

DEVELOPMENTAL CHARACTERS OF BOTHID FLATFISHES OF THE GENUS *PSETTINA*

C. B. LALITHAMBIKA DEVI

National Institute of Oceanography,  
Regional Centre, Cochin - 682018, India

The contribution sent to the ICES/ELH Symposium dealt primarily with descriptions of developmental series of two species of *Psettina*, *P. brevirictis*, and *P. iijimae*, including tables of morphometrics and meristics for each series and illustrations of two larval stages for each series. It is not possible to do full justice to these larval descriptions in this summary, consequently the complete descriptions will be published elsewhere. I plan to stress characters that are common to both series, which I consider to be of generic significance, and then to point out differences between the two series.

There is considerable confusion about generic characters of flatfish larvae in the bothid subfamily Bothinae. A larval character shared by all bothids in this subfamily is the development on early stage larvae of a single, elongated, anterior dorsal ray. This ray can become markedly developed, as in some species of *Arnoglossus*, or it can become inconspicuous in late-stage larvae, as in the genus *Bothus*. A character shared by the larvae of a number of genera is the development of serrations or spines on the ventral margin of the urohyal (cartilaginous plate), on the ventral margin of the posterior extension of one or both pelvic bones, and less commonly along both cleithra. Scale spinules are developed on late stage larvae of some species; these can form in various locations such as along the base of dorsal and anal fin rays, sometimes on the fin rays, or on other parts of the body. Development of such spinules usually is a specific character rather than generic. Some genera of bothids develop distinctive larval characters such as the urohyal appendage developed on larvae of *Psettina*, or the protruding gut formed on larvae of *Laeops*. Most kinds of bothid larvae develop little or no distinctive pigmentation. It is characteristic of bothid flatfishes to have the pelvic fin on the left or

ocular side, considerably larger than the pelvic fin on the right or blind side, and to have it extend forward of the cleithra for some distance.

In identifying bothid larvae to the generic level, it is necessary to utilize a combination of characters, including those discussed above, and in addition, meristic and morphometric characters. Meristic characters of particular importance are number of vertebrae and counts of D&A fins.

The character that is unique to early stage larvae of *Psettina* is the possession of a small muscular appendage hanging down from the head in the region of the urohyal. This appendage is present on early stage larvae, but gets progressively reduced during the flexion stage and it ultimately disappears on postflexion larvae. Spination is developed on the ventral margin of the urohyal and on pelvic bones, but not on the cleithra. Whereas spination is present on these areas in early stage larvae of *Engyprosopon*, it forms considerably later on larvae of *Psettina*. Such spination is lacking on preflexion stage larvae; it forms first on the urohyal during the flexion stage and on the pelvic bones soon afterwards. A single elongated dorsal ray develops on early stage larvae, but this ray becomes short or inconspicuous on postflexion stage larvae.

The first characteristic illustrations of a larvae of *Psettina* with urohyal appendage is in Jones and Pantulu (1958, Fig. 19); however, they attributed their larva to *Arnoglossus tapeinosoma*. Pertseva-Ostroumova (1965) described two series of larvae that possessed the urohyal appendage on smaller-sized larvae. These series were attributed to *Psettina hainanensis* and *P. iijimae*. Amaoka (1976) identified five postlarvae, 9.1 to 19.1 mm SL, as belonging to three species of *Psettina*. These larvae lacked spination on the urohyal and pelvic bones. Uchida (1936) described and figured a flatfish larva with a greatly

elongated and branched dorsal ray, as probably referable to *Psettina ijimae*. Amaoka (1973) showed this larva to be referable to *Arnoglossus japonicus*.

The flatfish larvae on which my observations are based were obtained during IIOE (1960–65) and during Naga Expedition (1959–61) into the Gulf of Thailand and adjacent waters. Most of the material of *Psettina* larvae is from Naga collections, in which *Psettina* larvae were among the more common flatfish larvae. Very brief descriptions are given of the two species of *Psettina* represented in the samples.

*Psettina brevirectis*. Larval specimens ranged in size between 2.1 to 14.5 mm SL, and the smallest juvenile was 16.1 mm SL. Caudal fin formation occurred between 4.6 to 7.0 mm. Beginning of eye migration observed on 12.7 mm SL specimen and completed by 16.1 mm. Basic meristics: vertebrae 10+25 to 27(10+26); D. 77–82; A. 59–64. Spination on urohyal first observed on 5.2 mm larva; total count on urohyal ranged between 4–6 spines. Spination on pelvic bone first observed on 7.0 mm larva; total counts ranged between 2–4, limited to left pelvic bone. No spination on cleithra. Spination still present on 14.5 mm larva but lacking on 16.1 mm juvenile.

*Psettina ijimae*. Series agrees well with Pertseva-Ostroumova's description of larvae of this species. Larval specimens ranged in size between 1.8 and 20.2 mm SL and the smallest juvenile was 22.5 mm. Beginning of eye migration on 13.5 mm specimen and completed by 22.5 mm SL. Caudal fin formation between 4.6 to about 7.0 mm. Basic meristics: vertebrae 10+28–30 (10+29); D. 82–95; A. 68–70. Spination on urohyal first observed on 5.1 mm larva; 5 to 10, usually 8 or 9 spines developed on larger larvae. Spination on pelvic bones first observed on 7.0 mm specimen, initially on left pelvic where 5–8 spines developed and later on right pelvic bone with 3–6 spines. Spination was still present on 20.2 mm larva, but lacking on 22.5 mm juvenile.

Preflexion larvae of both species have the characteristic urohyal appendage. Also, sequence of development of larval spines on the urohyal and pelvic bones is similar, but *P. ijimae* has a higher count of spines, particularly on the pelvic bones. An important distinguishing character is the formation of spinules on dorsal and anal fin rays in larvae of *P. ijimae* versus their absence on larvae of *P. brevirectis*. Larvae of *P. ijimae* average about three more myomeres or vertebrae than larvae of *P. brevirectis*, a count that can

be determined on larvae of all sizes. Also, as indicated above, D&A fin ray counts differ enough to be useful in identification of postflexion larvae. Another character useful in distinguishing between preflexion larvae of the two species is the position of the swim bladder. In *P. ijimae* the swim bladder occupies a space just above the intestinal loop, whereas in *P. brevirectis*, it is placed more anteriorly and is comparatively larger.

Inasmuch as extensive material was available for study including early juveniles, there is no doubt about assigning these series to *Psettina*. This point is emphasized because of the basic disagreement as to generic characters of *Psettina* larvae as between Amaoka, on the other hand, and Pertseva-Ostroumova and myself on the other.

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