FAUNA MALESIANA HANDBOOK 2

The larvae of Indo-Pacific coastal fishes

An identification guide to marine fish larvae

Edited by

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108 Zanclidae (Moorish Idol)

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The moorish idol is a small, yellow, white and black, sponge-eating reef fish. Zanclids have a deep, compressed body accentuated by a long, filamentous third dorsal spine, and a produced snout with setiform teeth. The single species is found throughout the Indo-Pacific (Randall, 1955; Johnson & Washington, 1987).

Spawning mode

The eggs of *Zanclus cornutus* (Linnaeus) are pelagic (Colin & Bell, 1991).

Development at hatching

Unknown.

Larvae

Morphology — Larvae are laterally compressed and initially of moderate depth. However, they soon develop a very deep head and trunk with an abruptly tapering tail. From about 3.0 mm, elongate, strut-like cleithra result in the body becoming rounded during flexion, and then kite-shaped (deepest at the cleithral symphysis and narrowing abruptly anteriorly and posteriorly). From flexion, the body is deepest at the base of the pelvic spine. There are 22 myomeres (9-12 + 10-13). Initially, the gut is straight for most of its length and descends abruptly downward at about midbody, however, by 2.8 mm, a single coil develops as the body deepens. The PAL is greater than 50% BL in preflexion larvae, but PAL decreases following flexion when the whole gut mass shifts anteriorly, so that by 16 mm much of it lies beneath the head. The small, inconspicuous gas bladder lies above the anterior portion of the gut. The conspicuous dome-shaped midbrain is housed in a dome-like cranial cavity. The approximately triangular head becomes extremely large, deep and laterally compressed by 3.0 mm. The head tapers to a small, terminal mouth which falls well short of the eye. Tiny conical teeth appear by 3.0 mm. The snout gradually lengthens throughout development and becomes markedly produced before settlement. The round eyes are moderate to large in preflexion larvae and, following flexion, are moderate in size (23-34% HL). Gill membranes become broadly attached to the isthmus during flexion and the point of attachment proceeds posteriorly with growth. Bones of the head and pectoral girdle (see Johnson & Washington, 1987 for definitions of head spines) develop extensive ornamentation although none of the spines are particularly long. The smallest specimen (2.5 mm) lacks spination, but several spines and serrate ridges are prominent by 3.0 mm. Most notable of these is an extremely large

supraoccipital crest that juts well above the snout and dorsal margin of the body and bears a series of slender curved spines dorsally. Additional ornamentation in preflexion specimens includes: single spines on the supracleithrum; pterotic and retroarticular; two spines on the ventral margin of the dentary; series of small spines on the inner, and moderate spines on the outer margins of the preopercle; and a serrate midventral keel from the isthmus to the pelvic base. During flexion the following spines appear: a small spine on the middle of the cleithrum, a dorso-lateral serrate ridge on each side of the median supraoccipital ridge, a serrate supraocular ridge, a large retrorse spine on the ventral margin of the lacrimal, a small lateral-ethmoid spine, and a lateral serrate ridge on the dentary. By 7.6 mm the spines on the outer margin of the preopercle are gone and the supraoccipital crest is less pronounced but there are additional serrate ridges on the frontal, lacrimal, nasal, ascending process of the premaxilla, anguloarticular, dentary, pterotic, posttemporal, supracleithrum and cleithrum and there are small spines on the dermosphenotic, second infraorbital, lateral ethmoid and extrascapulae. Dorsal- and anal-fin anlagen are present by 3.0 mm; the former is located just posterior to the head. The first fin elements to form are the pelvic spine, and spines 2 and 3 of the dorsal fin which are present at the beginning of flexion. Spine 3 of the dorsal fin quickly elongates, and by 7.6 mm it is as long as the body and distally filamentous. Near the end of flexion (4.4 mm), about half of the rays are present in the dorsal, anal and pelvic fins, and the pectoral fin has incipient rays. Full complements of fin elements are present in all fins by 7.6 mm (the smallest postflexion specimen known). All dorsal, anal and caudal elements and the pelvic spine bear spinules laterally, as do some pectoral and pelvic rays. These begin to form during flexion as do spinules along the base of the dorsal and anal fins. In contrast, similar spinules along the base of the midventral keel are present by 3 mm. By the end of flexion, incipient scales in the form of disc-shaped thickenings are present on the head. Distinctive, specialized, spiny scales cover much of the head and body by 9.6 mm. Each scale consists of a roughly ovoid basal plate with a vertically oriented, fan-like, laminar projection which extends outward at right angles to the plate and bears one to several small points distally. The large, specialized pelagic stage in zanclids is often called an acronurus (as it is in acanthurids). The largest pelagic specimens examined are extremely laterally compressed and disc shaped; much of the bony ornamentation is retained in a relatively reduced state. Specializations to pelagic life include the serrate dorsal, anal and pelvic spines, extensive ornamentation of the bones of the head and pectoral girdle, and early-forming fin spines and specialized scales.

Size of smallest examined specimen – 2.5 mm.
Size at initial ossification of dorsal-fin elements – 4.0 mm.
Size at notochord flexion – 4.0-4.5 mm.
Size of largest examined pelagic specimen – 49.0 mm (although individuals may be as large as 75 mm TL at settlement, Doherty et al., 1995).

MORPHOMETRICS (proportion of body length)

	PREFLEXION LARVAE	POSTFLEXION LARVAE
PAL	.61-.74	.32-.58
PDL	.45-.53	.42-.59
HL	.27-.41	.33-.46
SnL	.09-.19	.15-.27
ED	.09-.15	.09-.13
BD	.25-.64	.69-1.03
VAFL	-	.05-.12
DSL[a]	.08-.29	1.12-3.78
P2SL	.04-.09	.20-.57

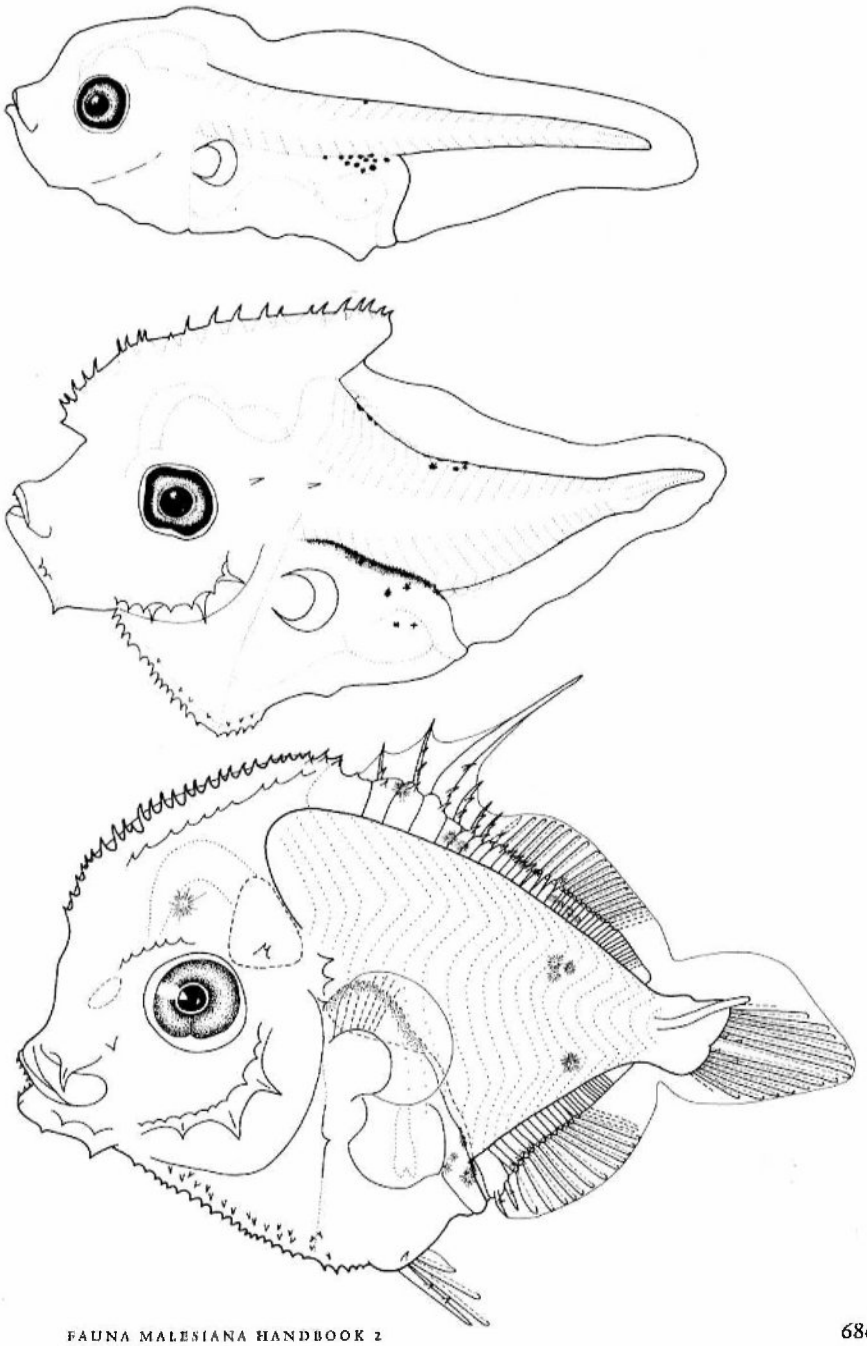
[a] Length third dorsal spine

Pigment — Zanclid larvae are lightly pigmented with the exception of a strong vertical pigment band in the acronurus stage (from about 13 mm). In preflexion specimens pigment is restricted to a sprinkling of melanophores along the dorsolateral surface of the gut and a few melanophores on, and on either side of, the dorsal midline of the trunk. Flexion and postflexion larvae also have a few melanophores laterally on the tail, at the bases of the caudal-fin rays and on the third dorsal spine at its base and on its the filamentous portion. Internal pigment is found on the gut mass, dorsally on the brain, on the opercle and posteriorly above the notochord. Acronurus-stage larvae are characterized by a broad band of pigment extending from the dorsal margin of the occiput to the ventral margin of the gut posterior to the pelvic-fin base, and a much narrower vertical pigment band along the base of the caudal fin; remnants of earlier pigment are variously present.

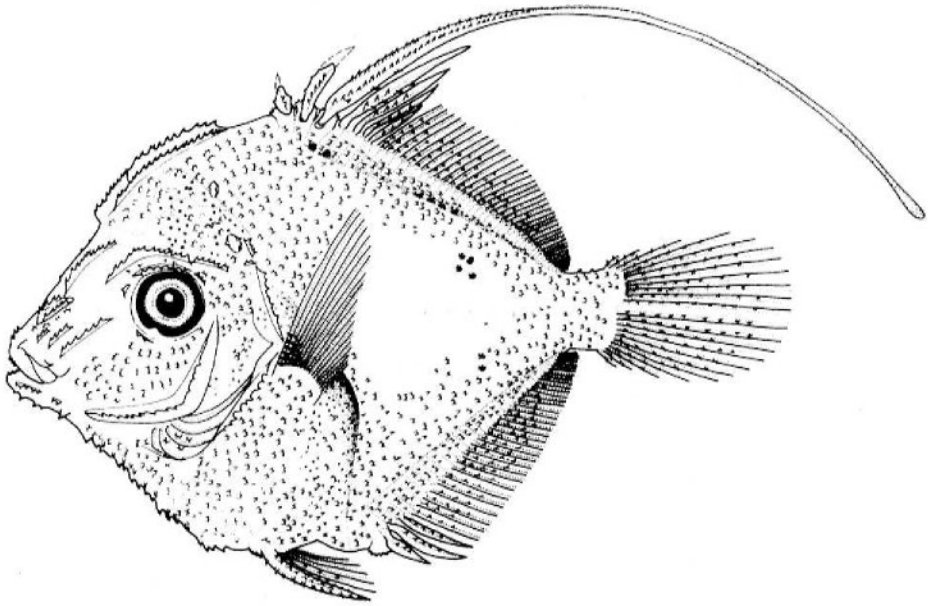
FIGURE 189

Larvae of *Zanclus cornutus* (Linnaeus). A-B from the Great Barrier Reef Lagoon near Lizard Island, A-C from a plankton tows, D-E from midwater trawls. A, B and D after Johnson & Washington (1987), E after Strasburg (1962).

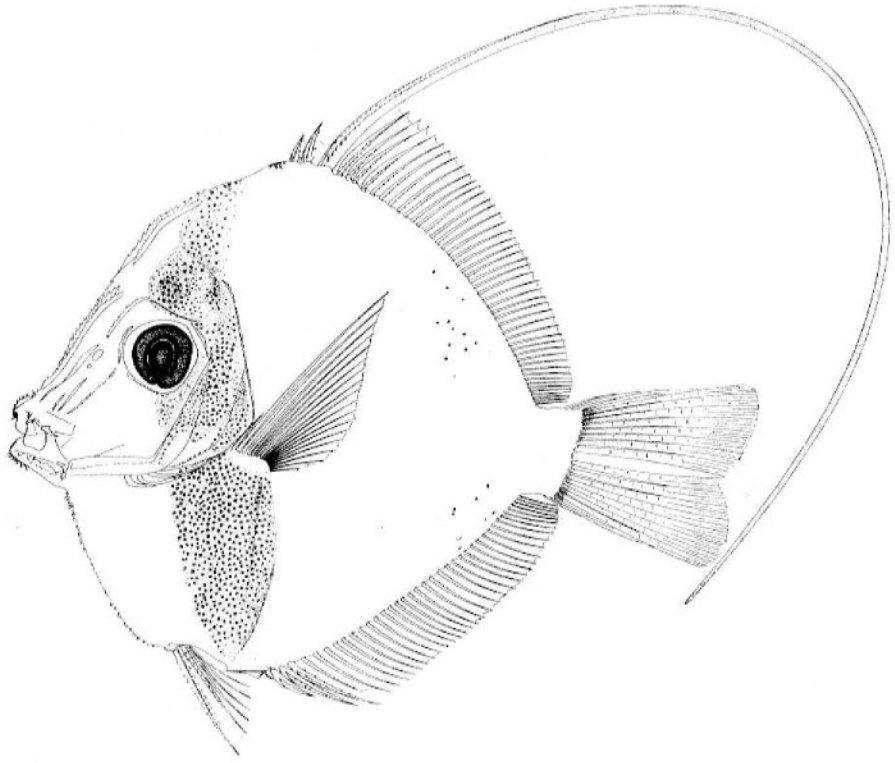
A 2.8 mm — **B** 3.0 mm — **C** 4.4 mm from off Rangiroa Atoll, Tuamotu Islands [NOTE about 10 disc-like thickenings (incipient scales) on the head omitted in drawing] — **D** 9.5 mm from the Solomon Sea — **E** 16.0 mm acronurus stage from off Hawaii (NOTE scales omitted in drawing).



D



E



Similar families — Zanclid larvae are characterized by the following: deep, laterally compressed, rounded to kite-shaped body; 22 myomeres; early-forming, serrate fin-spines; spinulose soft fin rays; elongate, filamentous third dorsal spine; early-forming, specialized scales; and extensive head spination. Zanclid larvae are most similar to larvae of acanthurids, but they could also be confused with caproids, menids, luvarids and perhaps siganids. Preflexion zanclid larvae can be distinguished from 3.0 mm by the greatly enlarged, distinctively spinulose, supraoccipital crest, (which is less prominent in acanthurids and bears relatively shorter spines), the presence in zanclids of pigment on and around the dorsal midline, and the relatively larger preopercular spines of zanclids. Postflexion larvae differ from those of acanthurids in having the following: more soft dorsal- and anal-fin rays; three serrate ridges along the supraoccipital crest; the third, rather than the second, dorsal spine elongate and that spine with a filamentous, pigmented extension; a large retrorse spine on the lacrimal; ventral margin of the pelvic girdle smooth; and scales with fan-shaped, rather than triangular, projections, lacking a ridge of firm connective tissue on the basal plate and not arranged in regular vertical rows. Caproid larvae are deep-bodied and compressed and have a large supraoccipital crest and a domed brain, but differ from zanclids in possessing a large spine at both the preopercular angle and on the supraoccipital posteriorly. Menid larvae are deep-bodied and compressed, but differ from zanclids in lacking a serrate mid-ventral keel between the isthmus and the pelvic base and in having a spineless, low, small supraoccipital crest. Zanclid larvae also resemble, in certain features, larvae of the closely related Luvaridae; however, the distinctive, truncate snout of the latter makes confusion unlikely. Siganid larvae are much less deep than are zanclids.

Description is based on an incomplete set of larvae, and on information in Manabe & Ozawa (1988) that had a gap in specimens between 4.4 and 7.6 mm.

MERISTIC CHARACTERS of the Indo-Pacific zanclid genus

	D	A	P1	P2	C	VERTEBRAE
Zanclus	VII, 38-43	III, 31-36	18-19	I, 5	8+8	22