

SCORPAENIDAE ***Sebastes marinus* (Linnaeus)****Spawning:** Spring-summer.**Eggs** — Development is ovoviviparous, with internal fertilization, hatching of eggs within oviduct and "birth" of larvae.**Larvae** — Hatch ("born") at 6.7-7.2 mm, with pigmented eyes and well-developed mouth.

— Flexion occurs at 8.5-11.8 mm, and transformation at about 24 mm.

— Body slender, with short gut which increases from 35% SL in preflexion to 58% SL in postflexion larvae.

— Dorsal and anal rays last to form; third anal spine and last dorsal spine begin as rays and change to spines in early juvenile stage.

— Pigmentation: spots on top of brain, dorsolateral surface of gut, embedded spot on nape and dorsal and ventral midlines of tail; caudal spot lacking in most specimens; ventral series of spots (range 11-24, \bar{x} = 18) extends from postanal myomeres 4-7 to postanal myomeres 19-22; dorsal series of spots (range 8-21, \bar{x} = 13) extends from postanal myomeres 10-15 to postanal myomeres 18-22.**Meristic features**

Myomeres: 30-32

Vert : 30-32

D : XIV-XVI, 12-15

A : III, 7-9

P : 18-20

C : 11-12+8+7+11-12

Sebastes viviparus* (Krøyer)*Larvae** — Hatch ("born") at 5.4 mm.

— Flexion occurs at 7.8-10.6 mm.

— Pigmentation: caudal spot present; top of snout pigmented at 6.0-10.6 mm (only occasionally present in *S. marinus*); lateral and ventral surfaces of gut pigmented (not present in *S. marinus* or *S. fasciatus*); medial surface of pectoral fin base pigmented at 6.0-10.6 mm, and pigment along bases of pectoral rays; possibly more spots in ventral series (range 18-29, \bar{x} = 25) than *S. marinus*.**Meristic features**

Myomeres: 29-31

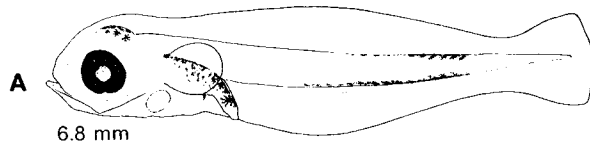
(Meristic counts overlap or coincide with *S. marinus*)

- Note:** (1) *S. viviparus* occurs only in Northeast Atlantic; it is included here to show similarity of larvae of all *Sebastes* species.
- (2) Larvae of all *Sebastes* species develop prominent supraoccipital, posttemporal and preopercle spines.

Fig. — A-I, Tåning 1961.**Ref.** — Moser *et al.* 1977.

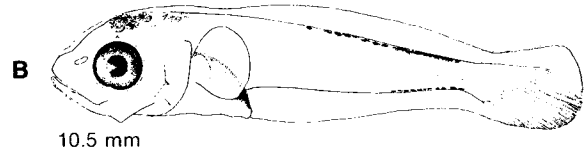
Sebastes marinus

SCORPAENIDAE

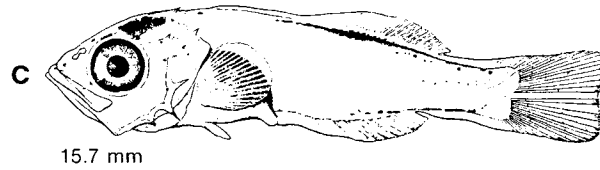


No caudal spot in most specimens

Ventral spots become obscured as anal fin develops

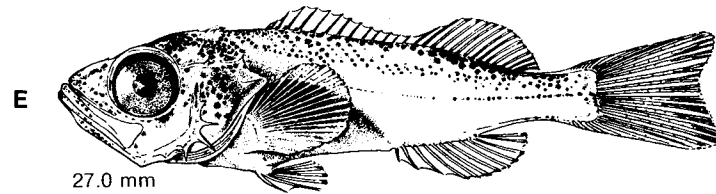
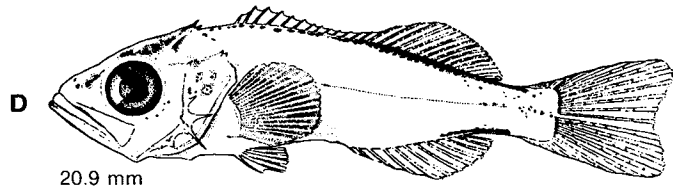


Entire dorsum pigmented at 15 mm



Spots appear at edge of hypurals

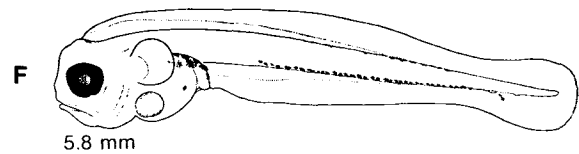
No pigment on pectoral or pelvic fins



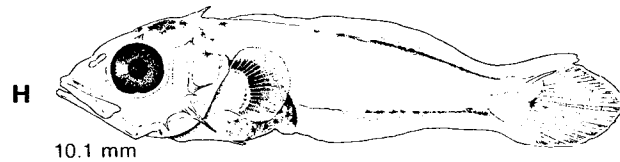
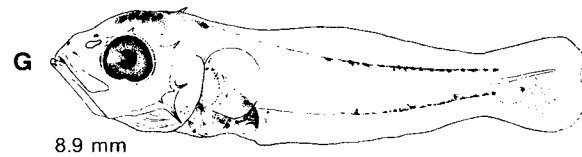
Dorsal spots spread anteriorly on both sides of developing dorsal fin

Sebastes viviparus

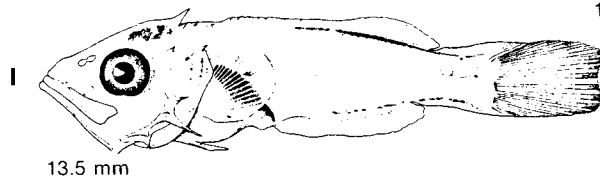
Snout pigmented in larvae 6.0–10.6 mm



Medial surface of pectoral fin base pigmented in larvae 6.0–10.6 mm



Propercle spines more developed than in comparably-sized *S. marinus*



SCORPAENIDAE *Sebastes fasciatus* (Storer)

- Larvae** — Hatch ("born") at 5.8 mm.
 — Body slender with short gut.
 — Flexion occurs at 8.5–10.0 mm.
 — Body slightly deeper than *S. marinus* in flexion and postflexion larvae.
 — Ossification features similar to *S. marinus*.
 — Pigmentation: spots on top of brain, dorso-lateral surface of gut, embedded spot on nape and dorsal and ventral midlines of tail, most specimens with 1 or 2 (sometimes 3 and 4) caudal spots; ventral series of spots (26–42) extends from postanal myomeres 1–4 to postanal myomeres 19–23, becoming obscure as anal fin develops, but some spots remain along anal fin base (compare to *S. marinus*); dorsal series of spots (3–9) extends from postanal myomeres 7–14 to postanal myomeres 14–22 (compare to *S. marinus*), splitting into two lines as in *S. marinus*; entire dorsum pigmented at about 10.8 mm.

Meristic features

Myomeres: 29–30
 Vert : 29–30
 D : XIV–XVI, 12–15
 A : III, 6–8
 P : 17–20
 C : 8+7(principal)

***Sebastes mentella* (Travin)**

(not illustrated)

- Note:** (1) Recent papers (Templeman and Sandeman, 1959; Barsukov, 1968; Barsukov and Zakharov, 1972; Litvinenko, 1974; Templeman, 1980; Ni, 1981a, 1981b) have established that *S. marinus* occurs west of Flemish Cap only in small numbers. Resident species along the coasts of Canada and USA are *S. fasciatus* and *S. mentella*. Ni (MS 1981) has shown that *S. mentella* predominates in more northern areas and in deeper water than *S. fasciatus* which is more common in southern waters at shallow depths, although the depth ranges of the two species overlap.
- (2) Comparisons have been made between juveniles of the four *Sebastes* species, but there are no adequate descriptions of larvae of the western North Atlantic forms. Presumably, *Sebastes* larvae collected in the Northwest Atlantic are either *S. fasciatus* or *S. mentella*. Anal fin ray counts may separate specimens greater than about 13 mm NL.

Meristic features

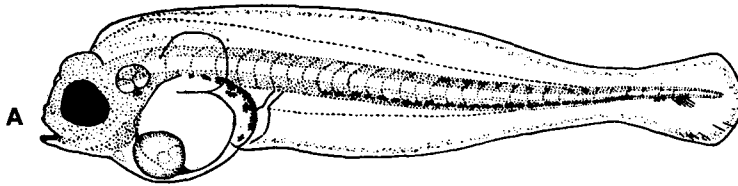
Myomeres: 30–32
 Vert : 30–32
 D : XIV–XVI, 13–16
 A : III, 8–11

Fig. — A–D, Bigelow and Welsh 1925.

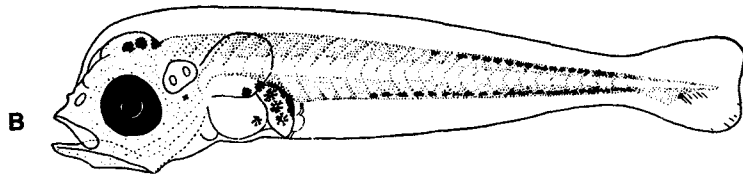
Ref. — Moser *et al.* 1977.

Sebastes fasciatus

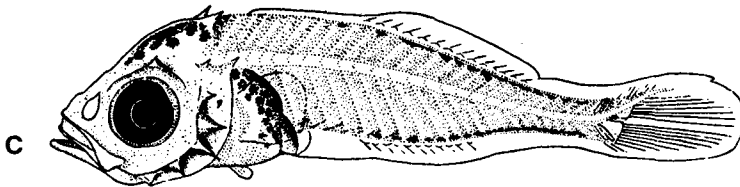
SCORPAENIDAE



6.0 mm

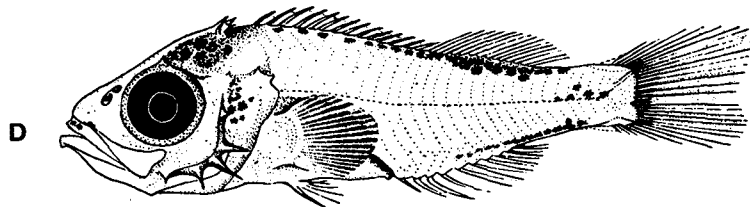


9.0 mm



12.0 mm

See *Scomber* (p. 318) for comparative note



20.0 mm

SCORPAENIDAE *Helicolenus dactylopterus* (Delaroche)**Spawning:** Mode of reproduction uncertain.

- Larvae**
- Hatching occurs at <2.8 mm.
 - Flexion occurs at 6.0–7.9 mm.
 - Body moderately slender, with short gut.
 - Preanal length increases from 49% SL in pre-flexion to 58% SL in postflexion larvae.
 - Third anal and last dorsal spines begin as rays, and change to spines in early juvenile stage.
 - Mass of spongy tissue appears at 4.0 mm in region of spiny dorsal fin.
 - Sizes at beginning of ossification and completion of fin rays:

Meristic features

- Myomeres : 24–25
- Vert : 24–25
- D : XII, 11–13
- A : III, 5
- P : 17–20
- C : 11+8+7+10–12

Caudal rays	4.0 mm	7.0 mm
Pectoral rays	4.0	8.0
Dorsal and anal rays	6.0	8.6
Pelvic rays (bud at 6 mm)	7.0	8.6

- Pigmentation: spots on top of head and lower jaw; dorsolateral pigment on gut spreads ventrally; few spots on trunk above pectoral base; medial surface of pectoral base solidly pigmented, with few spots inside distal edge of fin and on ray bases; few spots on ventral midline anterior to caudal fin.

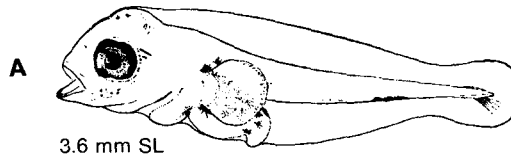
Note: *H. dactylopterus* is the most likely scorpaenid larva to be found south of Long Island and inshore of the Gulf Stream. Several other species may drift north in the Gulf Stream from (sub)tropical areas, but most of these are recognizable by large, early-forming, usually densely-pigmented pectoral fins.

Fig. — A–D, Tåning 1961.

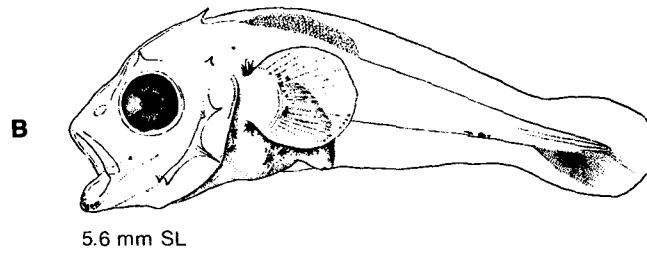
Ref. — Moser *et al.* 1977; Barsukov 1968.

Helicolenus dactylopterus

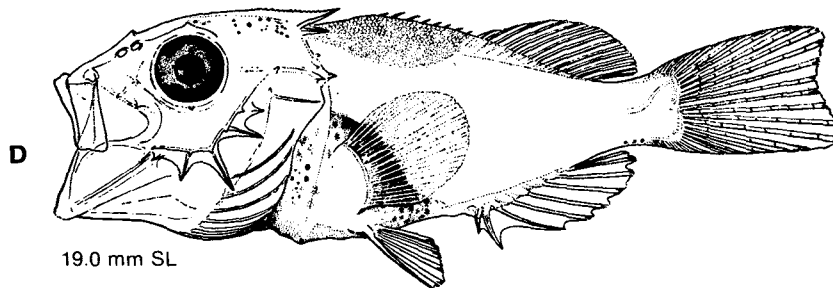
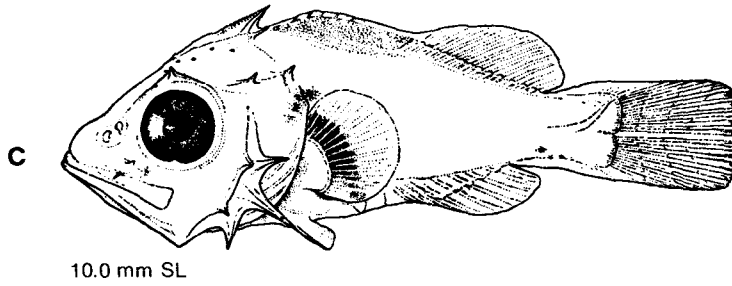
SCORPAENIDAE



Dorsolateral gut pigment spreads ventrally with development



Few spots on ventral midline



A-D (eastern Atlantic material)

TRIGLIDAE***Prionotus* (2 Species)**

(Interim account based on Middle Atlantic Bight specimens)

Spawning: Late spring into summer.

- Larvae** — Strong head spines including bony ridge over eye; ridge contains strengthening rods or "struts".
- Large pectoral fins form early, with characteristic pigment patterns.
 - Lowermost three pectoral rays separate from rest of fin.
 - Body cross-section triangular (deep ventrally).
 - Separate dorsal fins.
 - Meristic features of two species:

	<i>Prionotus carolinus</i> (Linnaeus)	<i>Prionotus evolans</i> (Linnaeus)
Vert :	10+16	10+16
D :	X, 13-14	IX-XI, 12-13
A :	12(11-13)	12
Plv :	I, 5	I, 5
P :	14+3(separate)	13+3(separate)

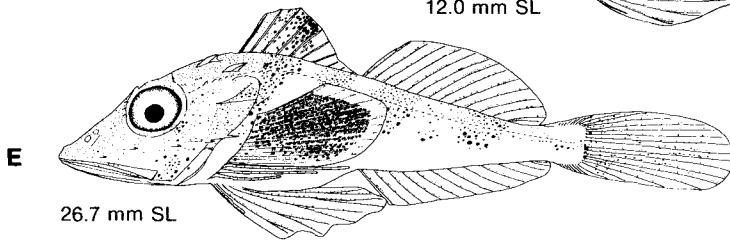
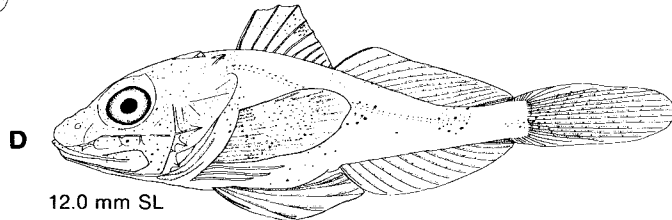
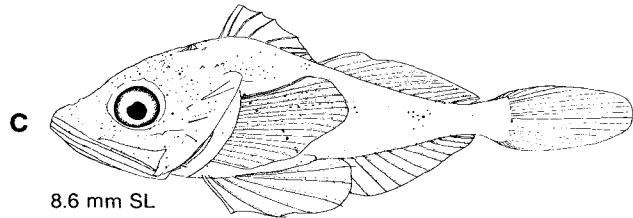
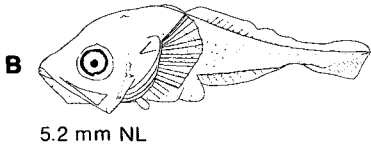
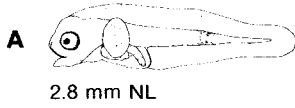
Note: The two species are found in coastal waters north of Cape Hatteras; other species may drift north with the Gulf Stream from southern areas.

Fig. — A-L, S. C. Goodwin (illustrator).

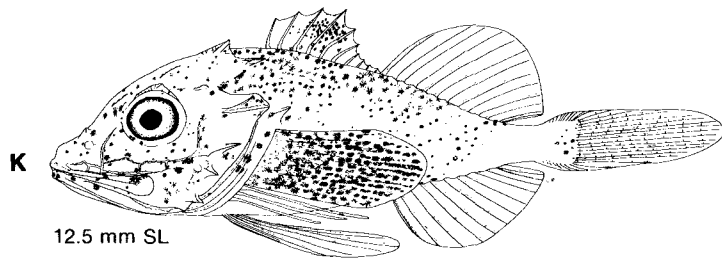
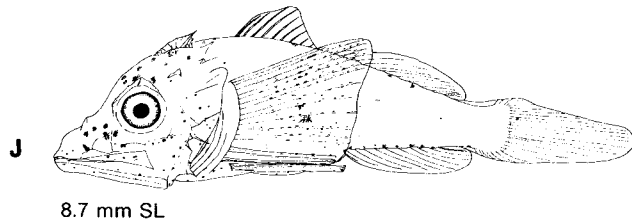
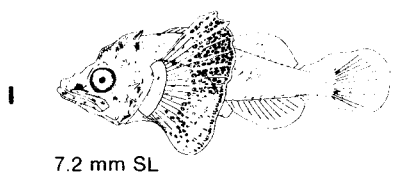
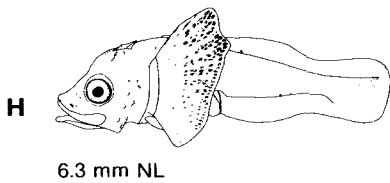
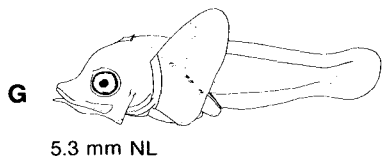
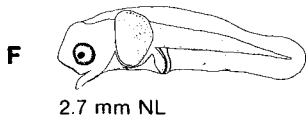
Ref. — Richards *et al.* 1979.

Prionotus carolinus

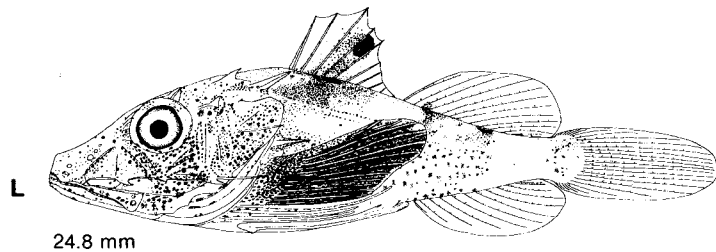
TRIGLIDAE



Prionotus evolans



Distinctive unpigmented area
anterior to caudal peduncle



COTTIDAE *Hemitripterus americanus* (Gmelin)

Spawning: Late autumn and early winter, in southern New England.

Meristic features

- Eggs** — Demersal, attached in clusters (usually on the sponge *Chalina*).
 — Diameter: 3.7–4.1 mm.
 — Shell: thick, tough and adhesive (pale yellow to light orange).
 — Oil globules: 1 (unpigmented).
 — O.G. diameter: about 0.8 mm.
 — Perivitelline space: narrow.

Myomeres: 38–39
 Vert : 38–39
 D : XVI–XVII, I, 12
 A : 13–14
 Plv : I, 3

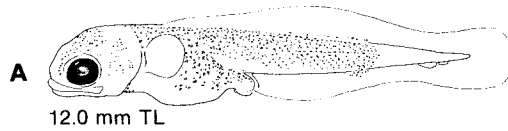
- Larvae** — Hatching occurs at 10–14 mm; eyes pigmented and mouth well developed.
 — Body relatively deep, snout moderately pointed, and gut long (preanal length >50% SL, except shorter at hatching).
 — Bulging gut typical of cottids, but pronounced in this species.
 — Head length 20–25% TL at hatching, increases with growth.
 — Spines: 4 preopercle, 2 parietal, 2 supracleithral; 2 develop on opercle in juveniles.
 — Caudal fin develops shortly after hatching; all fin rays usually complete at 18–20 mm SL; dorsal fin origin anterior to gill opening (compare to *Myoxocephalus scorpius*, p. 231); sequence of fin development: C, D₂ and A, P, D₁, Plv.
 — Pigmentation: heavy dorsolaterally on head, body and peritoneum (denser than in *M. scorpius*, p. 231); spots develop on membranes of first and second dorsal fins and on anal fin; spots on ventral surface of lower jaw and occasionally on isthmus; few spots on ventrolateral gut but not ventral midline; ventral row of spots posterior to anal fin (deep-lying and difficult to see).

Fig. — A, Warfel and Merriman 1944; B–D, Khan MS 1972 (all redrawn).

Ref. — Fulman 1976; Okiyama and Sando 1976; Laroche MS 1980.

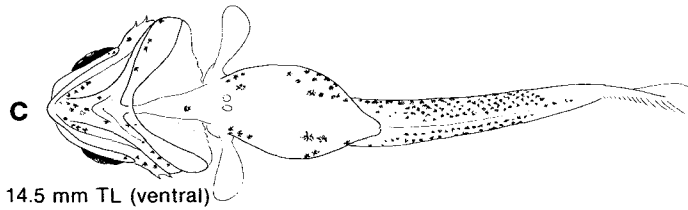
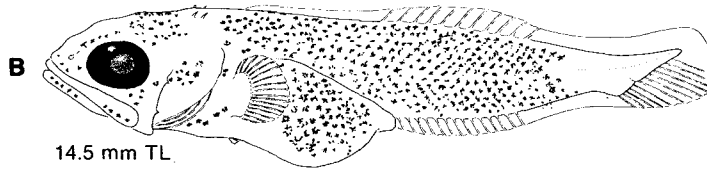
Hemitripterus americanus

COTTIDAE



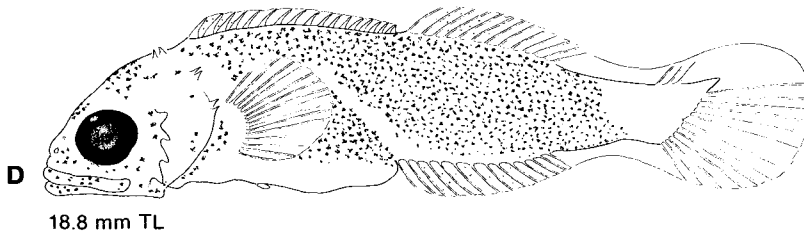
Hatches at larger size than
Myoxocephalus scorpius

Lateral body almost completely pigmented (except peduncle area) from hatching through development



First 3 dorsal spines thicker than other dorsal spines

Narrow unpigmented area posterior to dorsal gut (compare to *Myoxocephalus scorpius*, p. 231)



Juvenile stage begins

COTTIDAE***Myoxocephalus aeneus* (Mitchill)**

Spawning: New Jersey to Gulf of St. Lawrence during winter-spring.

- Eggs** — Demersal clusters on variety of substrates; incubation 40–57 days.
 — Diameter: 1.5–1.7 mm.
 — Shell: smooth and adhesive (clear, red, green, yellow).
 — Yolk: homogeneous.
 — Oil globules: 2 (coalesce to 1).
 — O.G. diameter; 0.2 mm.

- Larvae** — Hatching occurs at about 5 mm, and flexion at 6–8 mm.
 — Pigmentation: spots along ventral midline, isthmus to anus (occasionally fewer similar spots in *M. octodecemspinus*) (see illustrations for more detail).
 — Fin and spine formation as follows:

Meristic features

Myomeres: 30–35
 Vert : 30–34
 D : VIII–XI, 12–17
 A : (8)10–11(14)
 Piv : I, 3–4
 P : 14–17

Structure	Begin	Complete
Preopercle spines (4–6)	~5 mm	6–8 mm
Parietal spines (2)	~5	8–10
Supraorbital spine (1)	...	10–12
Supracleithral spine (1)	...	10–12
Pectoral rays	6–8	8–10
Caudal rays	6–8	8–10
Anal rays	6–8	8–10
Dorsal rays	6–8	8–10
Dorsal spines	8	8–10
Pelvic buds	~7.5	...
Pelvic rays	~8.5	9–10

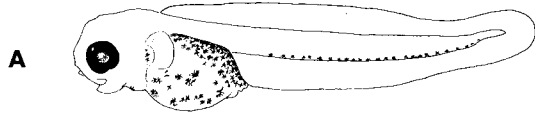
Note: Hatching, flexion and relative development occur at smaller sizes than in *M. octodecemspinus*.

Fig. — A–C, Lund and Marcy 1975; D, Khan MS 1972 (all redrawn).

Ref. — Wheeler and Miller 1960; Ennis 1969; Cowan 1971; Laroche MS 1980.

Myoxocephalus aeneus

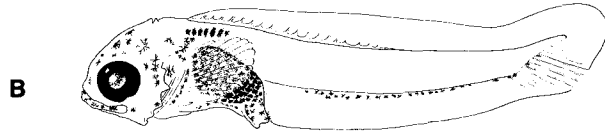
COTTIDAE



5.4 mm TL

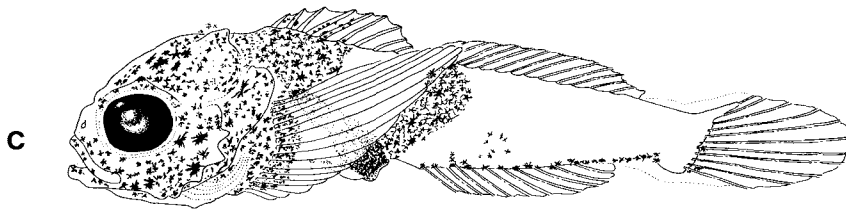
No spots on head in early larvae; heavy peritoneal pigment; spots at pectoral base; ventral row of spots begins at about myomere 8-13.

Internal pigment along dorsal fin base over pectoral fin



6.8 mm TL

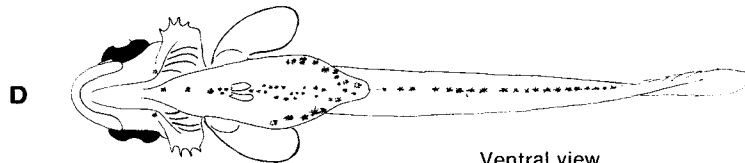
Head pigment can be very light



9.2 mm TL

Parietal spines merge to 1 per side at about 8.5 mm

Juvenile pigment developed at <12 mm; diagonal bands across body



9.7 mm TL

Ventral view

COTTIDAE *Myoxocephalus octodecemspinosus* (Mitchill)

Spawning: New Jersey to Gulf of St. Lawrence during late autumn to winter.

- Eggs** — Demersal clusters often deposited on sponge (*Haliclona*).
 — Diameter: 1.9–2.3 mm.
 — Shell: thick and adhesive (green, red, brown, orange).
 — Yolk: homogenous.
 — Oil globule: 1 or more.
 — O.G. diameter: varies.

- Larvae** — Hatching occurs at 6.3–7.3 mm, and flexion at 9–11 mm.
 — Resemble *Triglops murrayi* (see p. 230 for distinguishing characters).
 — Pigmentation: 3–5 large spots on isthmus in early larvae; small spots just anterior to anus disappear in larger larvae (see illustrations for more detail).
 — Fin and spine formation as follows:

Meristic features

Myomeres: 34–44
 Vert : 34–44
 D : VII–X, 15–17
 A : 12–15
 Piv : I, 3–4
 P : 16–19

Structure	Begin	Complete
Preopercle spines (4–6)	7.5 mm	8.5 mm
Parietal spines (2)	8.0	8.5
Supraorbital spine (1)	...	~14
Supracleithral spine (1)	...	~14
Pectoral rays	8–10	10–12
Caudal rays	8–10	14–16
Anal rays	8–10	12–14
Dorsal rays	10–12	12–14
Dorsal spines	11	12–14
Pelvic buds	~8.0	...
Pelvic rays	12–14	14–16

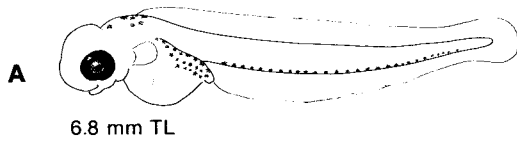
Note: Hatching, flexion and relative development occur at larger sizes than in *M. aeneus*.

Fig. — A, B, E, Colton and Marak MS 1969; C, D, Khan MS 1972 (all redrawn).

Ref. — Morrow 1951; Wheeler and Miller 1960; Ennis 1969; Cowan 1971; Laroche MS 1980.

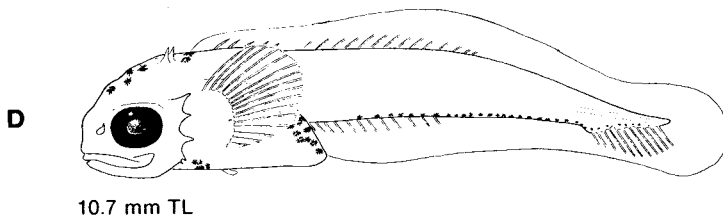
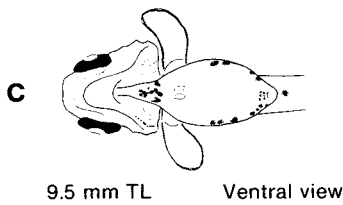
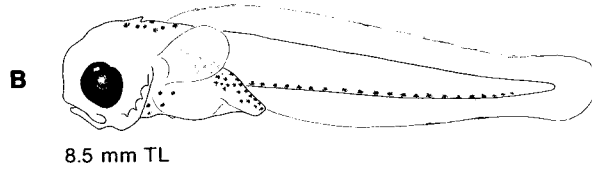
Myoxocephalus octodecemspinosus

COTTIDAE



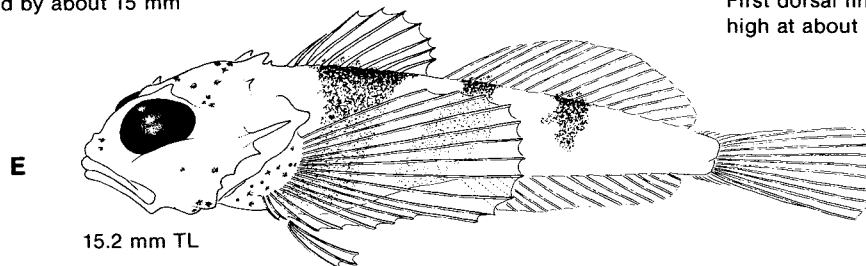
No spots on head in early larvae; ventral row of spots begins at about myomere 15, spaced apart anteriorly but close together posteriorly, begin to disappear at 12-14 mm.

Large spots on nape and peritoneum



Upper preopercle spine elongated by about 15 mm

First dorsal fin becomes high at about 15 mm



Juvenile pigment developed at about 14 mm

COTTIDAE***Triglops murrayi* Günther**

Spawning: Gulf of Maine and more northern waters during autumn-winter.

Eggs — Undescribed.
— Oocyte diameter: 2.0–2.2 mm (pinkish).
— Oil globules: 3–15.

Larvae — Hatching occurs at about 7–8 mm, and flexion at about 12 mm.
— Distinguished from *Myoxocephalus octodecem-spinosus* by meristic characters, deeper head, and development of 2 supraorbital spines at 12–14 mm (only 1 spine in *Myoxocephalus* species).
— Pigmentation: small group of tiny spots just anterior to anus at 8–10 mm (disappear later) (see illustrations for more detail).
— Fin and spine formation (see table below).

Meristic features

Myomeres: 43–46
Vert : 42–47
D : X–XII, 18–24
A : 19–23
Piv : 1,3
P : 16–19

***Myoxocephalus scorpius* (Linnaeus)**

Spawning: New York to Arctic waters in winter.

Eggs — Demersal in clusters; incubation about 3 months.
— Diameter: 2.0–2.5 mm.
— Shell: thick and adhesive (red-yellow to pinkish).
— Yolk: homogeneous.
— Oil globules: 1.
— O.G. diameter: 0.4–0.5 mm.

Larvae — Hatching occurs at 7.4–8.6 mm, and flexion at 9–15 mm.
— Preanus length shorter than in *Hemitripterus americanus*.
— Pigmentation: no abdominal or isthmus spots, but few just anterior to anus (see illustrations for more detail).
— Fin and spine formation (see table below).

Meristic features

Myomeres: 32–41
Vert : 32–41
D : VII–XII, 12–20
A : 9–16
Piv : 1,3
P : 14–19

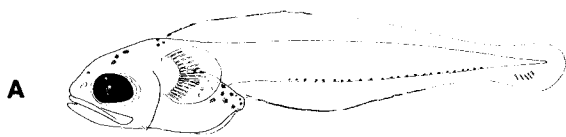
Structure	<i>T. murrayi</i>		<i>M. scorpius</i>	
	Begin	Complete	Begin	Complete
Preopercel spines (4)	12–14 mm	12–14 mm	10 mm	12–14 mm
Parietal spines (2)	12–14	12–14	10	16–18
Supraorbital spine(s)	12–14 (2)	12–14	... (1)	16–18
Supracleithral spine (1)	14–16	14–16	...	16–18
Pectoral rays	~8.5	12–14	10–12	14–16
Caudal rays	~8.5	14–16	8–10	14–16
Anal rays	~10.5	14–16	12–14	14–16
Dorsal rays	~10.5	14–16	12–14	16–18
Dorsal spines	~11.0	14–16	13–16	16–18
Pelvic buds	~9.0	...	9.0	...
Pelvic rays	14–16	16–18	14–16	16–18

Fig. — A–C, E–F, H, Khan MS 1972; D, G, Rass 1949 (all redrawn).

Ref. — Cox 1921; Vladykov 1933; Andriyashev 1954; Musick and Able 1969; Cowan 1971; Russell 1976; Laroche MS 1980; L. Van Guelpen 1981 (pers. comm.).

Triglops murrayi

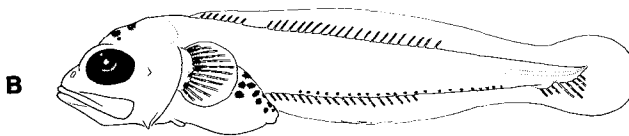
COTTIDAE



8.4 mm TL

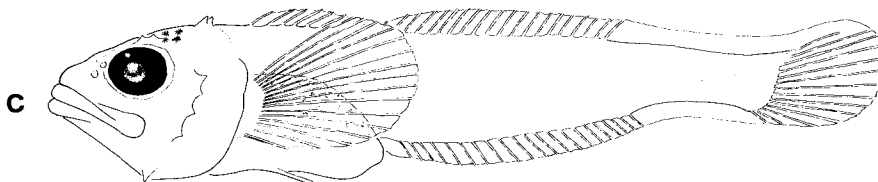
No lateral pigment

Large spots at base of pectoral fin at ~11 mm



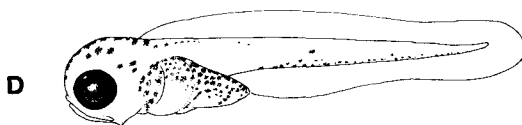
11.6 mm TL

About 20-24 ventral spots in postanal row, become embedded at 16-18 mm



18.9 mm TL

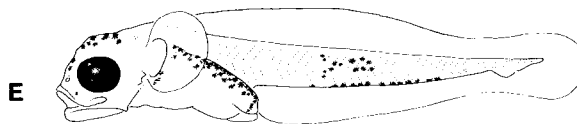
Myoxocephalus scorpius



7.9 mm TL

Lateral pigment increases from one to several spots in smallest larvae to prominent patch or band in larger larvae

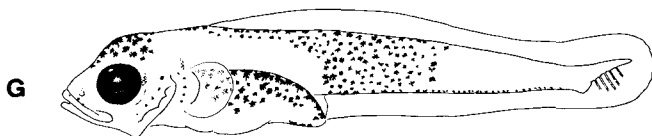
Spots on head, under pectoral base, and dorso-laterally on peritoneum; dorsal line of spots forms early, posteriorly from nape; ventral row of spots begins at about myomere 16



8.5 mm TL

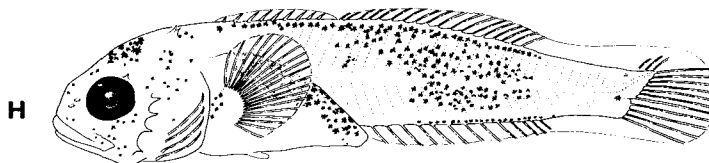


8.5 mm TL (ventral)



9.5 mm TL

Unpigmented area posterior to gut (compare to *Hemitripterus americanus*)



17.4 mm TL

D, G (eastern Atlantic material)