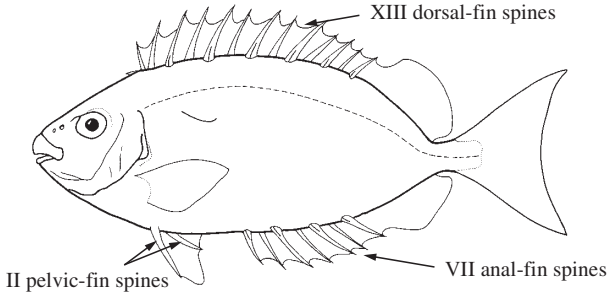
Although no family of fishes is apt to be confused with the Acanthuridae because of their distinctive spines on the caudal peduncle, there is superficial resemblance to the Siganidae and the monotypic Zanclidae.

**Siganidae:** pelvic fins with II spines and 3 soft rays between them; dorsal fin with XIII spines (IV to IX in Acanthuridae); anal fin with VII spines (II or III in Acanthuridae).

**Zanclidae (*Zanclus cornutus*):** snout protruding; premaxilla protractile; dorsal fin with a long filament from third spine; adults with a pair of supraocular bony projections; no spine or keels on caudal peduncle.



**Zanclidae (*Zanclus cornutus*)**



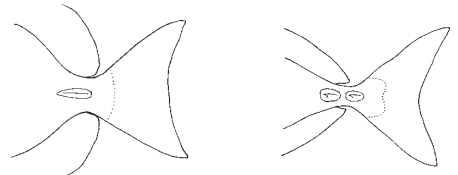
**Siganidae**

**Key to the genera of Acanthuridae occurring in the area**

- 1a. A single folding antrorse spine on each side of caudal peduncle (Fig. 1a); caudal-peduncle depth 2.1 to 3.5 times in head length . . . . . (**Acanthurinae**) → 2
- 1b. One to 10 fixed bony plates (keeled with age) on each side of caudal peduncle (Fig. 1b); caudal-peduncle depth 4 to 6 times in head length . . . . . (**Prionurinae, Nasinae**) → 5
- 2a. Pelvic fins with I spine and 3 soft rays; scales anteriorly on sides of head modified as small tuberculated plates (Fig. 2) . . . ***Paracanthurus***  
(a single species, *P. hepatus*, in the genus)
- 2b. Pelvic fins with I spine and 5 soft rays; scales anteriorly on sides of head not modified into tuberculated plates . . . . . → 3
- 3a. Dorsal-fin spines IV or V; length of longest dorsal-fin ray 2.2 to 3.8 times in standard length; peduncular spine in a shallow depression (Fig. 3) . . . . . ***Zebрасoma***
- 3b. Dorsal-fin spines VI to IX; length of longest dorsal-fin ray 3.6 to 6 times in standard length; peduncular spine in a well-defined deep groove . . . . . → 4



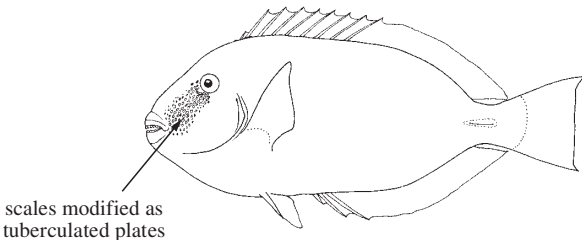
dorsal view



lateral view

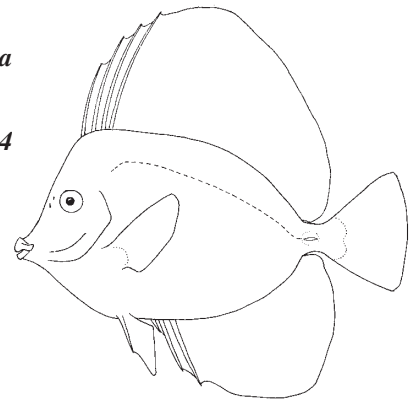
a) Acanthurinae      b) Nasinae

**Fig. 1 posterior part of body**



scales modified as tuberculated plates

**Fig. 2 *Paracanthurus hepatus***



**Fig. 3 *Zebрасoma***



- 3a.** Snout length 7.9 to 8.2 times in standard length; least depth of caudal peduncle 2.2 to 2.5 times in head length; body brown, caudal fin abruptly white (except Hawaii where coloured like body); a dark brown spot just below axil of pectoral fins, and another at rear base of dorsal fin; maximum standard length about 15 cm . . . . . *Acanthurus thompsoni*  
(Indo-Pacific)
- 3b.** Snout length 6 to 7.1 times in standard length; least depth of caudal peduncle 2.7 to 3.3 times in head length; colour not as above; maximum standard length greater than 26 cm . . . . . → **4**
- 4a.** Least depth of caudal peduncle 2.7 to 3 times in head length; brown with slightly irregular lengthwise blue lines on head and body; a yellow area behind eye and 2 yellow bands extending anteriorly to eye; outer part of pectoral fins not abruptly pale; maximum standard length about 40 cm . . . . . *Acanthurus mata*  
(Indo-Pacific except Hawaii)
- 4b.** Least depth of caudal peduncle 3.1 to 3.3 times in head length; body varying from light bluish grey to dark brown, without blue lines; outer part of pectoral fins abruptly white, the demarcation curved such that pale area is broadest on central part of fin; maximum standard length about 33 cm . . . . . *Acanthurus albipectoralis*  
(southern Great Barrier Reef, Coral Sea, and New Caledonia)
- 5a.** Body whitish with 6 narrow vertical black bars (1 on head passing through eye, 4 on side of body, and 1 on caudal peduncle); caudal fin truncate to slightly emarginate, the caudal concavity more than 15 times in standard length; peduncular spine very small; dorsal-fin rays 22 to 24; anal-fin rays 19 to 22 . . . . . *Acanthurus triostegus*  
(Indo-Pacific and tropical eastern Pacific)
- 5b.** Body not whitish with vertical black bars; caudal fin of adults emarginate to lunate, the caudal concavity usually less than 15 times in standard length; peduncular spine usually not small; dorsal-fin rays 23 to 33; anal-fin rays 22 to 29 . . . . . → **6**
- 6a.** Body very deep, its depth 1.5 to 1.6 times in standard length; caudal fin slightly emarginate, the caudal concavity 14 to 17 times in standard length; body and head with 3 whitish bars, the body posterior to middle bar and the dorsal and anal fins with small white spots . . . . . *Acanthurus guttatus*  
(Oceania to Mauritius; mainly insular)
- 6b.** Body not very deep, its depth 1.7 to 2.5 times in standard length; caudal fin emarginate to lunate; colour not as above . . . . . → **7**
- 7a.** A black spot at base of last few rays of both dorsal and anal fins (spot in axil of anal fin of *A. leucopareius* very small) . . . . . → **8**
- 7b.** No black spot at base of last few rays of dorsal and anal fins . . . . . → **10**
- 8a.** A whitish bar broadly bordered by dark brown from origin of dorsal fin across operculum; caudal fin without a white posterior margin; caudal fin slightly emarginate, the caudal concavity 10.5 to 12 times in standard length; body depth 1.7 to 1.8 times in standard length; total gill rakers on first gill arch 15 to 18 . . . . . *Acanthurus leucopareius*  
(anti-equatorial in insular areas of the Pacific from Hawaii to Japan in the north and Easter Island to New Caledonia in the south)
- 8b.** No whitish bar from origin of dorsal fin across operculum; caudal fin with narrow white posterior margin; caudal concavity 4.5 to 10 times in standard length; body depth 1.8 to 2.3 in standard length; total gill rakers on first gill arch 20 to 29 . . . . . → **9**

**9a.** Caudal fin moderately emarginate, the caudal concavity 5.8 to 10.5 times in standard length; black spot at rear base of dorsal fin not large, its greatest width more than 2 times in eye diameter; white posterior margin of caudal fin very narrow, its width less than 4 times in pupil diameter; no definite black margin around groove of peduncular spine; body depth 1.8 to 2 times in standard length; maximum standard length about 20 cm . . . . . *Acanthurus nigroris*  
 (islands of Micronesia and Polynesia to the Great Barrier Reef)

**9b.** Caudal fin lunate, the caudal concavity 4.5 to 6 times in standard length; black spot at rear base of dorsal fin large, its greatest width less than 2 times in eye diameter; white posterior margin of caudal fin not very narrow, its width about 2 times in pupil diameter; a definite black margin around groove of peduncular spine; body depth 2 to 2.3 times in standard length; maximum standard length about 15 cm . . . . . *Acanthurus nigrofuscus*  
 (Indo-Pacific)

**10a.** Upper three-fourths of body with narrow black-edged blue stripes alternating with yellow, the lower fourth pale lavender; peduncular spine very long, 1.9 to 2 times in head length, without a definite sheath; total gill rakers on first gill arch 14 to 17 . . . . . *Acanthurus lineatus*  
 (Indo-Pacific)

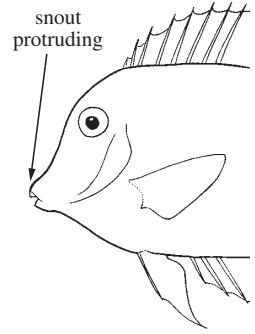
**10b.** Colour not as above; peduncular spine not very long, 2.1 to 8 times in head length, with a definite sheath; total gill rakers on first gill arch 16 to 29 . . . . . → **11**

**11a.** Dorsal-fin spines VIII; snout protruding (Fig. 9) . . . . . → **12**

**11b.** Dorsal-fin spines IX; snout not protruding . . . . . → **14**

**12a.** Brown without a white line on chin or a pale border to caudal fin (life colour unknown); an indistinct dark brown spot at upper end of gill opening, and a second spot, elliptical in shape and more distinct, posterior to upper end of gill opening; opercular membrane dark brown . . . . . *Acanthurus chronixis*  
 (known from a single specimen, 21 cm standard length, from Kapingamarangi, Caroline Islands)

**12b.** Adults dark brown with a white line under chin extending a short distance above corner of mouth, and a pale margin on caudal fin . . . . . → **13**



**Fig. 9**

**13a.** Margin of caudal fin broad (especially posteriorly) and yellow; an orange area behind middle-upper part of gill opening, extending ventrally behind base of pectoral fins, and often diffusely below fin base (juveniles yellow or as mimics of the angelfishes *Centropyge flavissimus* or *C. vrolikii*); anal-fin rays 25 to 28 . . . . . *Acanthurus pyroferus*  
 (western Pacific from Japan to New South Wales, east to French Polynesia and the Marshall Islands)

**13b.** Margin of caudal fin narrow and white; no orange area behind gill opening and extending ventrally behind base of pectoral fins (juveniles mimic the angelfish *Centropyge eibli*) . . . . . *Acanthurus tristis*  
 (Indian Ocean from Maldives and Chagos Archipelago to southwestern Indonesia)

**14a.** Mouth small, its width (from corner to corner) 4.5 to 6 times in head length; maximum number of upper and lower teeth 12; a white line under chin; body depth 1.7 to 1.9 times in standard length; dorsal-fin rays 28 to 33; anal-fin rays 26 to 29 . . . . . → **15**

**14b.** Mouth not small, its width 3.2 to 4.8 times in head length; number of upper or lower teeth 14 or more (in specimens greater than 5 cm standard length); no white line under chin (except *A. leucocheilus*); body depth 1.9 to 2.5 times in standard length; dorsal-fin rays 23 to 28; anal-fin rays 22 to 26 . . . . . → **18**

- 15a. Caudal fin lunate, the caudal concavity 5.5 to 8.5 times in standard length; dorsal-fin rays 29 to 33 (usually 30 to 32); a large elliptical bright orange area posteriorly on side of body enclosing in its hind part the peduncular spine (orange area absent in juveniles less than about 6.5 to 7 cm standard length) . . . . . *Acanthurus achilles*  
(islands of Oceania)
- 15b. Caudal fin slightly emarginate, the caudal concavity 10 to 17 times in standard length; dorsal-fin rays 28 to 31; no large orange area posteriorly on side of body . . . . . → 16
- 16a. Body blue; head black with a broad white band from pectoral-fin base to throat; no distinct white spot or broad white band below eye; dorsal fin yellow (except white margin and black submarginal line); anal and pelvic fins white . . . . . *Acanthurus leucosternon*  
(Indian Ocean from East Africa to southwestern Indonesia, including a record from Bali)
- 16b. Body largely black; no broad white band from pectoral-fin base to throat; a distinct white spot or broad white band below eye; dorsal, anal, and pelvic fins black except for white or blue margin and yellow basal band on dorsal and anal fins which broadens posteriorly on fins . . . . . → 17
- 17a. A horizontally elongate white spot directly below eye; no orange band in outer part of dorsal fin; caudal peduncle black except for yellow edge of socket and sheath of peduncular spine; base of pectoral fins black . . . . . *Acanthurus nigricans*  
(western Pacific to tropical eastern Pacific)
- 17b. A broad white band extending from lower edge of eye to upper lip; a bright orange band in outer part of soft portion of dorsal fin; caudal peduncle yellow, shading to black a short distance anteriorly; base of pectoral fins yellow . . . . . *Acanthurus japonicus*  
(Indonesia to southern Japan)
- 18a. A narrow white band encircling chin behind lower lip, followed by a broader dark brown to black band on throat, a whitish band of about equal width, and a still broader dark brown to black band on chest centred below eye (bands may be faint in preservative); peduncular spine sheath white, the socket with a black rim as broad or broader than spine width; caudal fin brown, with a narrow white band at base, a black posterior margin, and blue submarginal band . . . . . *Acanthurus leucocheilus*  
(East Africa to western Pacific, with records in Oceania from Palau and the Line Islands)
- 18b. Colour not as above . . . . . → 19
- 19a. A prominent dark mark on shoulder or behind eye . . . . . → 20
- 19b. No prominent dark mark on shoulder or behind eye . . . . . → 26
- 20a. A horizontal orange band, broadly rimmed in deep blue or purple, extending posteriorly from upper end of gill opening to above spinous portion of anal fin; caudal fin brown, spotted with dark brown, with a large crescentic white area centroposteriorly on fin (posterior margin narrowly black); no fine longitudinal lines on body; dorsal-fin rays 23 to 25 . . . . . *Acanthurus olivaceus*  
(western Pacific from southern Japan to New South Wales, east to Hawaii and Tuamotu Archipelago)
- 20b. No purple- or blue-bordered orange band in shoulder region; caudal fin without a large white posterior area; fine longitudinal lines present on body (except *A. nigricauda*); dorsal-fin rays 24 to 28 . . . . . → 21



- 21a.** Head and nape with prominent small yellow spots; a horizontally elongate bluish black spot extending posteriorly from behind upper end of gill opening, its length a little greater than eye diameter, its posterior end usually somewhat pointed; a large yellow spot in upper distal part of pectoral fins; dorsal fin with 8 or 9 narrow bluish brown stripes alternating with dull orange-yellow stripes; dorsal-fin rays 24 to 26; anal-fin rays 22 to 24 . . . . . *Acanthurus maculiceps*  
(Indonesia to Ryukyu Islands, east to Samoa and Marshall Islands)
- 21b.** Head and nape without small yellow spots; shoulder marking not as above; no large yellow spot on upper distal part of pectoral fins (except *A. fowleri*); dorsal fin not striped with brown and yellow; dorsal-fin rays 25 to 28; anal-fin rays 23 to 26 . . . . . → 22
- 22a.** Caudal fin with a distinct white posterior margin, broadest centrally where about 1/4 eye diameter in width; a long pointed black streak enclosing and extending anteriorly from peduncular spine (first appearing at a standard length of about 10 cm); a horizontal black band about as long as snout extending posteriorly from a short distance behind eye (first appearing at a standard length of about 6 cm); no fine longitudinal lines on body; outer fourth of pectoral fins abruptly pale (partly yellow in life) (except *A. xanthopterus*) . . . . . *Acanthurus nigricauda*  
(Indo-Pacific)
- 22b.** Caudal fin without a distinct white posterior margin; no black streak extending anteriorly from peduncular spine; shoulder marking not as above; fine longitudinal lines present on body; outer fourth of pectoral fins not abruptly pale . . . . . → 23
- 23a.** Socket of peduncular spine edged in dull orange; dorsal fin brown; a horizontally elongate dark brown or orangish brown spot at upper end of gill opening, a little longer than eye diameter and tilting slightly downward posteriorly, the posterior end not pointed; dorsal-fin rays 25 or 26; anal-fin rays 23 or 24 . . . . . *Acanthurus auranticavus*  
(Indonesia and Philippines west to the Maldives)
- 23b.** Socket of peduncular spine edged in black; dorsal fin orange-yellow with blue margin, blue line at base, and a few blue streaks posteriorly; no dark brown or orangish brown spot at upper end of gill opening; dorsal-fin rays 26 to 28; anal-fin rays 25 or 26 . . . . . → 24
- 24a.** A round black spot nearly as large as eye directly behind eye; an orange-yellow bar from behind black spot to below inner base of pectoral fins . . . . . *Acanthurus bariene*  
(East Africa to western Pacific from Ryukyu Islands to Great Barrier Reef)
- 24b.** Colour not as above . . . . . → 25
- 25a.** A large semicircular to subtriangular black mark anteriorly on side of body (open part anterior), the upper end at level of eye above dorsal end of gill opening, the lower end above base of pectoral fins; head suffused with purplish blue; caudal fin blackish centrally with a yellow band in each lobe that merges with white band at base, the posterior margin narrowly blue . . . . . *Acanthurus fowleri*  
(Indonesia to Solomon Islands and Philippines)
- 25b.** Colour not as above . . . . . → 26
- 26a.** Head with small pale (rust colour in life) spots; black around peduncular spine groove of adults extending well ahead of front of spine (by a distance almost as long as spine on a specimen 24.5 cm in standard length); caudal fin with a very narrow white posterior margin (broader in young); body depth of adults (over 20 cm standard length) 2.2 to 2.5 times in standard length . . . . . *Acanthurus grammoptilus*  
(northern Australia to Queensland)
- 26b.** Head without small pale spots; dark brown or black around groove of peduncular spine not extending much in front of spine; caudal fin without a narrow white posterior margin (except in juveniles which may have a very narrow pale margin); body depth of adults 1.9 to 2.1 times in standard length . . . . . → 27

- 27a. Caudal fin blue with numerous small blackish spots; sheath of peduncular spine white, in contrast to black edge of spine socket; a distinct yellow band crossing or nearly crossing anterior interorbital space; dorsal and anal fins orange-yellow without dark bluish stripes or with only a few narrow ones in outer part and blue streaks along posterior rays; eye large, its greatest diameter 3.2 to 4.7 times in head length (in specimens over the range of 12 to 30 cm standard length); anal-fin rays 24 to 26 . . . . . *Acanthurus dussumieri*  
(Indo-Pacific)
- 27b. Caudal fin without blackish spots; sheath of peduncular spine brown; no distinct yellow band crossing or nearly crossing anterior interorbital space (a yellowish area may extend anteriorly to eye, but not as a definite band); dorsal and anal fins with alternating stripes of grey-blue and dull orange-yellow; eye not large, its greatest diameter 3.9 to 5.4 times in head length (over the range of 12 to 30 cm standard length); anal-fin rays 23 to 25 . . . . . → 28
- 28a. Pectoral fins uniform brown; dorsal and anal fins dull orange with about 8 narrow grey-blue stripes (those in outer part of fin parallel to margin, those in basal part oblique); caudal fin not very lunate, the caudal concavity about 6 to 10 times in standard length; peduncular spine not small, 3 to 4.2 times in head length; a dark brown to black margin around socket of peduncular spine forming an area about twice as high as maximum width of spine; total gill rakers on first gill arch 21 to 25 . . . . . *Acanthurus blochii*  
(Indo-Pacific)
- 28b. Outer third of pectoral fins yellow (in specimens over about 12 cm standard length); dorsal and anal fins dull orange with 4 or 5 grey-blue stripes that parallel outer margin; caudal fin very lunate, the caudal concavity 4.5 to 7 times in standard length; peduncular spine usually small, about 4.5 to 5.5 times in head length; dark margin around socket of peduncular spine usually narrow and indistinct; total gill rakers on first gill arch 16 to 24 . . . . . *Acanthurus xanthopterus*  
(Indo-Pacific)

**Key to the species of *Ctenochaetus* occurring in the area**

- 1a. A prominent blackish spot at base of last 3 to 7 rays of both dorsal and anal fins, these spots extending narrowly onto adjacent regions of caudal peduncle . . . . . → 2
- 1b. No prominent blackish spot at base of last 3 to 7 rays of both dorsal and anal fins (juveniles of *C. striatus* and *C. hawaiiensis* have a small basal black spot only at rear of dorsal fin) . . . . . → 3
- 2a. Median fins dark brown (except juveniles with yellow caudal fin); margin of lips smooth; enlarged distal curved portion of each tooth of upper jaw divided into 6 approximately equal lateral denticulations (Fig. 4b) (including tip) . . . . . *Ctenochaetus binotatus*  
(Indo-Pacific)
- 2b. Caudal fin and posterior part of dorsal and anal fins pale (caudal fin white; posterior part of dorsal and anal fins bright orange in life); margin of lips papillate; enlarged distal curved portion of each tooth of upper jaw with lower half smooth and blade-like, the upper half with 3 (rarely 2) denticulations . . . . . *Ctenochaetus tominiensis*  
(Indonesia and Philippines to Solomon Islands, Great Barrier Reef, and Palau)
- 3a. Snout long, its length 3.6 to 3.9 times in standard length; margin of lips finely crenulate; caudal fin truncate to slightly emarginate, the caudal concavity greater than 15 times in standard length; total gill rakers on first gill arch 21 to 25; dark brown with pale greenish longitudinal lines following scale rows on head and body (juveniles orange with dark chevron-shaped markings) . . . . . *Ctenochaetus hawaiiensis*  
(islands of Oceania from Pitcairn to Palau, and Hawaii to the Mariana Islands)
- 3b. Snout not long, its length 4 to 5.5 times in standard length; margin of lips smooth; caudal fin emarginate to lunate, the caudal concavity 3.7 to 10 times in standard length; total gill rakers on first gill arch 26 to 36; colour not as above . . . . . → 4

- 4a.** Teeth of upper jaw with 3 or 4 denticulations on lateral edge of distal expanded ends; dorsal-fin rays not long, the longest 4.6 to 5.9 times in standard length; body of adults speckled with numerous small bright blue spots which may or may not persist as pale spots in preservative (juveniles with longitudinal blue lines posteriorly on body, blue dots anteriorly and on head); membranes of pectoral fins dark brown . . . . . *Ctenochaetus marginatus*  
(islands of Oceania except Hawaii, and islands of the tropical eastern Pacific)
- 4b.** Teeth of upper jaw with 5 to 7 denticulations on lateral edge of their distal expanded ends; dorsal-fin rays relatively long, the longest 3.6 to 4.4 times in standard length; most of body orangish brown with longitudinal bluish lines following scale rows, the head and anterior body with pale yellowish dots; membranes of pectoral fins hyaline . . . . . → **5**
- 5a.** Teeth of upper jaw with 6 (rarely 5 or 7) denticulations; teeth of lower jaw with 4 denticulations; caudal fin lunate, the caudal concavity 3.7 to 6 times in standard length; body depth 1.9 to 2.3 times in standard length; dorsal-fin rays 27 to 31 (usually 28 to 30); anal-fin rays 24 to 28 (usually 25 to 27); pectoral-fin rays 16 or 17 (usually 17); no yellow rim on orbit . . . . . *Ctenochaetus striatus*  
(Indo-Pacific)
- 5b.** Teeth of upper jaw with 5 denticulations; teeth of lower jaw with 3 denticulations; caudal fin emarginate, the caudal concavity 5.7 to 10 times in standard length; body depth 1.7 to 2 times in standard length; dorsal-fin rays 25 to 28 (usually 26 or 27); anal-fin rays 21 to 25 (usually 23 or 24); pectoral-fin rays 15 or 16 (usually 16); a yellow rim usually present on orbit . . . . . *Ctenochaetus strigosus*  
(Indo-Pacific, but differentiating into distinct populations over its range)

#### Key to the species of *Naso* occurring in the area

- 1a.** A single keeled plate posteriorly on each side of caudal peduncle; dorsal-fin spines IV or V; no filaments on caudal fin; no rostral protuberance on snout or forehead . . . . . → **2**
- 1b.** Two keeled plates posteriorly on each side of caudal peduncle; dorsal-fin spines V to VII (rarely IV in *N. brachycentron*); filaments on caudal fin present or absent; a rostral protuberance or horn-like projection on snout or forehead present or absent . . . . . → **4**
- 2a.** Dorsal fin with V spines and 27 to 29 soft rays; oblique groove on side of snout below nostrils, its length about equal to length of naked area enclosing nostrils; caudal fin yellow in life. . . . . *Naso minor*  
(East Africa, Réunion, Indonesia, and Philippines)
- 2b.** Dorsal fin with IV (rarely V) spines and 28 to 30 soft rays; oblique groove on side of snout from near edge of orbit half-way to mouth; caudal fin grey or blue in life . . . . . → **3**
- 3a.** Dorsal profile of snout convex; anterior interorbital region and adjacent space between nostrils with a broad flat median zone; total gill rakers on first gill arch 13 to 16; body depth 2.8 to 3.2 times in standard length; a series of about 30 narrow dark grey bars on body; caudal fin grey in life . . . . . *Naso thynnoides*  
(East Africa to Solomon Islands, Ryukyu Islands, and Caroline Islands)
- 3b.** Dorsal profile of head from above upper lip to above centre of eye straight; anterior interorbital region and adjacent space between nostrils strongly convex; total gill rakers on first gill arch 18 or 19; body depth 2.75 to 2.8 times in standard length; no narrow dark bars on body; caudal fin blue in life . . . . . *Naso caeruleacauda*  
(Indonesia and Philippines)
- 4a.** Teeth of adults incisiform with rounded tips, smooth edges, 30 to 35 or fewer in jaws; head without an anterior protuberance or horn; keeled peduncular plates bright orange (pale in preservative); a curved yellow line from behind corner of mouth to below eye . *Naso lituratus*  
(Indo-Pacific)
- 4b.** Teeth of adults lanceolate, the edges finely serrate, more than 35 in jaws; anterior head with or without a protuberance or horn; colour not as above . . . . . → **5**

- 5a.** Dorsal-fin spines IV or V (rarely IV) . . . . . → **6**
- 5b.** Dorsal-fin spines VI or VII (rarely VII) . . . . . → **10**
- 6a.** Dorsal-fin rays 24 to 26; anal-fin rays 23 to 25; dorsal profile of head of large adults straight to slightly convex, ending in a obtusely pointed protuberance just above and projecting anterior to upper lip . . . . . *Naso fageni*  
(East Africa to western Pacific)
- 6b.** Dorsal-fin rays 27 to 30; anal-fin rays 26 to 30; dorsal profile of head not straight to slightly convex and not ending in a protuberance just above and anterior to upper lip (a protuberance or horn, if present, higher on head) . . . . . → **7**
- 7a.** Body elongate, its depth 3.3 to 3.7 times in standard length; no protuberance or horn anteriorly on head at any stage; caudal fin and dorsal half of head and body with small blackish spots . . . . . *Naso lopezi*  
(western Pacific)
- 7b.** Body not elongate, its depth 2.2 to 2.8 times in standard length; a protuberance or horn developing anteriorly on head of adults, at least in males); small blackish spots on caudal fin, head, and body present or absent . . . . . → **8**
- 8a.** Adults with a large bulbous protuberance at front of snout; caudal fin truncate to slightly emarginate without filaments; small blackish spots usually present, at least dorsoanteriorly on body; anal-fin rays 26 or 27 . . . . . *Naso tuberosus*  
(East Africa to the islands of Micronesia and Samoa)
- 8b.** Adults with a long tapering horn extending forward at level of eye well before mouth (*N. brachycentron* with horn only in males; females of *N. brachycentron* with only a bump anterior to eye); caudal fin emarginate with a trailing filament developing from each lobe in adults (only on males of *N. annulatus*); no small blackish spots on body; anal-fin rays 27 or 28 . . . . . → **9**
- 9a.** A distinct hump in dorsal profile of body, centred on origin of soft portion of dorsal fin (first developing at a standard length of about 18 cm); profile of snout from mouth to eye strongly sloping, forming an angle of about 40° to horizontal axis of body; pectoral-fin rays modally 17; a few scattered small dark-edged pale spots on postorbital head and body above pectoral fins; no white margin posteriorly on caudal fin . . . . . *Naso brachycentron*  
(Indo-Pacific)
- 9b.** No hump in dorsal profile of body; profile of snout from mouth to eye or horn not strongly sloping, forming an angle of about 60° to horizontal axis of body; pectoral-fin rays modally 18; no spots on head or body; posterior margin of caudal fin white, this colour extending anteriorly onto interradial membranes of fin of adults . . . . . *Naso annulatus*  
(Indo-Pacific)
- 10a.** No protuberance or horn developing anteriorly on head of adults; teeth very small, about 85 to 100 in jaws of adults . . . . . → **11**
- 10b.** A distinct protuberance or horn developing anteriorly on head of adults; teeth not very small, 60 or fewer in jaws . . . . . → **12**
- 11a.** Bluish grey to grey-brown, capable of displaying a colour pattern of vertically elongate blotches (lighter or darker than ground colour) on side and upper part of body; opercular and preopercular margins not dark brown; caudal fin uniform in colour; gill rakers on lower limb of gill arches entirely pale; edge of lower lip not white; dorsal-fin rays 27 to 30 (modally 28) . . . . . *Naso caesius*  
(Hawaii to Marshall and Mariana islands, and Pitcairn Group to Fiji, New Caledonia, and the southern Coral Sea)
- 11b.** Grey-brown without a spotted phase (but capable of changing to pale bluish overall), the ventral part of head and body yellowish brown; opercular and preopercular margins often bordered by dark brown; caudal fin blue in life except for a broad spindle-shaped yellowish brown posterior margin; gill rakers on lower limb of gill arches with blackish base; edge of lower lip white; dorsal-fin rays 26 to 28 (modally 27) . . . . . *Naso hexacanthus*  
(Indo-Pacific)

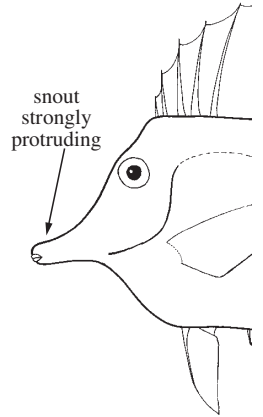
- 12a.** Adults with a prominent convex protuberance anteriorly on head centred at level of lower edge of eye; dorsal fin elevated, the first spine 1.5 to 1.7 times in head length; caudal fin truncate to slightly rounded with a filament developing from each corner in adults; side of body with vertical blue lines which break up into small blue spots dorsally and ventrally; a broad blue band extending from eye to front of rostral protuberance; dorsal-fin rays 26 or 27 . . . . . *Naso vlamingii*  
(Indo-Pacific)
- 12b.** Adults with a prominent horn-like projection extending anteriorly from eye; dorsal fin not elevated, the first spine 2 or more in head length; caudal fin of adults with or without a filament from each corner; vertical bluish lines and spots on body present or absent; no broad blue band extending anteriorly from eye; dorsal-fin rays 27 to 30 . . . . . → **13**
- 13a.** Profile of snout from upper lip to base of horn long and straight, sloping at an angle of about 45° to horizontal axis of body; rostral horn not extending anterior to mouth (first sign of a rostral projection, a bump before eye, at a standard length of about 10 cm); caudal fin emarginate, becoming truncate with a trailing filament from each corner in adults; pectoral-fin rays 17 or 18; no dark bluish lines or spots on body; peduncular plates bright blue; caudal fin not whitish . . . . . *Naso unicornis*  
(Indo-Pacific)
- 13b.** Profile of snout from upper lip to base of horn short, curved, and nearly vertical; rostral horn of adults extending well in front of mouth; caudal fin slightly rounded without trailing filaments; pectoral-fin rays 15 to 17; body with vertical dark brown lines and/or small spots; head with irregular short lines and/or spots, the lines long and oblique on horn (in one pale phase, the dark lines and spots may be very faint on head and body); peduncular plates not bright blue; caudal fin whitish with a large dark blotch centrobasally . . . . . *Naso brevirostris*  
(Indo-Pacific)

**Key to the species of *Prionurus* occurring in the area**

- 1a.** Dorsal fin with VIII spines and 21 or 22 soft rays; anal fin with III spines and 20 or 21 soft rays; pectoral-fin rays 16; body depth of subadults about 2 times in standard length, the body becoming more elongate with age (to as much as 3 times in standard length in large adults); adults developing a pronounced protuberance anteriorly on snout; colour grey-brown with indistinct dark bars on side of body, the 5 to 7 peduncular plates black . . . . . *Prionurus microlepidotus*  
(New South Wales to southern Queensland)
- 1b.** Dorsal fin with IX spines and 23 to 26 soft rays; anal fin with III spines and 22 to 25 soft rays; pectoral-fin rays 17 or 18; body depth of adults 2 to 2.3 times in standard length; no protuberance on snout of adults . . . . . → **2**
- 2a.** Keeled peduncular plates usually 3, no scattered small thorn-like plates dorsally and posteriorly to midlateral series; dorsal-fin rays 24 to 26; anal-fin rays 23 to 25; colour bluish grey with narrow vertical yellow bars on side of body and small yellow spots dorsally on body and on head; keeled peduncular plates blue and black . . . . . *Prionurus maculatus*  
(New South Wales to southern Queensland, Lord Howe Island, Norfolk Island, Kermadec Islands, and New Caledonia)
- 2b.** Keeled peduncular plates 8 to 10; scattered small thorn-like plates dorsally and posteriorly on body; dorsal-fin rays 23; anal-fin rays 22; greyish brown with narrow dull orange bars on side of body, the caudal fin yellow . . . . . *Prionurus* sp.  
(Bali and Komodo, Indonesia)


**Key to the species of *Zebrasoma* occurring in the area**

- 1a. Dorsal fin with IV spines and 29 to 33 soft rays; anal-fin rays 23 to 26; dorsal fin very elevated, the longest ray 2.1 to 2.5 times in standard length (in specimens over 5 cm in standard length); no brush-like patch of setae posteriorly on side of body; body with alternating pale and dark bars . . . . . *Zebrasoma veliferum*  
(central and western Pacific)
- 1b. Dorsal fin with IV or V spines and 23 to 28 soft rays; anal-fin rays 19 to 24; longest dorsal-fin ray 2.8 to 3.7 times in standard length (in specimens over 5 cm standard length); adults with an oval brush-like patch of setae posteriorly on side of body enclosing peduncular spine and extending well anterior to it (in *Z. rostratum*, apparently present only in males); body without pale and dark bars (except juveniles of *Z. scopas*) . . . . . → 2
- 2a. Snout strongly protruding (Fig. 10); body depth 1.9 to 2.1 times in standard length; lower teeth with 5 denticulations, the central one twice as large as adjacent ones; colour dark brown to nearly black (in life with faint irregular longitudinal bluish lines following scale rows) . . . . . *Zebrasoma rostratum*  
(French Polynesia to the Line Islands and Rose Atoll, Samoa Islands)
- 2b. Snout moderately protruding; body depth 1.4 to 1.75 times in standard length; lower teeth with 7 denticulations, the central one only slightly larger than adjacent ones; colour dark brown or yellow . . . . . → 3
- 3a. Pale overall (bright yellow in life); dorsal-fin rays 23 to 26 (modally 25); anal-fin rays 19 to 22 (modally 21) . . . *Zebrasoma flavescens*  
(northern-hemisphere islands of the central and western Pacific)
- 3b. Dark brown (body in life with fine pale blue-green longitudinal lines following scale rows, becoming dots anteriorly on body and on head); dorsal-fin rays 23 to 25 (modally 24); anal-fin rays 19 to 21 (modally 20) . . . . . *Zebrasoma scopas*  
(Indo-Pacific except Hawaii)



**Fig. 10** *Zebrasoma rostratum*

**List of species occurring in the area**

The symbol  is given when species accounts are included.

**Subfamily ACANTHURINAE**

-  *Acanthurus achilles* Shaw, 1803
- Acanthurus albipectoralis* Allen and Ayling, 1987
- Acanthurus auranticavus* Randall, 1956
- Acanthurus bariene* Lesson, 1830
- Acanthurus blochii* Valenciennes, 1835
- Acanthurus chronixis* Randall, 1960
-  *Acanthurus dussumieri* Valenciennes, 1835
- Acanthurus fowleri* de Beaufort, 1951
- Acanthurus grammoptilus* Richardson, 1843
- Acanthurus guttatus* Forster, 1801
- Acanthurus japonicus* (Schmidt, 1930)
- Acanthurus leucocheilus* Herre, 1927
- Acanthurus leucopareius* (Jenkins, 1903)
- Acanthurus leucosternon* Bennett, 1832
-  *Acanthurus lineatus* (Linnaeus, 1758)
- Acanthurus maculiceps* (Ahl, 1923)
-  *Acanthurus mata* (Cuvier, 1829)

- Acanthurus nigricans* (Linnaeus, 1758)  
 ➤ *Acanthurus nigricauda* Duncker and Mohr, 1929  
 ➤ *Acanthurus nigrofuscus* (Forsskål, 1775)  
*Acanthurus nigroris* Valenciennes, 1835  
*Acanthurus nubilus* (Fowler and Bean, 1929)  
 ➤ *Acanthurus olivaceus* Forster, 1801  
 ➤ *Acanthurus pyroferus* Kittlitz, 1834  
*Acanthurus thompsoni* (Fowler, 1923)  
 ➤ *Acanthurus triostegus* (Linnaeus, 1758)  
*Acanthurus tristis* Randall, 1993  
 ➤ *Acanthurus xanthopterus* Valenciennes, 1835  
  
*Ctenochaetus binotatus* Randall, 1955  
*Ctenochaetus hawaiiensis* Randall, 1955  
*Ctenochaetus marginatus* (Valenciennes, 1835)  
 ➤ *Ctenochaetus striatus* (Quoy and Gaimard, 1825)  
*Ctenochaetus strigosus* (Bennett, 1828)  
*Ctenochaetus tominiensis* Randall, 1955  
  
 ➤ *Paracanthurus hepatus* (Linnaeus, 1766)  
  
 ➤ *Zebrasoma flavescens* (Bennett, 1828)  
*Zebrasoma rostratum* (Günther, 1873)  
*Zebrasoma scopas* (Cuvier, 1829)  
 ➤ *Zebrasoma veliferum* (Bloch, 1797)

#### Subfamily PRIONURINAE

- Prionurus maculatus* Ogilby, 1887  
*Prionurus microlepidotus* Lacepède, 1804  
*Prionurus* sp.

#### Subfamily NASINAE

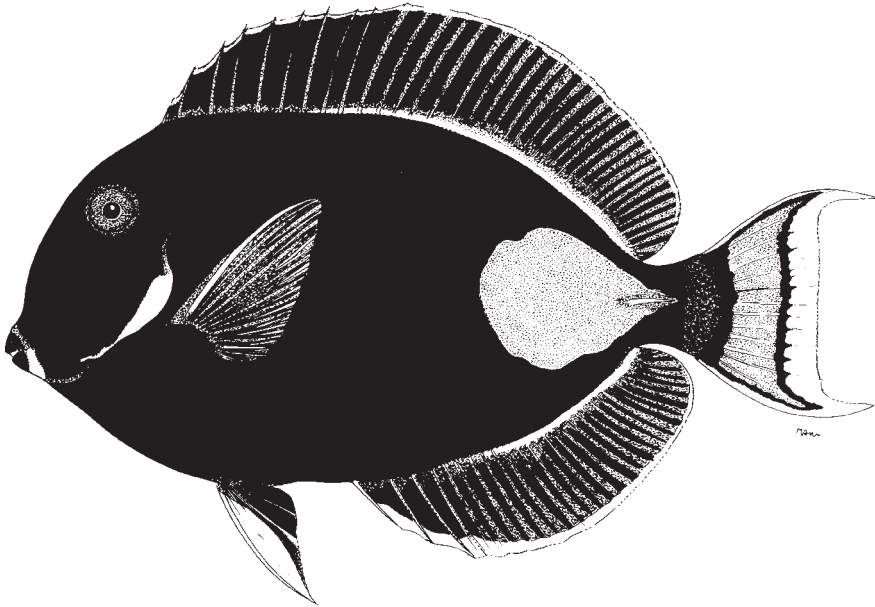
- Naso annulatus* (Quoy and Gaimard, 1825)  
*Naso brachycentron* (Valenciennes, 1835)  
 ➤ *Naso brevirostris* (Valenciennes, 1835)  
*Naso caeruleacauda* Randall, 1994  
*Naso caesius* Randall and Bell, 1992  
*Naso fageni* Morrow, 1954  
 ➤ *Naso hexacanthus* (Bleeker, 1855)  
 ➤ *Naso lituratus* (Forster, 1801)  
*Naso lopezi* Herre, 1927  
*Naso minor* (Smith, 1966)  
*Naso thynnoides* (Valenciennes, 1835)  
*Naso tuberosus* Lacepède, 1802  
 ➤ *Naso unicornis* (Forsskål, 1775)  
*Naso vlamingii* (Valenciennes, 1835)

#### References

- Randall, J.E. 1955. A revision of the surgeon fish genera *Zebrasoma* and *Paracanthurus*. *Pac. Sci.*, 9(4):96-412.  
 Randall, J.E. 1955. A revision of the surgeon fish genus *Ctenochaetus*, family Acanthuridae, with descriptions of five new species. *Zoologica*, 40(4):149-166.  
 Randall, J.E. 1956. A revision of the surgeon fish genus *Acanthurus*. *Pac. Sci.*, 10(2):159-235.  
 Randall, J.E. 1988. Three nomenclatorial changes in Indo-Pacific surgeonfishes (Acanthuridae). *Pac. Sci.*, (1987) 41(1-4):54-61.

*Acanthurus achilles* Shaw, 1803

(Plate XVIII, 134)

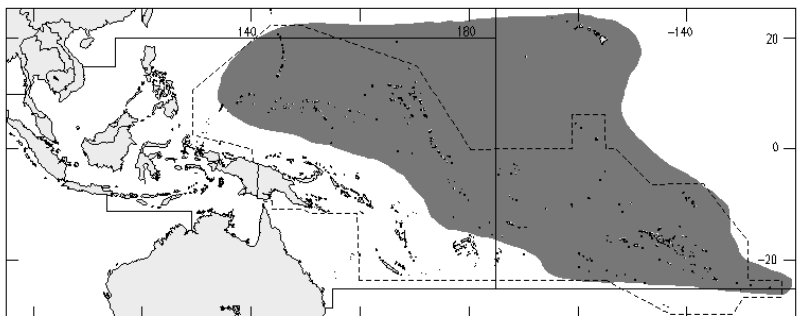
**Frequent synonyms / misidentifications:** None / None.**FAO names:** En - Achilles tang.

**Diagnostic characters:** Body deep and compressed, its depth 1.75 to 1.9 times in standard length. Snout slightly protruding, its length 3.9 to 4 times in standard length. Mouth small; teeth spatulate, close-set, with denticulate edges; **adults with 10 upper and 12 lower teeth**. Total gill rakers on first gill arch 16 to 20. **A continuous unnotched dorsal fin with IX spines and 29 to 33 soft rays; anal fin with III spines and 26 to 29 soft rays;** pectoral-fin rays 16; **caudal fin deeply emarginate to lunate, the caudal concavity 5.5 to 8 times in standard length. A lancet-like spine on each side of caudal peduncle** which folds into a deep horizontal socket. Stomach thin-walled. **Colour:** black with a large oval bright orange area posteriorly on side of body enclosing peduncular spine (orange spot first appearing at a standard length of about 6.5 to 7 cm); an elongate white spot at edge of operculum; caudal fin with a broad middle orange zone separated by black from the white borders; an orange line at base of dorsal and anal fins except anteriorly.

**Size:** Largest specimen examined 26 cm total length, commonly to 20 cm.

**Habitat, biology, and fisheries:** A shallow-water species which occurs in moderately turbulent water of exposed reefs. Feeds on filamentous and small fleshy algae. An aggressive species that drives other herbivorous fishes from its territory. The late postlarval stage, termed the "acronurus" stage, is unusually large for this and related species, reaching a total length of 7 cm; it has small brown spots dorsally and posteriorly on the body. *Acanthurus achilles* occasionally hybridizes with the closely related *A. nigricans* (*A. glaucopareius* a junior synonym). Of some importance as an aquarium fish; most are supplied for the aquarium trade from Hawaii.

**Distribution:** Known from the islands of Micronesia and Polynesia, including Hawaii and the Pitcairn Group; a single record from Mexico; a few questionable reports from Indonesia and Philippines should be confirmed.

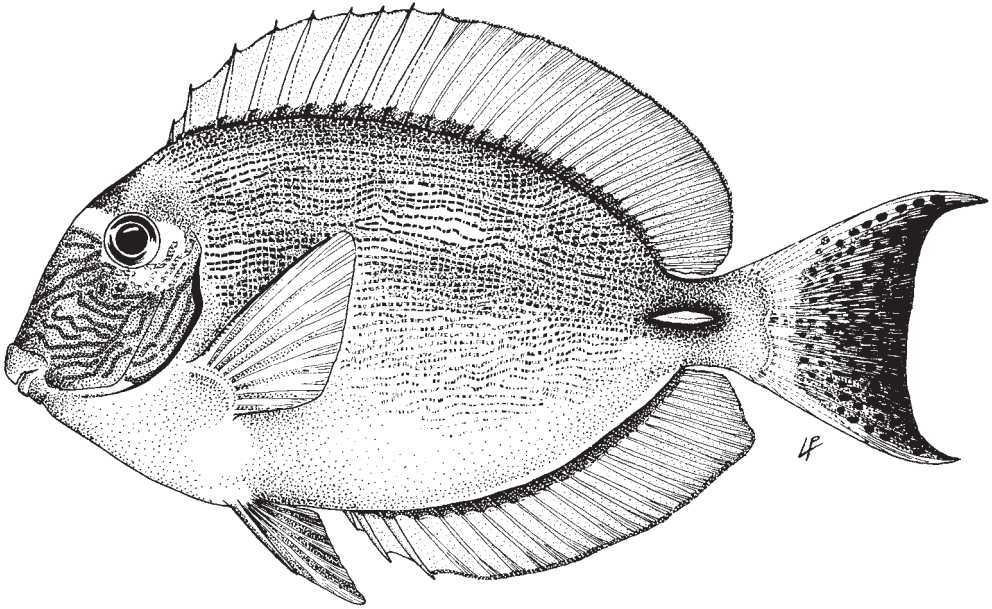




***Acanthurus dussumieri*** Valenciennes, 1835 (Plate XVIII, 135)

**Frequent synonyms / misidentifications:** None / *Acanthurus bariene* non Lesson, 1831.

**FAO names:** **En** - Eyestripe surgeonfish; **Fr** - Chirurgien couronné; **Sp** - Navajón coronado.

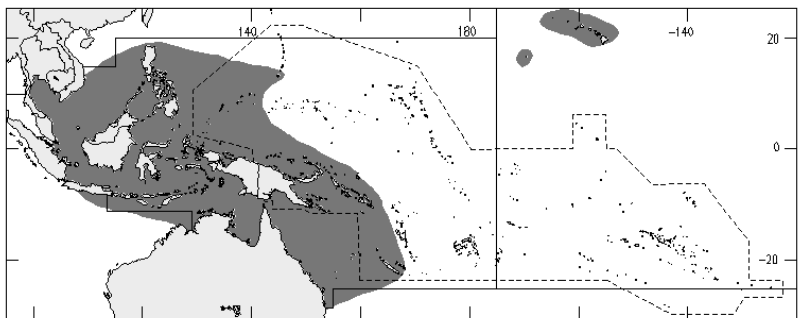


**Diagnostic characters:** Body deep and compressed, its depth 1.9 to 2.1 times in standard length. Snout 4.2 to 4.6 times in standard length. Eye 3.4 to 4.7 times in head length (at standard lengths of 11 to 30 cm). Mouth small; teeth spatulate, close-set, with denticulated edges. Total gill rakers on first gill arch 22 to 26. **A continuous unnotched dorsal fin with IX spines and 25 to 27 soft rays;** anal fin with III spines and 24 to 26 soft rays; caudal fin emarginate to lunate, the caudal concavity varying from 14 times in standard length (at standard lengths of 11 cm) to 5 times at 30 cm. **A lancet-like spine on each side of caudal peduncle which folds into a deep horizontal groove; length of spine 3 to 5 times in head length** (relatively longer in larger individuals). A thick-walled gizzard-like stomach. **Colour:** light brown with numerous longitudinal, slightly wavy purplish to bluish grey lines on body; similar, but more irregular lines on head; **a yellow band about as wide as pupil extending anteriorly from eye** and less distinctly posteriorly from eye; **sheath of peduncular spine pale cream to white;** socket of peduncular spine surrounded by a black area about 3 times as high as width of spine; dorsal and anal fins yellow, sometimes with traces of narrow bluish longitudinal bands distally; a bluish band basally on dorsal and anal fins; **caudal fin deep blue with numerous small blackish spots;** pectoral fins light yellowish brown.

**Size:** Maximum total length 54 cm, commonly to 35 cm.

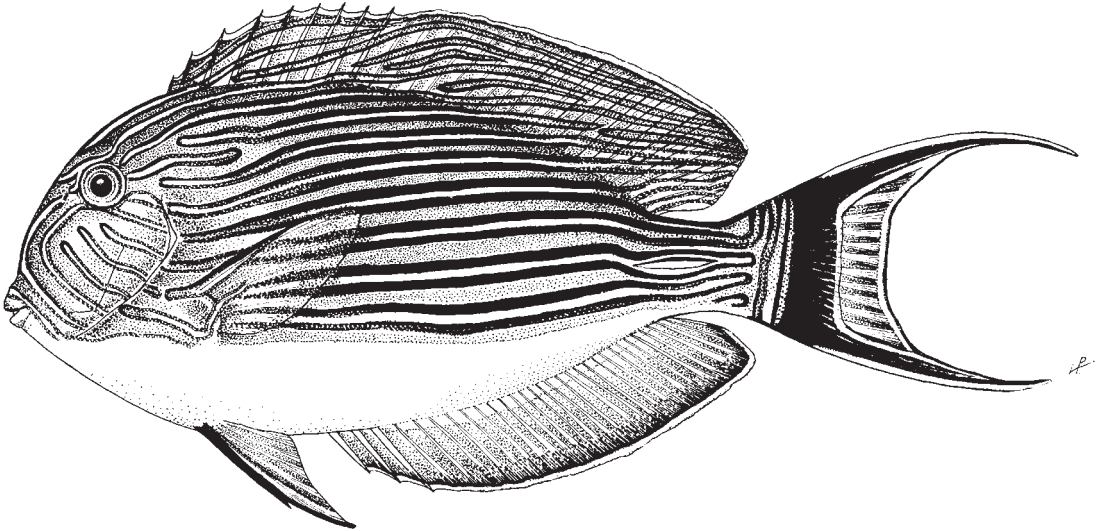
**Habitat, biology, and fisheries:** Closely tied to coral reefs or rocky substrata. Usually seen as solitary individuals; generally found at depths greater than about 15 m. Feeds on benthic algae. No definite fishing grounds; caught incidentally in many localities. Taken mainly in traps. Marketed fresh.

**Distribution:** East Africa, southern Arabian Peninsula, and Mauritius to the western Pacific where it ranges from southern Japan to New South Wales, east to New Caledonia, Guam, and Hawaii.



*Acanthurus lineatus* (Linnaeus, 1758)

(Plate XVIII, 136)

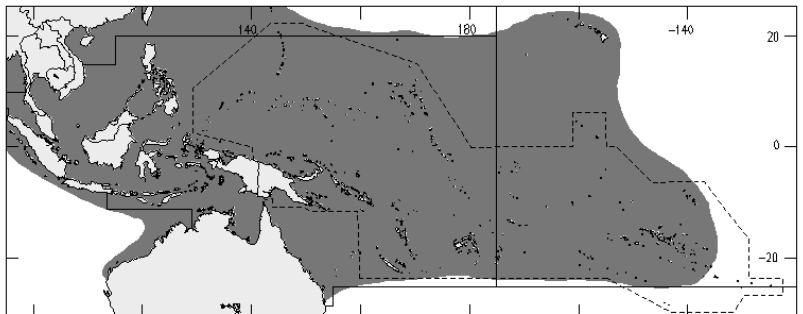
**Frequent synonyms / misidentifications:** None / None.**FAO names:** En - Lined surgeonfish; Fr - Chirurgien zèbre; Sp - Navajón cebra.

**Diagnostic characters:** Body deep and compressed, its depth 2.1 to 3 times in standard length (body of juveniles relatively deeper than that of adults). Snout 5.2 to 5.7 times in standard length. Mouth small; teeth spatulate, close-set, with denticulate edges. Total gill rakers on first gill arch 14 to 16. **A continuous unnotched dorsal fin with IX spines and 27 to 30 soft rays**; anal fin with III spines and 25 to 28 soft rays; **caudal fin deeply lunate**, the caudal concavity 3.3 to 4.5 times in standard length. **A lancet-like spine on each side of caudal peduncle which folds into a deep horizontal groove, this spine long, 1.9 to 2.5 times in head length, and venomous.** Stomach thin-walled. **Colour:** upper three-fourths of body and head with alternating black-edged blue and yellow stripes, those on the head mainly diagonal; lower fourth pale lavender to bluish white; dorsal fin finely striped pale blue and yellowish; anal fin grey with a yellow basal band and a light blue margin; caudal fin blackish with a large, grey crescent centroposteriorly, edged at the front in bluish white and at the posterior margin with black; pectoral fins pale except basally where they are coloured like the body; pelvic fins yellow-orange with a white lateral margin and a blackish submarginal line.

**Size:** Maximum total length 30 cm, commonly to 25 cm.

**Habitat, biology and fisheries:** An inshore species of coral reefs or rocky substrata exposed to wave action. Grazes benthic algae. An aggressive territorial fish. No definite fishing grounds. Taken by throw nets, gill nets, spears, and traps. Marketed fresh.

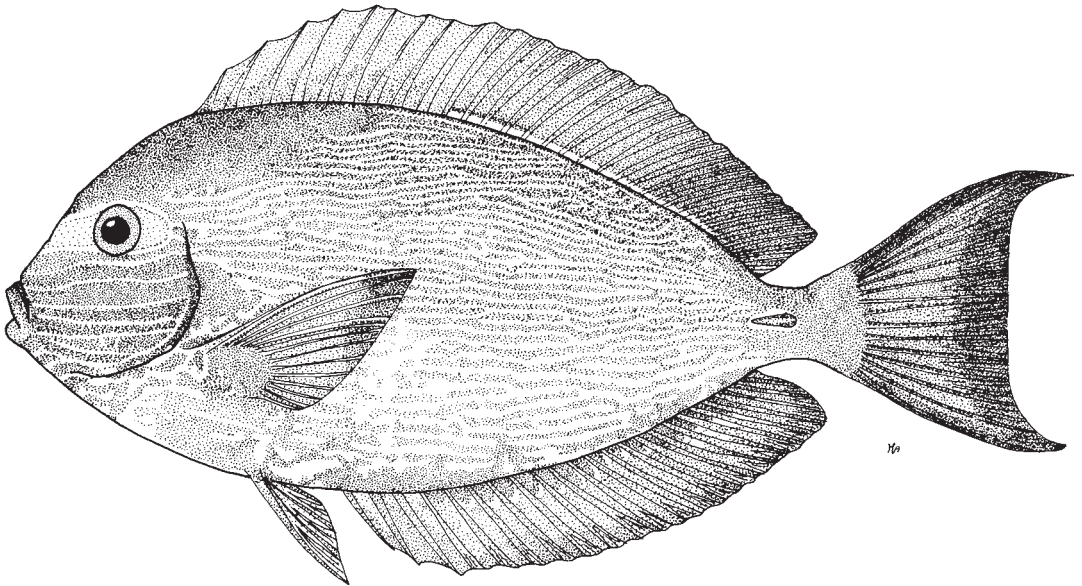
**Distribution:** Widespread in the Indo-Pacific region; absent from the Red Sea and other seas of the Arabian Peninsula; south on the East African coast to Delagoa Bay, Mozambique; east in the Pacific to French Polynesia and Hawaii (where it occurs only as a waif).



***Acanthurus mata*** (Cuvier, 1829)

**Frequent synonyms / misidentifications:** *Acanthurus bleekeri* Günther, 1861 / None.

**FAO names:** En - Elongate surgeonfish (formerly also reported as Bleeker's surgeonfish, *A. bleekeri*).

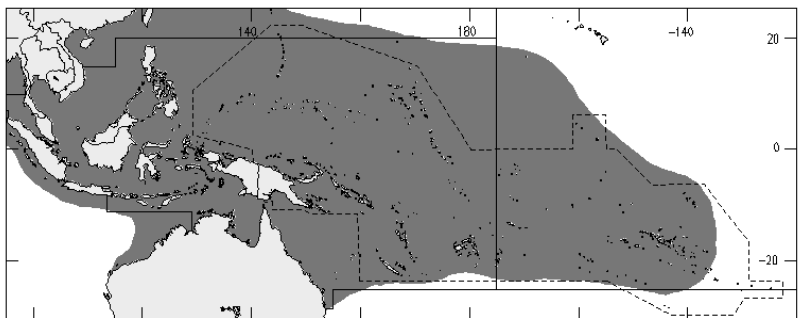


**Diagnostic characters:** Body moderately deep and compressed, its depth 2.1 to 2.5 times in standard length (smaller individuals deeper-bodied). Snout relatively short, 6 to 6.9 times in standard length. Eye 3.2 to 4.5 times in head length (at standard lengths of 12 to 28 cm). Mouth small; teeth spatulate, close-set, with denticulate edges, and small for the genus. Total gill rakers on first gill arch 13 to 15. **A continuous, unnotched dorsal fin with IX spines and 24 to 26 soft rays**; anal fin with III spines and 23 or 24 soft rays; caudal fin emarginate to lunate, the caudal concavity 6.5 to 9 times in standard length (concavity greater in larger individuals). **Caudal peduncle narrow, the least depth 10 to 12 times in standard length, with a lancet-like spine on each side which folds into a deep horizontal groove.** Stomach large, U-shaped, thin-walled with large, thorn-like papillae on inner surface. **Colour:** brown with longitudinal blue lines on head and body; a yellow area behind eye and 2 yellow bands extending anteriorly from eye. In life, this fish is capable of changing its ground colour from dark brown to pale blue.

**Size:** Maximum total length 50 cm, commonly to 35 cm.

**Habitat, biology, and fisheries:** Occurs on coral reefs or over rocky substrata, generally at depths greater than 15 m. Juveniles feed on benthic algae, adults primarily on zooplankton. More inclined to enter turbid, plankton-rich areas than other species of the genus. Sometimes seen in aggregations. Caught incidentally throughout its range, mainly in traps, occasionally by nets or trawls. Marketed fresh.

**Distribution:** Occurs throughout most of the Indo-Pacific region from the Red Sea south to Natal and east to French Polynesia and the islands of Micronesia; in the western Pacific from southern Japan to Sydney, New South Wales.

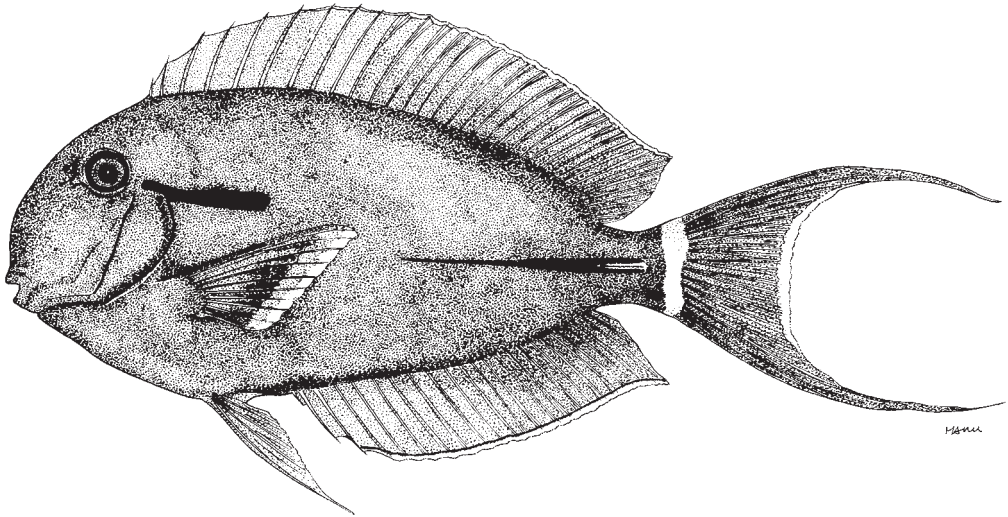


*Acanthurus nigricauda* Duncker and Mohr, 1929

(Plate XVIII, 137)

**Frequent synonyms / misidentifications:** None / *Acanthurus nigricans* (non Linnaeus, 1758); *A. gahhm* (non Forsskål, 1775).

**FAO names:** En - Epalette surgeonfish.

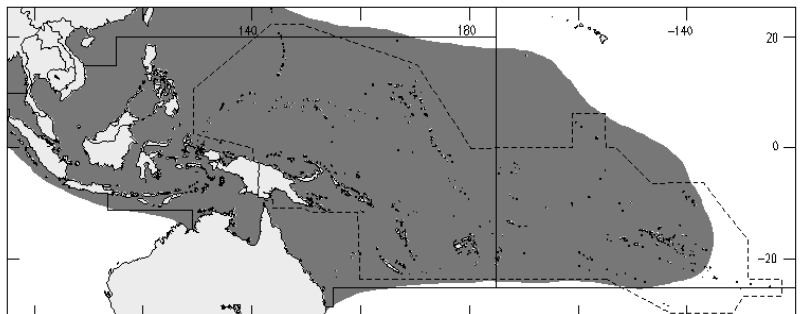


**Diagnostic characters:** Body moderately deep, its depth 1.9 (in subadults) to 2.2 times (large adults) in standard length. **Dorsal profile of head of large adults strongly convex.** Snout length 4.3 to 4.5 times in standard length. Mouth small; teeth spatulate, close-set, with denticulate edges, 14 teeth in jaws of small juveniles to as many as 19 upper and 22 lower teeth in large adults. Total gill rakers on first gill arch usually 20 or 21. **A continuous unnotched dorsal fin with IX spines and 25 to 27 soft rays;** anal fin with III spines and 24 to 26 soft rays; pectoral-fin rays 17. **Caudal fin progressively more lunate with age, the caudal concavity varying from 6.5 times in standard length (in a specimen 7.6 cm standard length) to 3.6 times in standard length (in a specimen 23.7 cm standard length).** **A lancet-like spine on each side of caudal peduncle** which folds into a deep horizontal socket; peduncular spine varying from 7.5 times in head length (in a specimen 7.5 cm length) to 4.5 times in head length (in a specimen 23.7 cm length). Stomach gizzard-like. **Colour:** dark brown (but capable of changing colour quickly to light purplish grey), without fine longitudinal lines on body or spots on head; caudal fin with a distinct white posterior margin, broadest centrally where about 1/4 eye diameter in width; a long pointed black streak enclosing and extending anteriorly from peduncular spine (first appearing at a standard length of about 10 cm); a horizontal black band about as long as snout extending posteriorly from a short distance behind eye (first appearing at a standard length of about 6 cm); dorsal and anal fins without stripes, the distal margin blue; outer fourth of pectoral fins abruptly pale (partly yellow in life); a middorsal purplish blue band sometimes present on nape.

**Size:** Maximum total length 40 cm, commonly to 30 cm.

**Habitat, biology, and fisheries:** Usually seen over sand near coral heads or rocky bottom of lagoons and bays. Feeds on benthic algae (probably also on seagrasses and their epiphytes); often observed grazing on the fine film of algae growing on compact sand surfaces. Generally caught in traps, by nets, or by spearing.

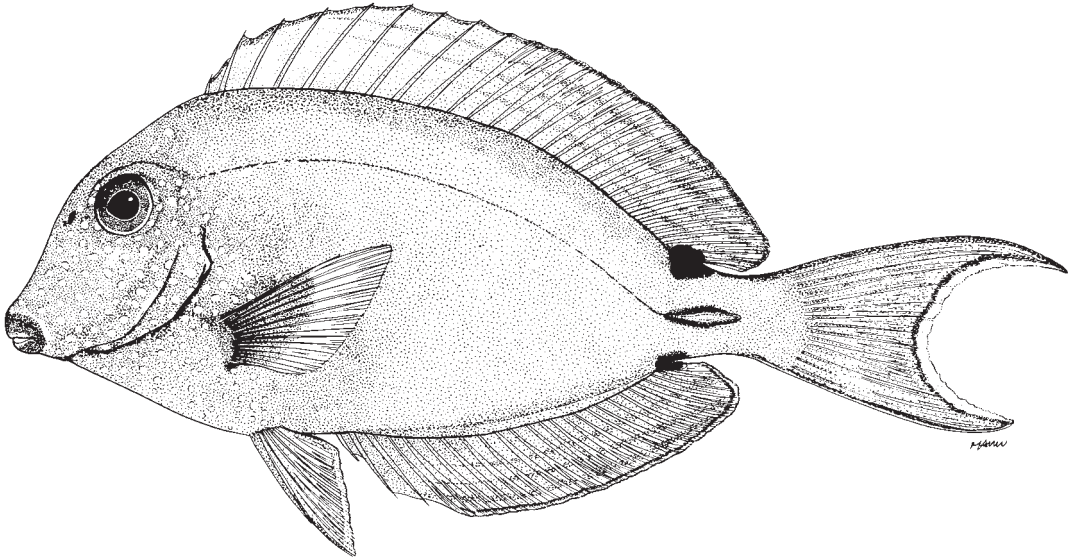
**Distribution:** Occurs from the east coast of Africa (but not the Red Sea or other seas of the Arabian Peninsula) south to Natal and east to the Society Islands, Tuamotu Archipelago, islands of Micronesia, and the Line Islands; in the western Pacific from the Ryukyu Islands to the Great Barrier Reef. A single record from Hawaii is erroneous.



***Acanthurus nigrofuscus*** (Forsskål, 1775)

**Frequent synonyms / misidentifications:** None / *Acanthurus elongatus* (non Lacepède, 1802) (named from an unidentified juvenile).

**FAO names:** En - Brown surgeonfish.

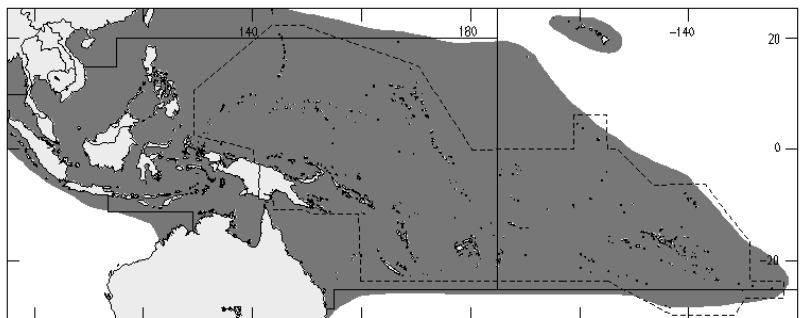


**Diagnostic characters:** Body moderately deep, its depth 2 to 2.3 times in standard length. Dorsal profile of snout slightly concave, the snout length 5 to 5.3 times in standard length. Mouth small; teeth spatulate, close-set, with denticulate edges, the uppers a little pointed; upper jaw of juveniles with about 10 teeth, the lower with 12; adults with 14 upper and 16 lower teeth. Total gill rakers on first gill arch 21 to 24. A continuous unnotched dorsal fin with IX spines and 24 to 27 (usually 25) soft rays; anal fin with III spines and 22 to 24 soft rays; pectoral-fin rays 16 or 17. Caudal fin of adults lunate, the caudal concavity 4.5 to 6 times in standard length. A lancet-like spine on each side of caudal peduncle which folds into a deep horizontal socket. Stomach thin-walled. **Colour:** brown to lavender brown, usually with faint longitudinal bluish grey lines or rows of dots (generally not persisting in preserved specimens); **head and chest with small yellow-orange spots**; lips blackish; a narrow blackish edge around socket of peduncular spine; **a prominent black spot at rear base of dorsal and anal fins**, the spot at dorsal-fin base more than 1/2 eye diameter; caudal fin with a white posterior border, about half pupil diameter in greatest width.

**Size:** A small species, largest specimen 21 cm total length; commonly to 15 cm.

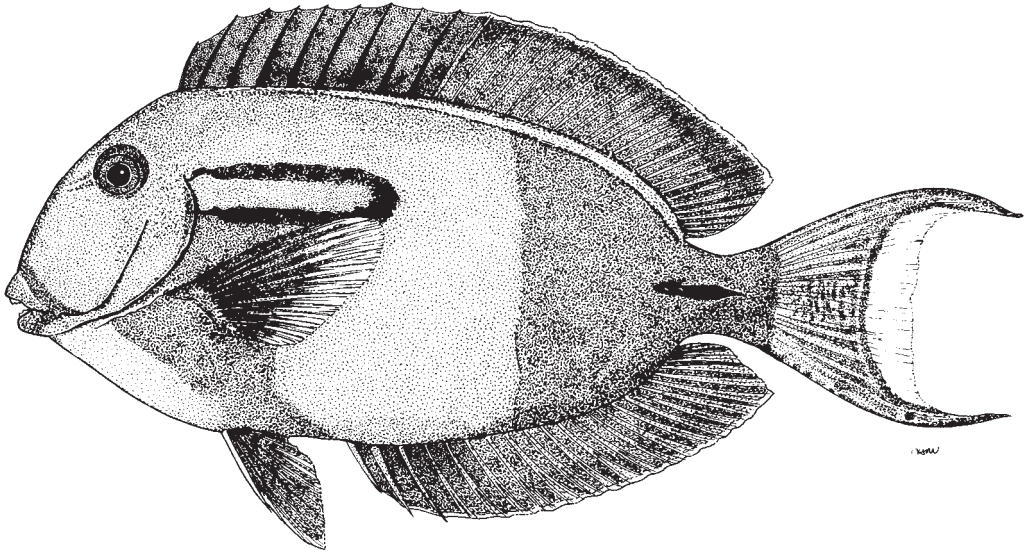
**Habitat, biology, and fisheries:** One of the most abundant of surgeonfishes on coral reefs; generally found below the surge zone. Feeds on filamentous benthic algae, sometimes in small schools. Taken mostly in traps or by driving schools to a barrier net.

**Distribution:** Throughout the Indo-Pacific region from the Red Sea and coast of East Africa south to Transkei (South Africa), east to the islands of Oceania; in the western Pacific from southern Japan to New South Wales (in the Sydney area only as juveniles); not known from the Persian Gulf or Gulf of Oman.



*Acanthurus olivaceus* Forster, 1801

(Plate XVIII, 138)

**Frequent synonyms / misidentifications:** None / None.**FAO names:** En - Orangeband surgeonfish.

**Diagnostic characters:** Body moderately deep, its depth 2 to 2.4 times in standard length. **Dorsal profile of head of large adults strongly convex** (more convex in males than in females). Snout length 4.5 to 4.9 times in standard length. Mouth small; teeth spatulate, close-set, denticulate on edges, varying from 14 teeth in jaws in small juveniles to 20 upper and 21 lower teeth in large adults. Total gill rakers on first gill arch 24 to 28. **A continuous unnotched dorsal fin with IX spines and 23 to 25 soft rays**; anal fin with III spines and 22 to 24 rays; pectoral-fin rays 16 or 17 (usually 17); **caudal fin strongly lunate, the caudal concavity of adults 4 to 5 times in standard length. A lancet-like spine on each side of caudal peduncle** which folds into a deep horizontal socket, the spine length 2.5 to 3.5 times in head length. Stomach gizzard-like. **Colour:** light olive grey to dark brown with a horizontal bright orange band, broadly edged in deep blue or purple, extending posteriorly from in front of upper end of gill opening, the band length about equal to head length; caudal fin with small dark brown dots and a crescentic white area posteriorly; a narrow orange band at base of dorsal fin; one colour phase with the posterior third of the standard length abruptly darker than anterior two-thirds. Juveniles yellow (the first sign of the shoulder band appears as dusky mark at a standard length of about 4.5 cm).

**Size:** Maximum total length about 35 cm, commonly to 26 cm.

**Habitat, biology, and fisheries:** A coral-reef species, but often found over sand near reefs. Frequently seen in small aggregations. Feeds on benthic algae. Caught by traps, nets, or spears. Marketed fresh.

**Distribution:** Central and western Pacific; in the west from southern Japan to central New South Wales; in the east to Hawaii and Tuamotu Archipelago. Records of *A. olivaceus* from the Indian Ocean have been misidentifications of *A. tennetti*, except for Christmas Island where the species occurs naturally.

**Remarks:** A closely related species from the Marquesas will soon be described (Randall, in press). It has a deep blue band on the shoulder with an orange spot at the front; there are no small dark brown spots on the caudal fin, and the colours of the caudal fin are reversed (pale with a black posterior crescent).

