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Description of larvae of the Feather Blenny, *Hypsoblennius hentz* (Pisces: Blenniidae), from New York Waters

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Abstract

Hypsoblennius hentz (Lesueur) larvae are described from specimens recently collected in the vicinity of New York Harbor and Raritan Bay. Previous descriptions (Hildebrand and Cable 1938) were erroneous and additionally we provide the first yolk-sac larval descriptions for Western Atlantic *Hypsoblennius*. *H. hentz* larvae are distinguished from the other Atlantic species by the size and distribution of preopercular spines.

Key words: *Hypsoblennius ionthus, Hypsoblennius invemar, Hypsoblennius exstochilus*

Introduction

There are six families within the suborder Blennioidei (Springer 1993). Larvae of blennioids have several characteristics in common (Cavalluzzi 1997, Ditty *et al.* 2005, Watson 2009): an elongate body (body depth commonly ≤ 20% standard length, SL) with a relatively short coiled gut (35–50% SL), a long continuous dorsal fin, dense pigment over the visceral mass, small concentrations of melanophores on the ventral surface between the pterygiophores, six branchiostegals, pigment along the ventral margin of the tail, and a melanophore at the tip of the cleithral symphysis. Most larvae of the family Blenniidae are distinguishable from other blennioids by having pigmented pectoral fins and black pigment on the roof of the mouth (Cavalluzzi 1997, Ditty *et al.* 2005).

Larval *Hypsoblennius* are distinguished from other Atlantic blenniid genera by the presence of melanophores on the roof of the mouth and by the presence of 1–3 large preopercular spines (Ditty *et al.* 2005). Spines are difficult to see unless the larvae are stained. Here we describe blenniid larvae collected in New York waters that are referable to *Hypsoblennius hentz* (Lesueur), the feather blenny.

Distribution of Feather Blenny and identification of larvae. The feather blenny is a small, continental shallow water blenniid distributed from Campeche, Mexico (Smith-Vaniz 1980) to Nova Scotia (Scott and Scott 1988). Other than the two specimens from Nova Scotia, there are no other records of the species north of Long Island, New York. The feather blenny is known to spawn in the Great Bay and Little Egg Harbor, New Jersey (Able and Fahay 1998). Adults were collected in 2000 in the East River, New York (seven specimens, New York State Museum—NYSM 51411, 51417, 52154, 52158, and 52159) and near Shoreham, Long Island in 1985 (American Museum of Natural History—AMNH 221647). An adult feather blenny was caught in a seine in Jamaica Bay, Long Island on September 2, 2009 (C. Bowser, Hudson River National Estuarine Research Reserve, *pers. comm.)*.

Three other blenniids have been recorded from New York waters; two records of striped blenny (*Chasmodes bosquianus*) most recently from 1842, two records of seaweed blenny (*Parablennius marmoreus)* most recently from Long Island in 1971 (Briggs and Waldman 2002), and a single freckled blenny (*Hypsoblennius ionthas*) from the Indian Point Power Plant in the Hudson River in 1985 (Geoghegan *et al.* 1992), thought to be a ballast introduction. Feather blenny is the only blenniid regularly seen from the Raritan Bay and New York Harbor area.

Larval stages of feather blenny were first described by Hildebrand and Cable (1938) and their descriptions and illustrations were faithfully copied in more recent publications (Fritzsche 1978, Lippson and Moran 1974, Wang and Kernehan 1979). Ditty *et al.* (2006) recognized that many of the feather blenny larval illustrations in

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Hildebrand and Cable (1938) were, in fact, striped blenny larvae. Fahay (2007) concurred with Ditty *et al.* (2006). Thus we are left with a single illustration and brief description of a 5 mm SL larva and several illustrations of juvenile feather blenny (Ditty *et al*. 2006, Fahay 2007).

The New York State Museum has specimens of larval blenniids collected from the waters around Manhattan and Jamaica Bay on southern Long Island. Other blenniid larvae have been reported from Hempstead and Shoreham in Long Island Sound (Briggs and Waldman 2002). These larvae have a different morphology and color pattern from those already described and, by process of elimination, are feather blenny larvae.

Material examined (All measurements are given as mm SL). All specimens are catalogued in the New York State Museum (NYSM): 53648 (1, 5.5)—Pumpkin Patch Channel, Jamaica Bay, Long Island, NY, July 9, 2001; 62011 (1, 5.6)—Lower New York Harbor/Raritan Bay, June 26, 2002; 62117 (3, 3.6-5.9)—Lower New York Harbor/Raritan Bay. June 26, 2002; 63523 (1,3.1)—Lower New York Harbor/Raritan Bay, July 1, 2002; 66016 (1, 2.3)—New York Harbor at One NY Plaza, June 24, 2008; 66117 (1, 2.4)—New York Harbor at One NY Plaza; 66329 (1, 2.1)—New York Harbor at One NY Plaza, October 20, 2008; 67612 (1, 11.0)—East River near the Poletti power plant, Queens, NY, August 1, 2002; 67613 (1, 2.0)—New York Harbor at One NY Plaza, September 7, 2010; 67614 (1, 5.9)—New York Harbor at One NY Plaza, July 6, 2010; 67615 (2, both 2.1)—New York Harbor at One NY Plaza, July 23, 2010; 67616 (1, 2.3)—New York Harbor at One NY Plaza, July 27, 2010.

Description of larvae of Feather Blenny

Yolk-sac larvae—(2.0–2.4 mm SL, Fig. 1—A, B, B_1)

Body elongate with a short gut (2.3–2.4 in SL). Eye very large (1.6–2.0 in head). Head 4.2–6.0 in SL (Table 1). The rounded pectoral fin is oriented postero-dorsally. At least two incipient caudal rays visible. No preopercular spines developed on the head. Yolk sac small with at least six oil globules.

One or more black spots cover entire roof of the mouth (Fig. B_1). Upper lip also black in some specimens. Eye darkly pigmented. Very dense melanophores cover dorsal surface of gut and extend close to the anal opening. One or two melanophores on ventral surface of the gut near the anal opening. There are smudges of pigment on the proximal posterior surface of the pectoral fin. A single melanophore on the ventral end of each myomere on each side of the fish (over the incipient pterygiophore).

TABLE 1. Meristic and mensural characters of larval to juvenile feather blenny (*Hypsoblennius hentz*) from New York waters. NYSM# is the catalog number from the New York State Museum, SL is standard length (mm), and TL is total length (mm).

NYSM#	SL	TL	Eye in Head	Head in SL	Preanal Myomeres	Postanal Myomeres
67613	2.0	2.1	1.8	4.4	7	22
67615	2.1	2.2	1.7	4.2	8	20
67615	2.1	2.2	1.7	4.2	10	20
66329	2.1	2.2	1.9	5.6	10	21
67616	2.3	2.5	1.7	4.6	8	27
66016	2.3	2.4	2.0	5.1	8	25
66117	2.4	2.5	1.6	6.0	7	28
63523	3.1	3.5	2.6	3.4	8	22
62117	3.6	3.8	2.8	4.0	7	23
62117	5.1	6.0	3.0	3.4	8	22
53648	5.5	6.7	2.9	3.4	10	19
62011	5.6	6.7	2.8	3.3	9	24
62117	5.9	7.1	3.2	3.5	9	21
67614	5.9	6.5	2.6	3.8	8	24
67612	11.0	13.1	3.0	3.3	10	21

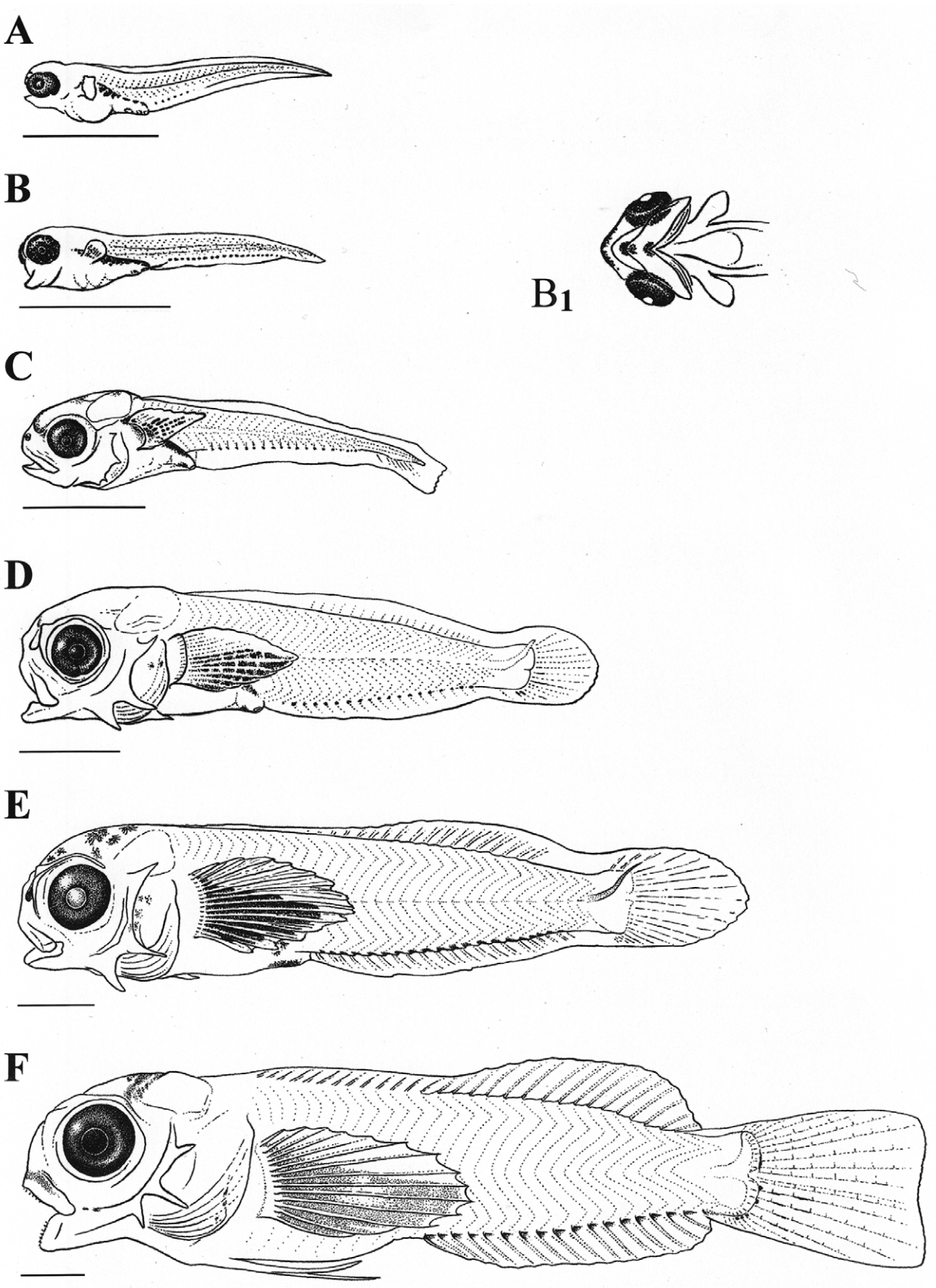

FIGURE 1. Illustrations of *Hypsoblennius hentz* larvae from New York waters. The horizontal line equals 1 mm. A&B—yolk sac larvae. B_1—ventral view of head of yolk sac larva showing pigment at cleithral symphysis, on roof of mouth (partially seen through the transparent lower jaw), and along the edge of premaxilla. C—preflexion larva. D&E—postflexion larvae. F—settled juvenile.

Post-yolk sac, preflexion larvae—(3.1 mm SL, Fig. 1 C)

Head (3.4 in SL) and eye (2.6 in head), which have proportionately decreased in size and gut length has increased (2.0 in SL, Table 1). Pectoral fin pointed, oriented more horizontally, and rays visibly extending past the anus. Beginnings of preopercular spines visible, as are about seven incipient caudal rays.

Pigment on the posterior surface of the pectoral fin present on ventral interradial membranes and extending to tip of fin. Some of the incipient caudal rays have a concentration of melanophores at the base.

Post-flexion larvae—(3.6–5.9 mm SL, Fig. 1 D & E)

Premaxillary situated more dorsally, with a small concentration of pigment on premaxillary tip, and posterior of the premaxilla is outlined with melanophores. Both aspects of premaxillary pigment are absent in largest larva. No visible pigment on roof of mouth. Several large melanophores over top of brain extending to anterior nape. Pigment on cleithral symphysis varies from a small melanophore to a large diffuse spot and light pigment also present along anterior margin of cleithrum. Interradial pigment on posterior part of pectoral fin begins between the seven ventral rays as disconnected elongate blotches and spreads as larvae grow to the first (dorsal) ray (but does not reach the fin margin on the dorsal edge). Pectoral pigment spreads to the rays, including interradial membranes. Squiggly darker cross-hatching also develops on membranes. Pigment is still dense on the dorsum of viscera but becomes buried and thus less visible in largest larva. Melanophores on venter of anus persist. Pigment concentrations on ventral margin of myomeres tends to develop elongate dorsal extensions or posterior extensions in largest larva. The smallest larvae still have a melanophore on dorsum near base of tail but this pigment is absent in larger larvae. Caudal rays are developed in the larger larvae and some have melanophores at the base with pigment extending along the caudal rays for a short distance.

Branchiostegal rays are clearly visible. Preopercular spines are large. The central spine is largest and extends backwards to pectoral-fin base. Upper preopercular spine level with dorsal base of pectoral fin and is thus distant from the other two. Ventral spine small, directed postero-ventrally, and its base is close to base of central spine.

Juvenile—(11 mm SL, Fig. 1 F)

This specimen is faded. There is diffuse pigment on the anterior surface of the premaxilla. Single row of large curved premaxillary and mandibular teeth are visible. Contiguous blotches of pigment cover dorsal surface of brain extending as subsurface pigmentation onto the anterior nape and further over the dorsal surface of spinal cord to dorsal-fin origin. Preopercular spines large and appear slightly serrated, but the large central spine distant from pectoral-fin base. Dorsal preopercular spine is now close to the other two. Diffuse pigment along the anterior edge of the cleithrum and at the cleithral symphysis.

Pectoral rays 1–8 are either completely unpigmented or pigment does not reach margin of fin (pigmented only at base of ray). Interradial pigmentation is patchy (possibly an artifact) but reaches pectoral-fin margin ventral to 8th ray.

Dorsum of gut remains densely pigmented, but pigment is buried in tissue. Melanophores on each ventral pterygiophore elongate posteriorly and some have dorsal extensions, thus producing a dashed-line effect along ventral margin of body. The last three or four of these melanophores are contiguous. Vertically elongated melanophores also present on bases of some caudal rays. Basal third of most caudal rays outlined by tiny melanophores.

Discussion

There are four described species of *Hypsoblennius* in the Western Atlantic Ocean (Smith-Vaniz 1980). *H. henz* is sympatric with *H. ionthas* (Jordan and Gilbert) in continental shallow waters from Southport, North Carolina to Aransas, Texas (Smith-Vaniz 1980). Post-flexion larvae of these two species are distinguishable by the size and arrangement of the three preopercular spines. The central and largest spine on the preopercle in *H. ionthas* extends to or past the base of the pectoral fin rays in larvae ≥ 5.4 mm SL, the dorsal preopercular spine in larger larvae is aligned with the center of the pectoral fin, and the ventral spine is very close to the base of the central spine (Ditty *et al.* 2005). In *H. henz* post-flexion larvae, the central (largest) spine does not extend past the base of the pectoral fin, the dorsal spine is aligned with the dorsal base of the pectoral fin, and the ventral spine is more distant from the base of the central spine (Fig. 1). We have no descriptions of yolk-sac or preflexion larvae of *H. ionthas.*

The distribution of *H. henz* overlaps *H. invemar* Smith-Vaniz and Acero only in the Northern Gulf of Mexico and along the Atlantic coast of Florida and the Florida Keys (Schofield *et al.* 2009). *Hypsoblennius invemar* inhabits the tests of barnacles on oil platforms (Ditty *et al.* 2005) and has been observed off Palm Beach, Florida since 1992, where possibly introduced through shipping (either in barnacles attached to hulls or in ballast water) or during transport of oil rigs from South America (Schofield *et al.* 2009). Postflexion *H. hentz* larvae can be distinguished from *H. invemar* by the former having three preopercular spines and the latter only one very large preopercular spine (Ditty *et al.* 2005). There are no descriptions or illustrations of preflexion *H. invemar* larvae.

Hypsoblennius exstochilus Böhlke is an insular species known from the Bahamas, Jamaica, Mona Island, and St. Croix (Smith-Vaniz 1980). *H. exstochilus* larvae have not been described and *H. hentz* is not sympatric with this species.

Blenniid larvae have pigmented pectoral fins and black pigment on the roof of the mouth (Cavalluzzi 1997, Ditty *et al.* 2005). Pigment on the roof of the mouth was only seen in the smallest (yolk-sac) larvae in our series. This pigment was not visible in preflexion post-yolk-sac larvae or in larger postflexion specimens.

All of the larvae in our series have pigment on the posterior surface of the pectoral fins. The pigment is represented by small smudges in the early yolk-sac larvae and the pigment spreads dorsally and distally as the fish grow. Pigment is limited to the interradial membranes until settlement (technically the juvenile stage with a full complement of fin rays) when pigment covers the fin rays as well.

A presumed larval synapomorphy within the family Benniidae for the genus *Hypsoblennius* is the presence of one to several long preopercular spines, whereas other Atlantic blenniid genera have only small spines or lack them (Balbontín and Pérez 1979, Stevens and Moser 1982, Ditty *et al.* 2005, Watson 2009). The distinction between small and large spines is not objective, however the illustrations in Ditty *et al.* (2005) give a good subjective picture of the differences. *H. hentz* larvae have three preopercular spines that first appear as nubs in preflexion post-yolk-sac larvae and elongate thereafter (Fig. 1). These spines are transitory in *H. invemar* and *H. ionthas* being obscured (probably due to growth of the peropercle) when the larvae settle at 10–12 mm SL (Ditty *et al.* 2005). In *H. hentz*, the preopercular spines persist in a juvenile at 11 mm SL (Fig. 1–F). In our series of specimens, the peropercular spines are barely visible in the largest preflexion larvae (Fig. 1–C) and are relatively large in postflexion larvae (Fig. 1—D–F). Spines are difficult to see unless the larvae are stained with alizarin and alcian blue (Ditty *et al.* 2005) or rose bengal in our specimens.

Accurate classification of blenniid larvae as *Hypsoblennius* is feasible in yolk-sac and small preflexion larvae by the presence of melanophores on the roof of the mouth and in large preflexion and postflexion larvae by the presence of 1–3 preopercular spines. Discovery and description of *H. exstochilus* larvae would test the validity of these characters.

The larval specimens reported here represent the most northern records of spawning of feather blenny. Larval specimens reported from the north shore of Long Island (Briggs and Waldman 2002) could not be located and we could not verify their identification. We have New York specimens of 2.1–2.2 mm SL yolk-sac larvae from 24 June and 20 October thus indicating a substantial spawning season. Olney and Boehlert (1988) reported feather blenny larvae from Chesapeake Bay during May through October.

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