BRANCHIOSTEGIDAE

Tilefishes (sand tilefishes)

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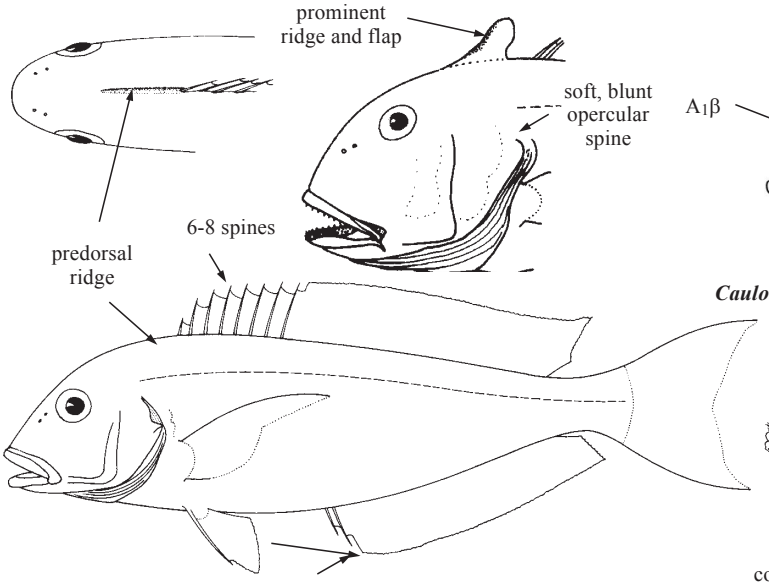
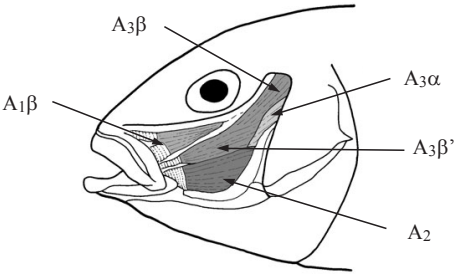
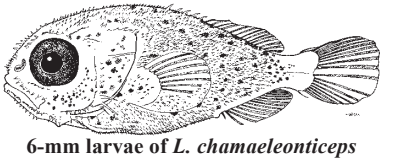
Diagnostic characters (**subfamily Branchiosteginae: Body quadriform, head rounded; body depth 21 to 34% (usually 29%) standard length; predorsal ridge (a raised seam in front of dorsal fin) prominent (may form flap in *Lopholatilus*), or may be reduced, but always present**; predorsal length 29 to 39% (usually 32%) standard length; head length 25 to 32% (usually 29%) standard length; head depth 72 to 100% (usually 85%) head length; suborbital depth 13 to 24% (usually 17%; varies with size) head length; orbit diameter 15 to 44% (usually 26%; varies with size) head length; **preopercle finely serrated on upper limb to angle or just below, lower limb with fine, few, or no serrae; preopercle angle 85 to 110°; opercle with a single soft, blunt spine (*Lopholatilus*), or a stout notched spine (*Caulolatilus*)**; jaws protrusile and slightly oblique, extending from well in front of orbit under rear nostril to below pupil; mouth terminal to slightly inferior, **jaws on each side with 5 to 7 mandibular pores (usually 5 or 6); total gill rakers on first gill arch 18 to 26 (usually 20); dorsal and anal fins long and continuous; length of dorsal-fin base 52 to 68% standard length; anal-fin base 27 to 44% standard length; dorsal fin with 6 to 8 spines and 15 to 26 soft rays; anal fin with 1 or 2 spines and 13 to 25 soft rays; caudal fin truncate, double, or slightly emarginate,** with 17 principal rays, sometimes with elongate tips; scales ctenoid (in pockets) over most of body, cycloid (replacement type) in head region; pored lateral-line scales 66 to 96; scales above lateral line 7 to 16; scales below lateral line 23 to 46; **vertebrae 10 or 11+ 14 or 16 (higher than the usual 24 for perciform fishes); supraoccipital skull crest well elevated and elongate or low and elongate**; well-formed foramen in the ceratohyal; **first haemal spine over second anal-fin ray with parapophyses fused medially forming a receptacle for rear of swimbladder; supraneural (predorsal) fin supports formula always 0-0-2; first haemal spine positioned over the second anal-fin ray or fifth to seventh anal-fin ray**; procurrent caudal-fin rays 10 or 11 (usually 10) in upper lobe, and 9 or 10 (usually 9) in lower lobe; highly complex adductor mandibulae (jaw) musculature, with 5 major subdivisions, including $A_3\beta$; **unusual pelagic larvae, with numerous head spines (no pronounced rostral spine) and serrated ridges. Colour:** back and upper sides ranging from grey-brown to violet; lower sides and belly usually yellowish, silvery, or white; often with bright coloured (blue, gold, yellow, silver, or white) markings or spots on head, body sides, dorsal, anal, and caudal fins.

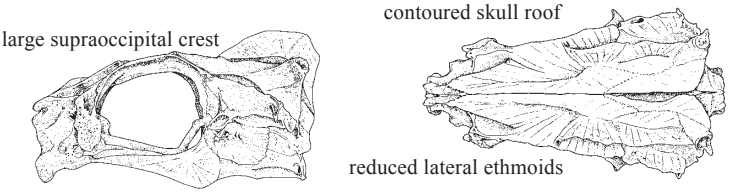




***Caulolatilus chrysops* deep adductor (jaw) musculature with $A_1\alpha$**

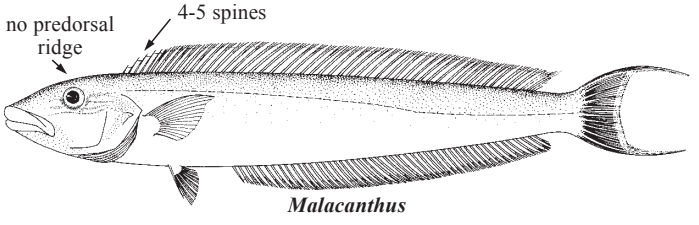


6-mm larvae of *L. chamaeleonticeps* (Fahay and Berrien, 1981)

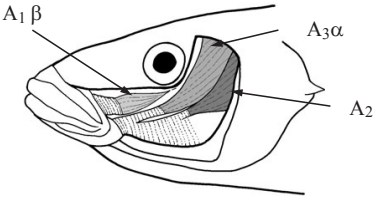


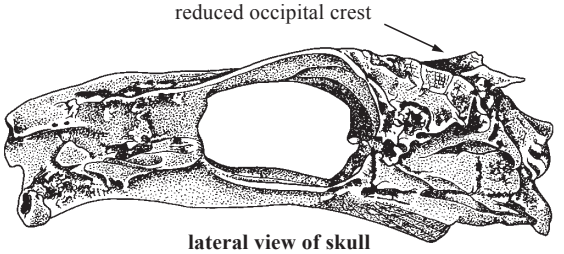
lateral and dorsal view of skull of *Caulolatilus chrysops*

Diagnostic characters: (subfamily Malacanthinae) only 1 genus and species found in Area 31; **body elongate and fusiform, body depth 13 to 19 % (usually 14 to 17 %) standard length**; with blunt or rounded snout; **snout length 39 to 52% standard length**; upper lip very fleshy, overhanging upper jaw; **no predorsal ridge; predorsal length 23 to 27% standard length**; head length 23 to 28% standard length; head depth 49 to 60 % head length; suborbital depth 9 to 20% (varies with fish size) head length; orbit diameter 11 to 25 % (varies with fish size) head length; **preopercle edge smooth, angle 110 to 115°; opercle with single sharp pointed spine about 3/4 the diameter of the eye (not found in Branchiosteginae, only a single soft blunt spine or a stout notched spine)**; mouth terminal, slightly inferior, jaws slightly oblique, extending posteriori to below posterior nostril well anterior of eye; **jaws each side with 7 mandibular pores**; 6 branchiostegals; 4 gill arches; **gill rakers blunt and reduced; total gill rakers on first gill arch 8 to 13 (usually 10); dorsal and anal fins long and continuous (sum of bases 112 to 135%, usually 125% standard length); length of dorsal-fin base 67 to 73% standard length; anal-fin base 53 to 63% standard length; dorsal-fin spines 4 or 5; dorsal-fin soft rays 54 to 60 (usually 56 to 58); anal-fin spines 1; anal-fin rays 48 to 55 (usually 51 to 54); caudal fin lunate with extended filaments from upper and lower tips**; caudal fin with 17 principal rays; scales ctenoid in pockets over most of body, mostly cycloid (replacement type) in head region; pored lateral-line scales 135 to 152; scales above lateral line 11 to 17; scales below lateral line 40 to 53; vertebrae 10 + 14; **supraoccipital skull crest very reduced to a small pointed process; first haemal spine formed from parahypophyses fused only at their tips, forming a broad elliptical arch (unlike Branchiosteginae where they are fused medially forming a curved arch for rear of swimbladder); supraneural (predorsal) fin support formula always 2-**; **highly complex adductor mandibulae (jaw) musculature but less complex than Branchiosteginae, with only 4 major subdivisions (lacking muscular subdivisions of $A_3\beta$; jaw muscles in Branchiosteginae); unusual pelagic larva, with numerous enlarged head spines and a sickel-shaped rostral spine and numerous serrated ridges**; when first discovered, *Malacanthus* larvae were so unusual, they were thought to belong to a new genus and species of fish; pelagic larval metamorphose to a benthic form at around 60 mm standard length. **Colour:** when fresh: head with a series of blue and yellow thin stripes under and around eyes; body light metallic blue-green, darker dorsally; bluish white underbelly; may have light yellow bars on sides; dorsal fin with thin outer band of bright yellow with a clear band then another yellow band below; remainder of dorsal with 3 or 4 rows of yellow spots; anal fin similar to dorsal only lighter; caudal fin with yellow-orange areas at bases of dorsal and ventral portions, area between black-grey, remainder of caudal fin white with some grey; pectoral fins clear; pelvic fins white.

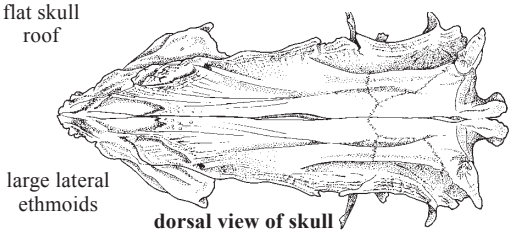


Malacanthus

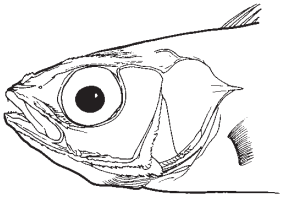


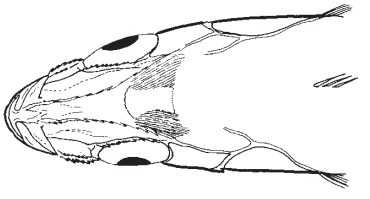


lateral view of skull



dorsal view of skull


lateral view of head (larval *Malacanthus plumieri*)


dorsal view of head (larval *Malacanthus plumieri*)

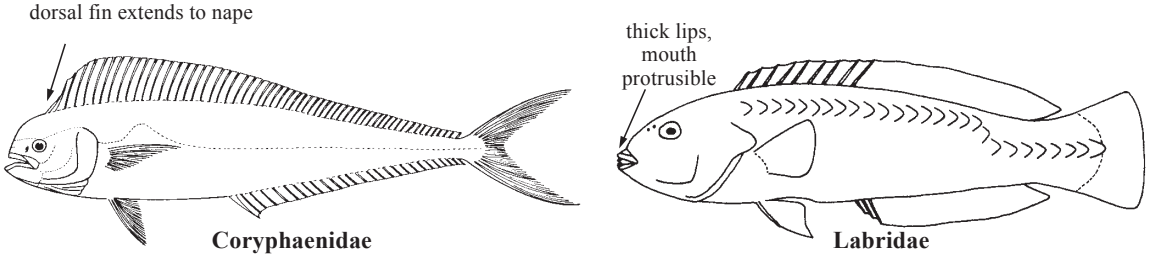
Habitat, biology, and fisheries: Branchiosteginae are large, and relatively deep dwelling (range 20 to 600 m; although usually 50 to 200 m) fishes found along the edges of continental shelves, at the heads of deep-sea canyons, or near the upper slopes of islands. Found on mud or rubble bottoms; feed mostly on benthic invertebrates and small fishes. They often inhabit caves or crevices, or may construct mounds or burrows. They are caught in traps, trawls, or hook-and-line. *Caulolatilus* are playing an increasingly important role in a growing sport and commercial offshore fishery (particularly off the eastern USA and the Caribbean). Deepwater tilefishes are often caught by an electric "snapper" reel". *Lopholatilus* are similarly being caught in growing numbers by sport and commercial fishermen in deeper waters of Canyon heads and over the upper continental slope and caught on hook-and-line or occasionally in trawls. The great northern tilefish (*Lopholatitus chamaeleonticeps*) has been used as a classical historic fishery example from its discovery in May of 1879 off New England to its apparent extinction in March of 1882 where 1.5 billion were killed by a cold water intrusion, the greatest single vertebrate mortality ever recorded. This species has a narrow temperature tolerance (6 to 16°C) and is prone to mortality with sudden temperature changes. *Lopholatilus chamaeleonticeps* was considered extinct until 1891 when the northern stocks were apparently repopulated from southern stocks. By 1898, they were numerous again, and from 1916 to 1917 over 5 300 t were landed. Low landings since then probably reflect a lack of demand rather than a lack of availability, although overfishing is a possibility. Tilefishes are generally superb quality foodfishes. Malacanthinae are generally smaller, more shallow water fishes (range 10 to 150 m, usually less than 50 m) that feed either on plankton (*Hoplolatilus*) or (according to Randall) in decreasing order of occurrence: stomatopods, small fishes, polychates, sipulculids, chitons, echinoids, amphipods, and shrimp (*Malacanthus*). *Malacanthus* constructs large burrows in sand near grassy areas or reefs; sand tilefishes are caught on hook-and-line or trap.

Remarks: Tilefishes and sand tilefishes include 5 genera and 42 species worldwide. Some authors (including: Cervigon, et al., 1993; Dooley, 1978, Marino and Dooley, 1982; and Tominaga et al., 1996) consider the tilefishes as 2 distinct families (tilefishes- Branchiostegidae, and sand tilefishes- Malacanthidae) based upon numerous morphological and other differences between the 2 groups. Other authors (Nelson, 1994; Eschmeyer, 1990) consider tilefishes as a single family Malacanthidae (including 2 subfamilies Latilinae (Branchiosteginae) and Malacanthinae). Tilefishes will be considered as a single family taxon for purposes of consistency within this publication following Nelson's (1994) taxonomic arrangements.

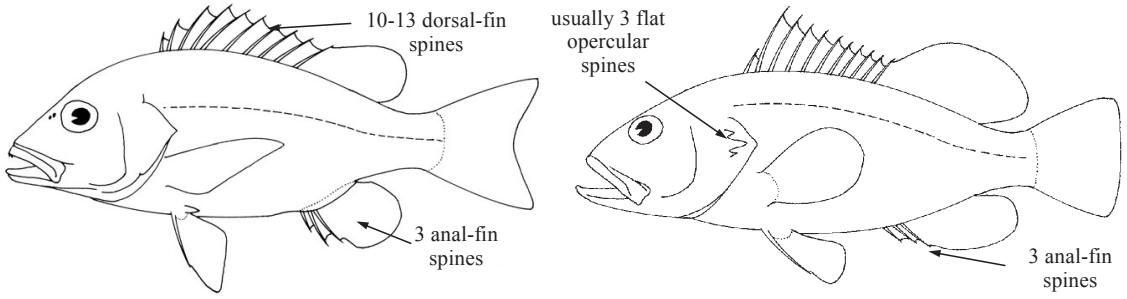
Similar families occurring in the area

Coryphaenidae: dorsal fin extends to nape.

Labridae: thick lips, mouth protrusible; teeth prominent or nipping canines; dorsal-fin spines 9 to 14; 3 anal-fin spines.

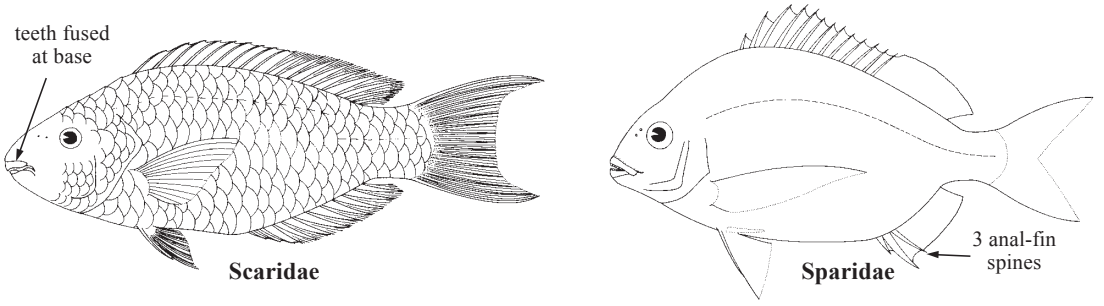


Lutjanidae: maxilla slides beneath suborbital bone; dorsal-fin spines 10 to 13; 3 anal-fin spines.
Serranidae: usually 3 flat opercular spines; 3 anal-fin spines.



Lutjanidae **Serranidae**

Scaridae: teeth fused or united at base.
Sparidae: incisor-like or canine-like front teeth, molar-like lateral teeth; no suborbital scales; 12 or 13 dorsal-fin spines; 3 anal-fin spines.



Scaridae **Sparidae**

Key to the genera of Branchiostegidae occurring in the area

1a. Body quadiform, body depth 21 to 34% standard length; predorsal ridge prominent as either a ridge or elevated flap; preopercular edge serrated on upper limb to angle or just below angle; operculum with well developed flat blunt spine or a blunt soft tab-like spine, never into a sharp spine; dorsal fin with 7 or 8 spines, 15 to 27 soft rays . . . . . → *2*

1b. Body elongate, body depth 13 to 19% standard length; no predorsal ridge; preoperculum edge smooth; operculum with a sharp and prominent spine; dorsal fin with 4 or 5 spines, 54 to 60 soft rays (Fig. 1) . . . . . ***Malacanthus***

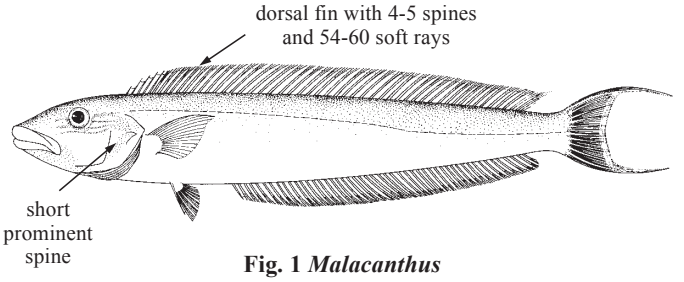


Fig. 1 ***Malacanthus***

2a. Predorsal ridge present as a slightly elevated seam, never as an elevated crest or prominent flap; opercular spine bony and blunt; no barbel on posterior margin of upper lip (Fig. 1); anal fin with 1 or 2 spines (first spine often reduced) and 20 to 26 soft rays; dorsal fin with 7 or 8 (rarely 6) spines and 23 to 27 soft rays; vertebrae 11+16 (Fig. 2) . . . . . ***Caulolatilus***

2b. Predorsal ridge present as a prominent elevated crest or enlarged flap (flap not found on *Lopholatilus villarii* from Brazil); opercular spine reduced to a soft blunt tab; cutaneous barbel may be present at posterior margin of upper lip (Fig. 2); anal fin with 1 spine and 14 (rarely 13) soft rays; dorsal fin with 7 spines and 15 soft rays (rarely 8 and 14); vertebrae 10+14 (Fig. 3) . . . . . ***Lopholatilus***

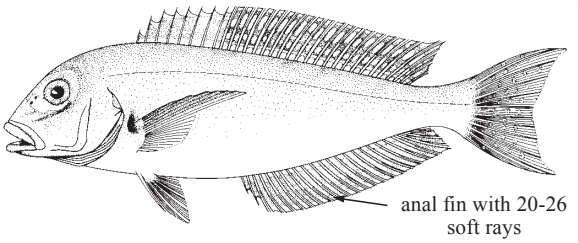


Fig. 2 ***Caulolatilus***

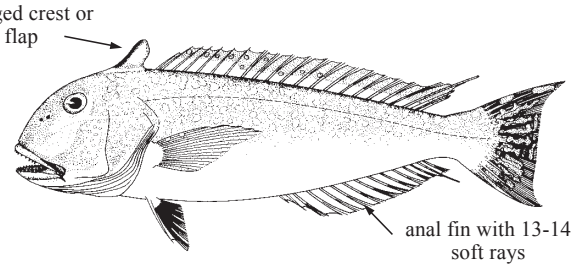


Fig. 3 ***Lopholatilus***

Key to the species of *Caulolatilus* occurring in the area (Dooley, 1981)

1a. Interoperculum with scales . . . . . → *2*

1b. Interoperculum naked . . . . . → *5*

2a. Dorsal fin with 8 spines and 23 to 25 rays; pectoral-fin soft rays 18 or rarely 19; a broad yellow-gold patch under eye to nostril (Fig. 6) . . . . . ***Caulolatilus chrysops***

2b. Dorsal fin with 7 spines and 23 or 24 rays; pectoral-fin soft rays 16 or 17 (rarely 18); no broad yellow-gold patch under eye to nostril . . . . . → *3*

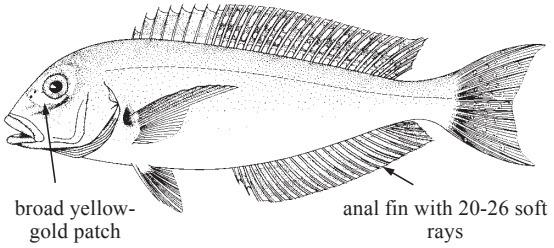


Fig. 6 ***Caulolatilus chrysops***

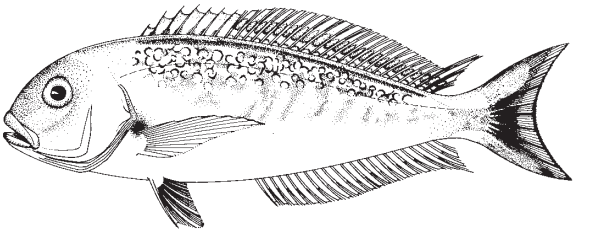


Fig. 7 ***Caulolatilus cyanops***

3a. Spinous dorsal membrane brilliant orange-yellow; upper body with dark markings; dorsal-fin height about 10% standard length; base with a dark line along its entire length; a large dark area above pectoral-fin axil; emarginate caudal with broad yellow areas on each lobe (Fig. 7) . . . . . ***Caulolatilus cyanops***

3b. Spinous dorsal dusky, not a brilliant orange-yellow; upper body without dark markings; dorsal-fin height 7.5 to about 12% standard length, base without a dark line along its base; no large dark area above pectoral-fin axil (a small diffuse dusky spot may appear); truncate or slightly emarginate caudal without broad yellow areas on each lobe . . . . . → *4*

4a. Dorsal-fin height 12% standard length; anal-fin origin below dorsal-fin soft rays 4 and 5; peritoneum white with a few dark speckles; jaws extending posteriori to under anterior margin of fleshy orbit (Fig. 8) . . . . . ***Caulolatilus dooleyi***

4b. Dorsal-fin height 7.5% standard length; anal-fin origin below dorsal-fin soft rays 5 and 6; peritoneum dusky; jaws extending well under orbit to anterior 1/3 eye (Fig. 9) . . . . . ***Caulolatilus bermudensis***

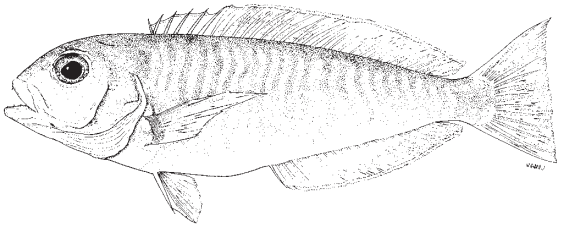


Fig. 8 ***Caulolatilus dooleyi***

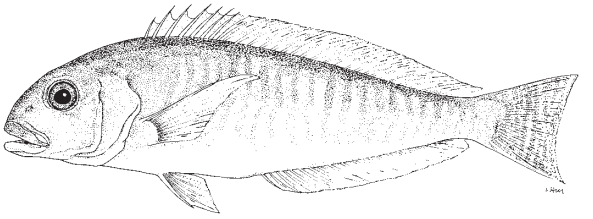


Fig. 9 ***Caulolatilus bermudensis***

5a. Dorsal-fin 8 spines, 22 to 23 rays; anal fin 1 or 2 spine, 23 to 25 rays; pored lateral-line scales 96 or more; predorsal ridge not dark or differently pigmented; body elongate, body depth 23% standard length; body with 17 to 22 yellow, wavy vertical bars; caudal fin with a brilliant yellow area covering most of lower portion (Fig. 10) . . . . . ***Caulolatilus williamsi***

5b. Dorsal-fin 7 spines (rarely 6 or 8), 23 to 27 rays; anal fin 1 or 2 spines, 20 to 24 rays; pored lateral line scales 73 to 91; predorsal ridge black; body depth 24 to 34% standard length; body may have dark reticulations, but has no vertical yellow bars; caudal fin may have some yellow markings, but lack large yellow area on lower portion . . . . . → ***6***

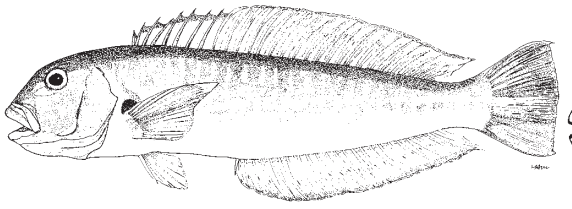


Fig. 10 ***Caulolatilus williamsi***

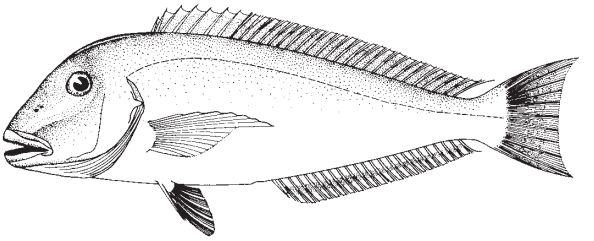


Fig. 11 ***Caulolatilus microps***

6a. Dorsal fin 7 spines (rarely 8), 24 to 27 rays; anal fin with 2 spines, 22 to 24 rays; no dark area above axil of pectoral fin; no suborbital bar or dark area on snout; caudal fin truncate; dorsal-fin membrane without any distinct pattern; pored lateral-line scales 80 to 90 (usually 85); orbit diameter to suborbital depth less than 1.0 (Fig. 11) . . . . . ***Caulolatilus microps***

6b. Dorsal-fin 7 spines (rarely 6), 23 to 26 rays; anal fin with 1 or 2 spines, 20 to 23 rays; prominent dark area above axil or pectoral fin; distinct dark suborbital bar, dark area on snout; caudal fin rounded (double emarginate); dorsal-fin membrane with a pattern of dark blotches; pored lateral-line scales 73 to 81 (usually 78); orbit diameter to suborbital depth greater than 1.8 . . . . . → ***7***

7a. Upper body covered with dark mottling; dark predorsal ridge without an anterior prominent dark semicircle; mouth extends to well under eye (Fig. 12) . . . . . ***Caulolatilus guppyi***

7b. Upper body uniformly pale brown or violaceous, without any dark pattern of mottling; dark predorsal ridge preceded by a prominent dark semicircle; mouth extends to just under anterior rim of orbit (Fig. 13) . . . . . ***Caulolatilus intermedius***

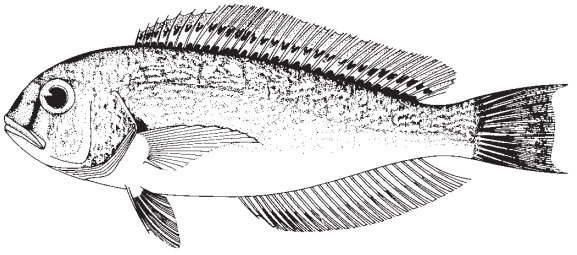


Fig. 12 ***Caulolatilus guppyi***

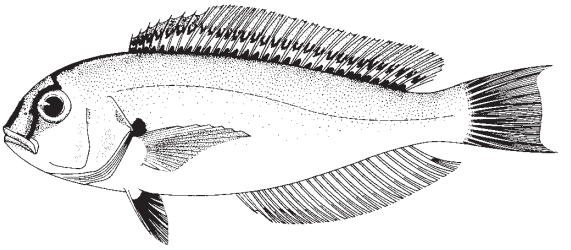


Fig. 13 ***Caulolatilus intermedius***

List of species occurring in the area

The symbol ◄ is given when species accounts are included.

Subfamily Branchiosteginae

◄ *Caulolatilus bermudensis* Dooley, 1981.
◄ *Caulolatilus chrysops* (Valenciennes, 1833).
◄ *Caulolatilus cyanops* Poey, 1866.
◄ *Caulolatilus dooleyi* Berry, 1978.
◄ *Caulolatilus guppyi* Beebe and Tee-Van, 1937.
◄ *Caulolatilus intermedius* Howell Rivero, 1936.
◄ *Caulolatilus microps* Goode and Bean, 1878.
◄ *Caulolatilus williamsi* Dooley and Berry, 1977.

◄ *Lopholatilus chamaeleonticeps* Goode and Bean, 1879.

Subfamily Malacanthinae

◄ *Malacanthus plumieri* (Bloch, 1786).

References

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